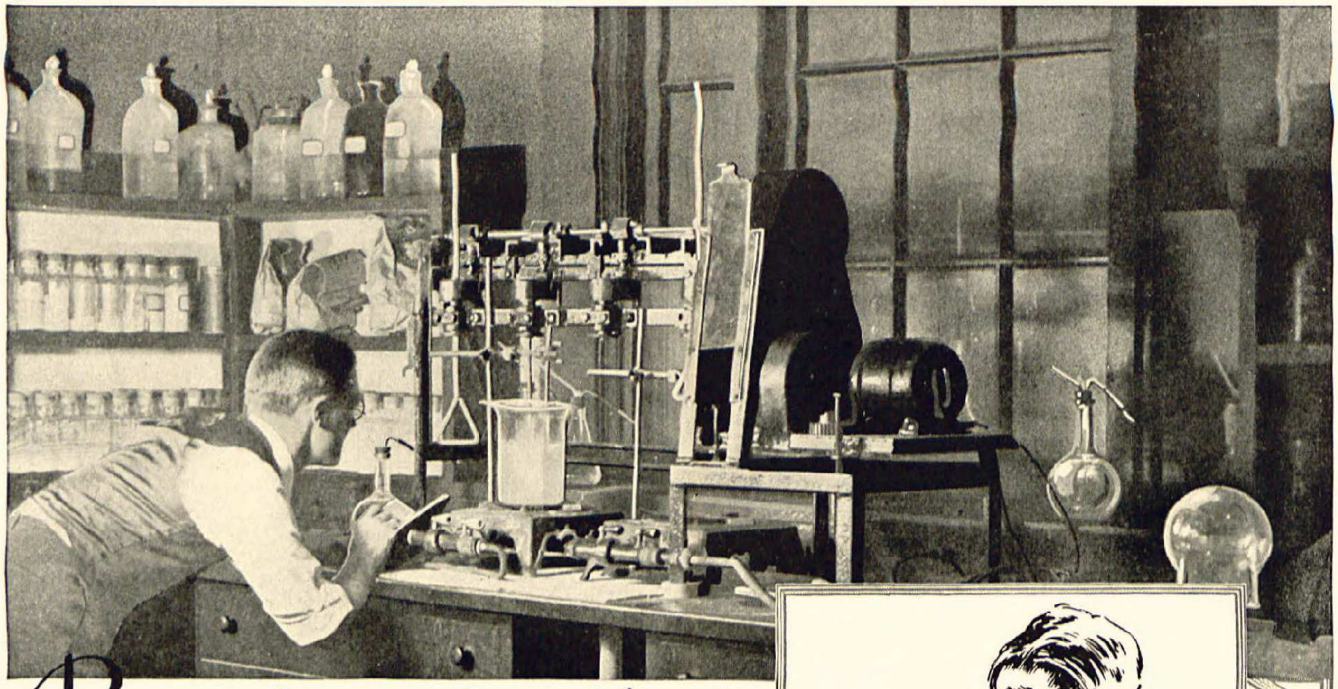
THE D.U PONT MAGAZINE



MAY · 1935



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THE DU PONT MAGAZINE

VOL. XXIX MAY, 1935 No. 5

A Chemical Family—IV

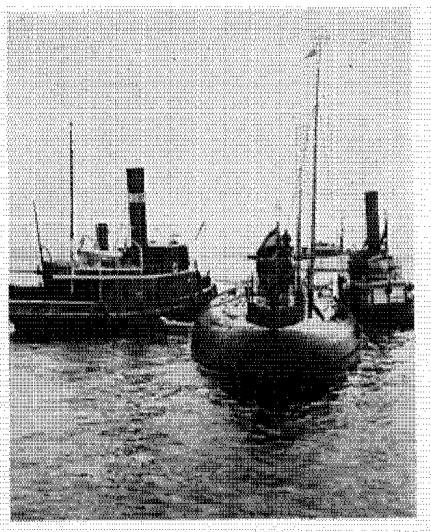
Give a chemist a lump of coal and he will do some remarkable things with it. Herein is told the story of how the du Pont Company developed a "key" industry

By BROOKS DARLINGTON

SHORTLY after dawn on the morning of July 10, 1916, a long, dark hulk looking like a gigantic black whale emerged slowly from the waters of Chesapeake Bay. Early workers on the Baltimore waterfront watched the spectral form sliding towards them through the mists and, as it approached the dock, saw a hatch pop open and uniformed men come clambering out. As the entire nation soon learned, it was the 315-foot German merchant submarine *Deutschland*, first craft of its kind to cross the Atlantic Ocean. She had slipped under the British sea blockade with 750 tons of dyestuffs—a cargo worth over a million dollars at then-current American prices.

After the first burst of amazement over this exploit had died away, people of this country settled down to sober reflection. They had heard in a general way about a shortage of dyestuffs, had listened without great excitement to prophecies of a "white world," with color eliminated from their daily lives. But the dramatic arrival of this undersea merchantman threw into sharp focus the plight of American industries dependent upon an uninterrupted supply of dyes.

Before the war, only five per cent of the coal-tar dyestuffs used in this country were American-made. Most of the remaining ninety-five per cent came from Germany. Since this source had been cut off, about 70,000 separate establishments, producing cotton, wool, silk, linen and other textiles; paper, furs, ink, leather, carpets and many other essentials, faced a desperate situation. Industries representing an investment of $4,000,000,000, employing 2,000,000 people and having a yearly output of $6,000,000,000 worth of goods, had begun to suffer acutely as a result of the blockade.



INTERNATIONAL NEWS PHOTO

The arrival of the German merchant submarine, Deutschland, at Baltimore, July 10, 1916

As the months passed, with no let-up in the European conflict in sight, the dyestuffs problem here grew steadily worse. People complained that, in spite of the high prices they had to pay, their garments faded in the sunlight or lost their color in the wash. Little wonder, for domestic manufacturers were making desperate efforts to secure any kind of coloring substance. They actually scraped the floors of warehouses for color. Remnant stocks of all sorts were mixed to produce needed shades, regardless of the original purpose of the dyestuffs or their suitability for the fabrics to be dyed. Prices skyrocketed; dyes formerly selling for less than a dollar a pound soared to



Each du Pont dyestuff must meet the rigid requirements of its standard before it is offered to the consumer. Here you see a member of the staff inspecting skeins of dyed yarn at the Technical Laboratory

more than forty. These supplies running out, the color-using industries had to turn to natural dyestuffs, obtained from logwood and other vegetable matter in the jungles of Central America, although their equipment was not adapted to this use. And because of overburdened shipping facilities, even these substances could not be obtained in sufficient quantities.

Here was an acute situation indeed. The United States, at that time still a neutral, had to stand by almost helplessly with nearly a quarter of the nation's manufacturing enterprise in distress. All because this country had no synthetic dyestuffs industry of her own. Surely a striking example of America's need for economic self-sufficiency! And surely a challenge to the widely-heralded resourcefulness of her people.

What could be done about it? Obviously, the answer lay in building up a domestic supply. But the Germans had so long dominated the field of coal-tar colors that popular thought endowed them with almost superhuman abilities. Few believed that America could ever hope to compete with the Germans, with their tremendous concentration of knowledge, manufacturing technique and skilled personnel. This conviction was so prevalent that it amounted to a national inferiority complex; people argued that Americans were engineers, mechanics, merchants—almost anything but chemists. And those whose very businesses depended upon colors were themselves skeptical. For this they had good reason. Knowing something of the vast complexities bound up in synthetic dyestuffs manufacture, they viewed the outlook with despair.

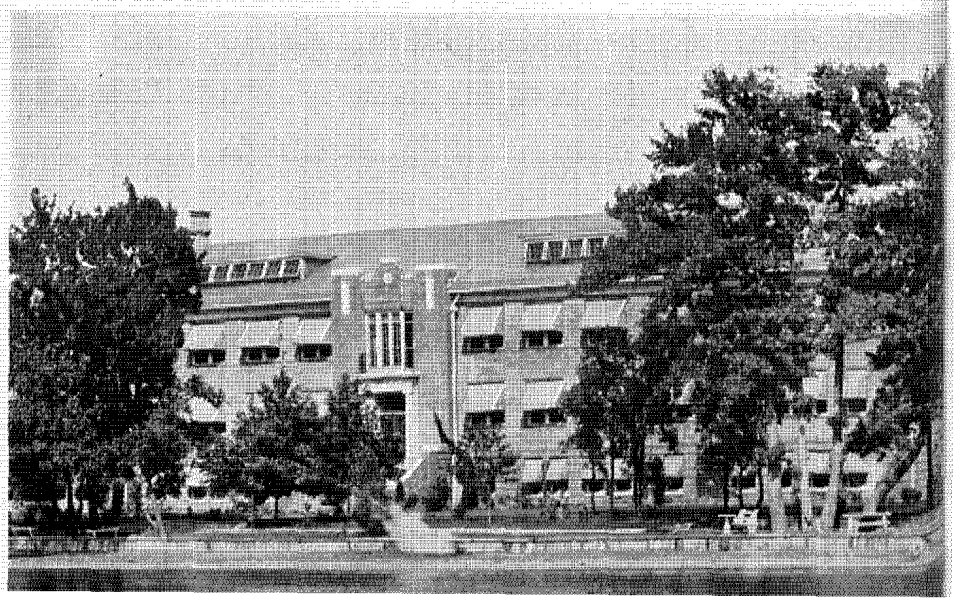
But even as newspaper headlines featured a statement from the commander of the *Deutschland* that his "U-boat" was only the forerunner of a projected merchant fleet that would maintain regular service along the new submarine trade-lane across the Atlantic, a research program was quietly getting under way in certain experimental laboratories. Apparently there were those who *did* have faith in the American chemist!

For some months the du Pont Company had been considering the possibilities of dyestuffs manufacture. By the middle of 1916 the management could see enough encouraging factors to warrant further investigation. The need for a domestic dyestuffs industry certainly existed, and there was every indication that this would be a logical move for the organization to make. But could the du Pont technical staff whip the tremendously complex problems facing them? That was indeed a question, and it could be answered in one way only—through research. Accordingly, work was started at the Company's Experimental Station, near Wilmington, Delaware, and at its Eastern Laboratory, near Gibbstown, New Jersey.

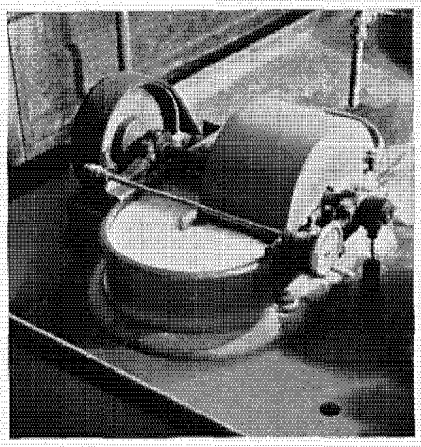
What were the factors that could induce practical business executives to look beyond all discouragements and make active plans for such a venture? The answer can be summarized in two words—men and materials.

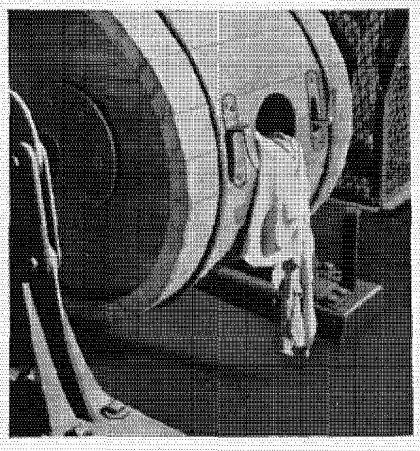
First, the du Pont Company had built up a large organization of skilled chemists and engineers. It was foreseen that the close of the war would inevitably bring on a severe business recession in this country, calling for widespread readjustments. The Company's executive group felt a definite responsibility for the future of these trained men and, for its own part, did not wish to lose their services, if that could possibly be avoided. What better outlet could be found for their cumulative knowledge and ability than in dyestuffs manufacture, particularly since the existing explosives business offered a means of entry?

Second, the du Pont Company was at that time using most of the basic raw materials needed in making dyes—nitric and sulphuric acids, benzene, toluene, naphthalene, the xylenes, aniline and picric acid. Moreover, the processes used in converting certain of these substances into explosives could also be utilized in preparing dye intermediates. As we have seen in a previous article, du Pont chemists and engineers already had a wide knowledge of how to nitrate various materials and how to design the necessary equipment. They had also learned a great deal about reduction and hydroxylation, two other



A partial view of the Technical Laboratory at Deepwater Point, New Jersey, where dyestuffs are tested under plant operating conditions for fastness and other properties





Testing dyestuffs at the Technical Laboratory brings into use practical working models of equipment such as that used by dyers in plant-scale operations. The first view, at the right, shows a miniature beater in the paper laboratory, and adjoining it is a leather-dyeing unit

processes common to both lines of manufacture. Going into the dyestuffs business would therefore not be plunging into a totally new field. Rather, it would be largely an extension of the Company's interests in the organic chemical industry.

By the end of the year the laboratory investigators who had set to work on dye problems felt that they were ready to go ahead. In February, 1917, plans for a plant were started. Fittingly enough, the first building erected on the site chosen at Deepwater Point, New Jersey, was a research unit, the Jackson Laboratory. Its function was—and still is—to determine which dyes should be made, then to discover ways of making them so that they could be put into actual plant production. Later, another unit called the Technical Laboratory was added to study methods of applying the finished dyestuffs, to test their quality and determine how they should be used for best results.

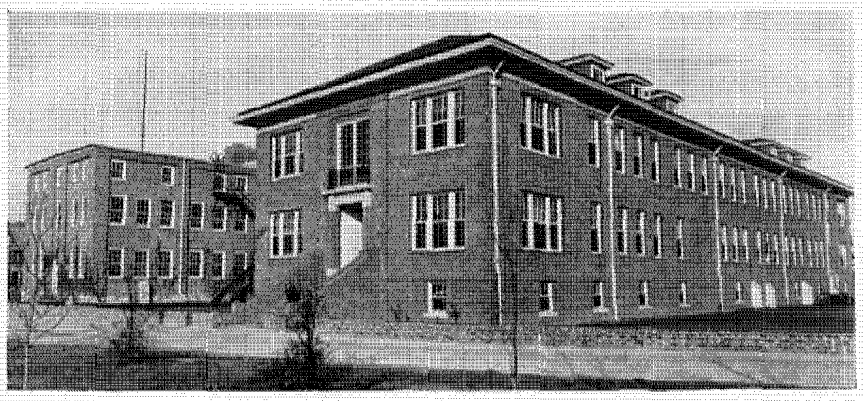
Now we have indicated briefly certain connections that exist between the production of various explosives and the manufacture of dyestuffs. But there is danger of conveying a wrong impression, if we attempt to oversimplify this relationship. Finished dyes, of course, are not explosive; the products used for coloring textiles are compounds entirely different from those used as bursting charges. The same raw materials may be used in each, but they are treated in different ways, depending upon the final product desired. The true kinship between the two classes lies in a group of synthetic compounds known as coal-tar intermediates. The name is well chosen, for they are the intermediate compounds between the black, evil-smelling tars obtained through destructive distillation of coal, and the varied and colorful finished substances used for dyeing. It so happens that these same intermediates are also the starting point for the manufacture of some explosives, pharmaceuticals, rubber chemicals, flavoring materials, perfume bases, photographic developers and many other useful products. Every one can be traced back to coal.

Coal-tar is obtained principally from by-product coke ovens or by "scrubbing" illuminating gas with solvents. On distillation, this thick, sticky substance yields a number of complex carbon compounds which come off as fractions at different boiling points. These are the "crudes" from which dyestuffs intermediates are made. The head of the family is benzene, also called benzol, which is not to be confused with the petroleum product spelled b-e-n-z-i-n-e. From the first "cut" also come toluene, and the xylenes. Next comes phenol, commonly known as carbolic acid, and naphthalene, which is used for making moth-balls. Most important of the others are anthracene, cresol, and carbazol. All of them together make up only about one-half of one per cent by bulk of the primal raw material, coal.

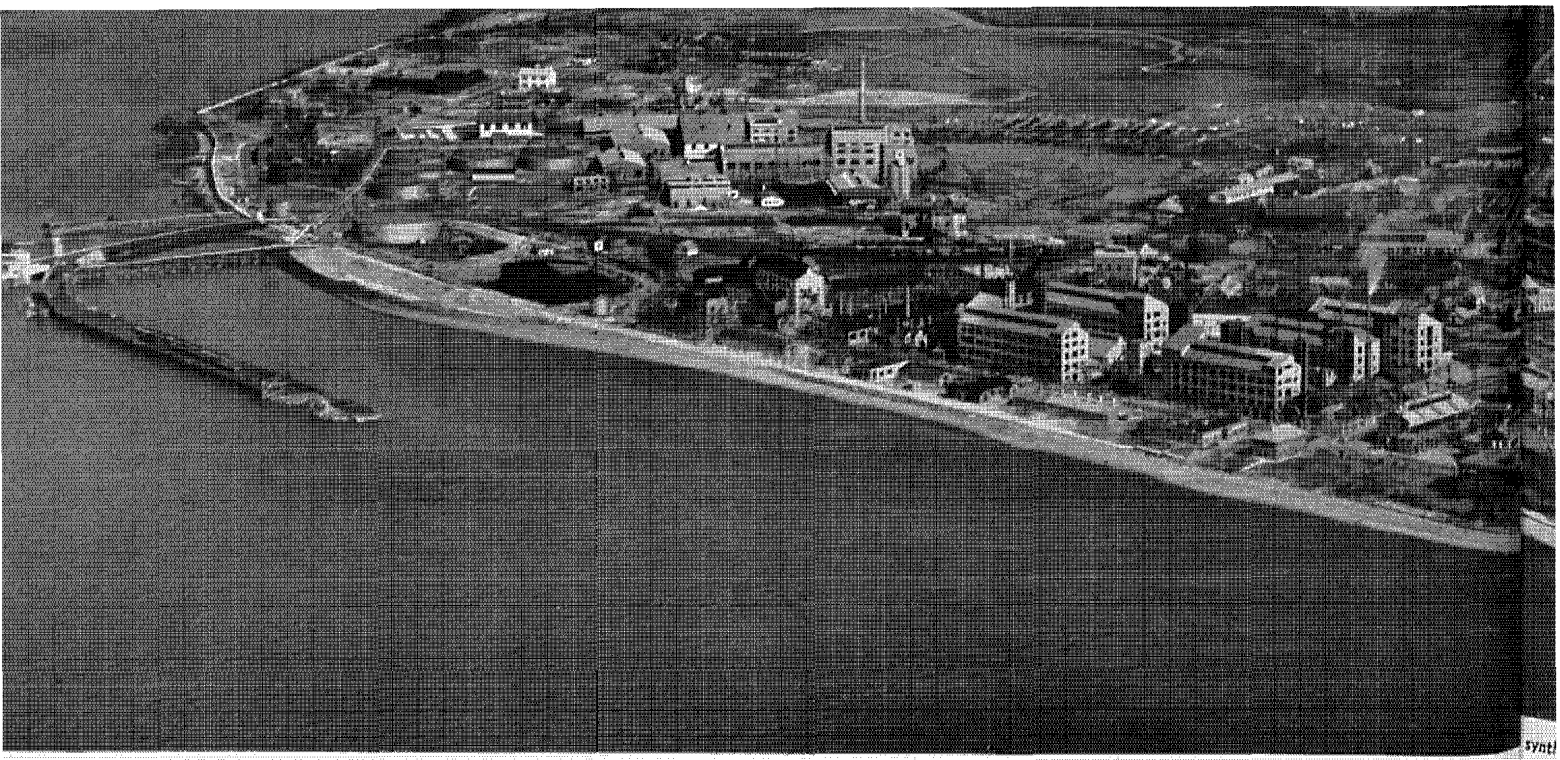
When purified, these substances are either colorless liquids or white, crystalline solids. They have a peculiar odor, which gives them the name "aromatic compounds," but they exhibit none of the brilliant colors which appear on further treatment. Figuratively speaking, let's give one or two of these substances to a chemist and see what he can do with them.

A good one to start with is toluene, for almost everyone has heard about one of its chemical derivatives, trinitro-toluene, or "TNT." Now, whatever the final product, the chemist first nitrates the toluene. This gives him several compounds which yield a group of dyes, a number of intermediates for still other dyes, and certain rubber chemicals.

Benzene, too, has an important place in our story. Nitrated benzene, or nitro-benzene, when reduced, gives aniline. This in turn, yields tetryl, a high explosive, and diphenylamine, used as a stabilizer in smokeless powder. The du Pont Company had



The birthplace of many du Pont organic chemical products. Jackson Laboratory No. 2, in the foreground, partly conceals the original No. 1 unit, which was built in 1917



A panoramic view of the du Pont plant at Deepwater Point, New Jersey, where dyestuffs, industrial alcohol, tetraethyl lead, the synthetic rubber, "DuPrene"

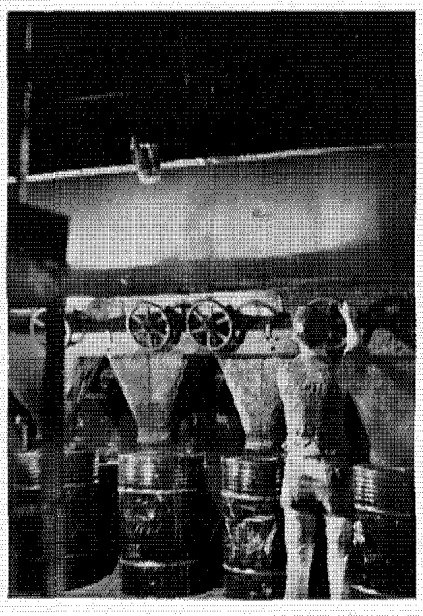
produced aniline for years before entering the dyestuffs business. In fact, that was one of the factors which influenced the final decision. The first synthetic dyestuffs were made from aniline or substituted anilines and it is still of such prime importance that coal-tar colors as a whole have come to be known as aniline dyes, though not all of them are actually made from this material. It is the basis for indigo, one of the dyes that forms the backbone of the industry.

Indigo is a standard blue for overalls, uniforms and the like. It was one of the first synthetic dyes to gain outstanding commercial importance and is today one of the most widely used textile colors. Since it holds such a predominate position, the hardship caused the color-using industries when the blockade cut off their supply is easy to understand. Naturally, it was in tremendous demand. And, just as naturally, any company embarking on dyestuffs manufacture would want to produce indigo first of all.

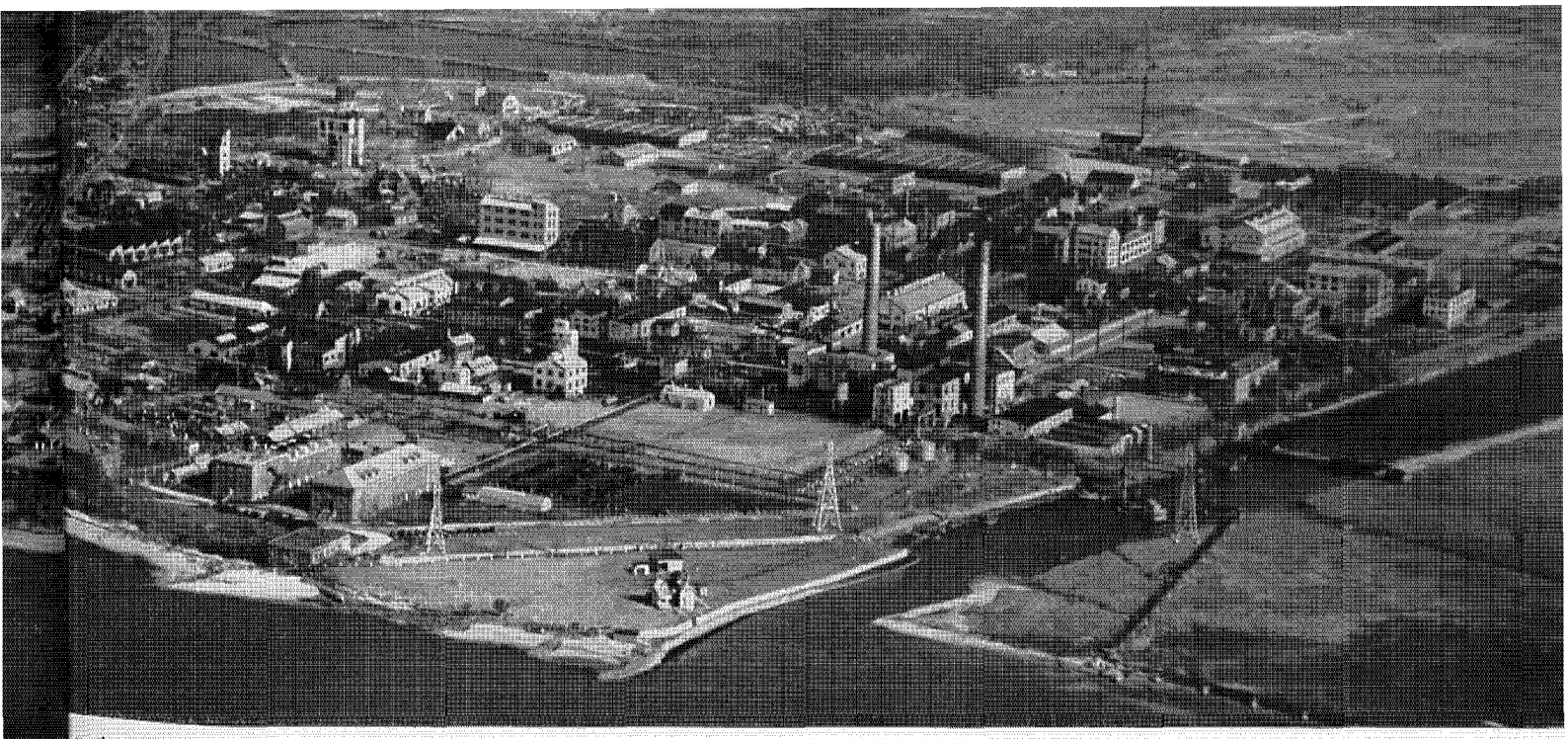
The du Pont Company, as we have seen, already had facilities for producing aniline, the raw material for indigo manufacture, and already knew how to make some of the intermediates needed for this essential dye. It was therefore a most logical move, both from the business and the technical standpoints, for the du Pont chemists to carry the manufacturing process several steps further to obtain indigo. That is exactly what they did, but the job was not nearly so simple as it sounds. As a matter of fact, indigo is one of the most difficult of all dyes to make, and none of them are easy. It required several years of extremely hard work and the expenditure of large sums of money before even the technical problems could be solved.

Then, just as a glimmer of success could be seen, a new situation arose to plague the struggling young American industry. With the close of the war, prices for nearly every product of domestic manufacture dropped precipitately. With the German blockade lifted and internal competition becoming increasingly keen, dyestuffs suffered particularly. Whereas the average price had been about $1.26 per pound in 1917, it soon fell to less than half that figure. Only the most efficient manufacturers could hope to stay in business. So the du Pont Company's infant industry, born in the laboratory, turned once more to research for strength with which to survive. The main activities of the Jackson Laboratory were concentrated on reducing manufacturing costs through improvement in the technical efficiency of plant operations and through corresponding improvement in the quality of the products.

The new undertaking was just beginning to show prospects of yielding a return on the time, effort and funds that had been invested in it when the depression of 1921 came along and all but annihilated it. Serious thought



Strong lights were required to illumine this equipment in the old sulphur black plant, but with the aid of two 1000-watt lamps the cameraman finally managed to catch this view



synthetic camphor and other organic chemical compounds are manufactured. Less than two decades ago there was no industrial development in this area

was given to abandoning the whole project. But the management felt that, aside from its financial aspects, the business had justified one of the principal reasons for its establishment: it had provided an outlet for the knowledge, experience and creative energies of the Company's technical staff. These men had demonstrated that they could make dyes as high in quality, if not higher, than those formerly imported from abroad. And in so doing, they had uncovered possibilities for broader diversification in the organic chemical field; they had revealed opportunities for extensions into allied fields of manufacture that held definite promise.

The question was, would these future prospects outweigh the solid fact that the dyestuffs venture had up to that time proved a considerable financial loss? And the line of reasoning which influenced the final decision might be summed up as follows: "When the chemical industry fails to go forward, it goes backward; there is no such thing as standing still. The only way to attain economic success in this division of the chemical industry is to go into it on an even more extensive scale." The du Pont Company decided to go forward.

This conclusion may at first thought seem paradoxical, but an explanation can be given that not only summarizes the business aspects of dyestuffs manufacture but leads into fascinating new fields. Under modern conditions in the dyestuffs industry, this is a fundamental truth: Once a concern is in the business on a large scale, carrying its operations all the way from raw materials through intermediates to finished dyes, it must take advantage of every commercial opportunity which these intermediates afford. Since by their very chemical nature they form the basis for certain kindred products, the manufacturer must not only use them for making dyes but must also make from them every related product for which there is a market. Otherwise, he cannot make a go of the dyestuffs business itself. These economic facts dictate that the efficient dyestuffs producer shall also be a manufacturer of related organic chemical products based on coal-tar derivatives.



The first du Pont dyestuff manufactured on a commercial scale was indigo. This picture was taken in the shipping room where cans of indigo were being packed in wooden cases for export to China

Perhaps we can bring this thesis down to more concrete terms by giving an illustration from the du Pont Company's present activities in the organic chemical field. Benzene is chlorinated to make chlorobenzene, a by-product of which is para-dichlorobenzene, an effective moth repellent. Chlorobenzene, in turn, is nitrated, hydrolyzed and reduced to para-aminophenol, which is the basis for eight or nine sulphur colors and for the photographic developer, "Methol." Two kindred compounds produce three dyes and four dyes, respectively, as well as an intermediate for another group. By still another process there is obtained picric acid, which can be used as a high explosive, but which is employed in the dyestuffs industry as an intermediate for sulphur black.

(Continued on page 23)

"Blowing" the Bar

• This describes a new and successful use of du Pont explosives in Mississippi River control work . . . .

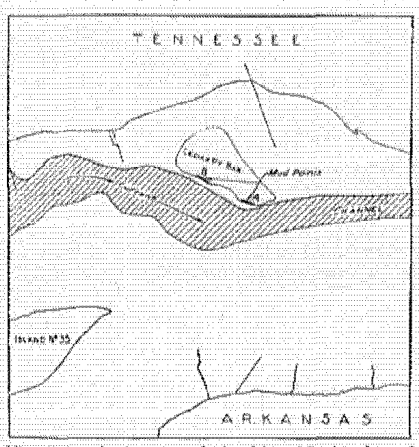
By S. C. LATTA

Last summer the U. S. Engineers at Memphis, Tennessee, purchased some du Pont explosives for experimental use in connection with certain of their operations. These tasks included blasting out revetments for bank grading, loosening piles which were to be pulled in dyke work, and constructing drainage ditches. In each instance the "shots" made were successful and eminently satisfactory to the engineers, both in results and costs.

The latest demonstration took place in November, 1934, and is the theme of this article. It deals with the use of explosives in conjunction with dredging operations about forty miles up the river from Memphis. Island No. 35 and Cedar Point Bar on the Tennessee side are old landmarks. Steamboats ride the strong current that sweeps between them. And U. S. Engineers, at the time this story begins, had been dredging the channel on a quite extensive scale, trying to make "Ol' Man River" more amenable to their will.

Cedar Point Bar, in particular, engaged their attentions. It was reaching out toward the channel and interfering with the free flow of the river. The engineers wanted to remove this projection, and they thought the Mississippi might oblige, at least in part, if some adjustments were made on Island No. 35. Consequently, in July, they ordered a dredge to construct a sand dyke as an extension of the island at the south end, so as to direct the water flow toward the Tennessee side and against a portion of Cedar Point Bar. This stratified mass of sand and mud had formed as a result of building "pike dykes" on that side. These dykes had been removed and the engineers wanted to get rid of this bar altogether and to establish a revised channel alignment following more closely the eastern shore line.

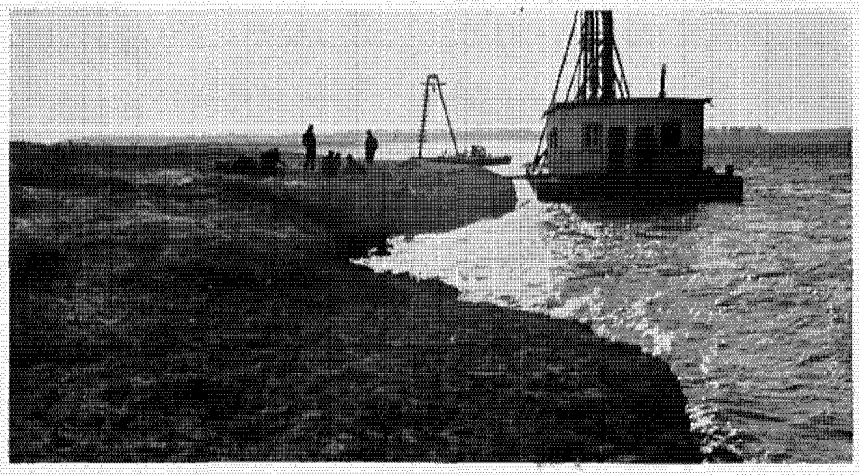
It was believed that the strong current, thus directed, would scour or erode this bar. And for about three months after the stage was set, a rapid scouring action did take place as planned. Then, a gradual decrease was noted. The river was not carrying away the yardage expected. Engineers sought the cause and located it. Two stubborn mud points on the west face of the bar, like dykes, were found to be thwarting the normal flow attack.



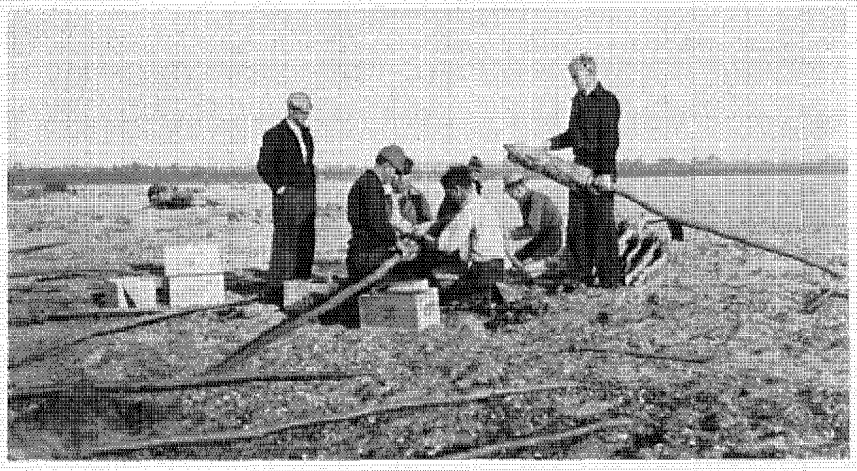
Visualizing the location of Island No. 35, the channel and the two mud points on the east side of Cedar Point Bar, from a sketch made in November, 1934

This situation could have been met easily with a dredge, but none was immediately available. So the question arose, why not break down these mud points by blasting? Although dynamite had not been used previously for such work in that district, it was thought that some well-placed charges might do the work and thus avoid the expense of moving a dredge to the scene.

Lieutenant B. L. Robinson, chief of the Dredging Section, and his assistant, C. C. Cobb, called T. M. Keyser, of the du Pont Agricultural Extension Section, into consultation. Mr. Keyser surveyed the project, made recommendations, arranged for the delivery of a ton of du Pont fifty per cent Ditching Dynamite, electric blasting caps and other accessories, and he supervised the initial blasting operations. In this he had the full cooperation and able assistance of



The Mississippi began its accelerated scouring action after the first test shot of nine holes was made. Prior to that time the shore line was straight



Preparing the charges for loading by the water-jet method. Eighteen sticks of 50 per cent du Pont Ditching Dynamite in three clusters were tied to the end of a willow pole and securely wrapped with burlap

Forrest L. Dye, Government inspector, who finished the job without any further aid. Since then, Mr. Dye has prepared a comprehensive, detailed report of the project for the benefit of other engineers who may encounter problems of a similar character in river control work.

As stated before, the strategy of attacking Cedar Point Bar consisted in directing a powerful water current laterally against the banks to scour the mud and sand away. A variation of that same strategy was also applied in loading explosives vertically in the mud points mentioned. River water was forced under pressure from a pump on board a pile-driver boat, and by means of hose lines and water-jet pipes the dynamite charges were placed in position.

Eighteen sticks of ditching dynamite, in three clusters of six each, constituted a load which was tied at the end of a willow pole about fifteen feet long, and covered with burlap bagging as shown in one illustration. When the workmen were ready to start loading, the pole was raised in upright position. Two long jet-pipes, one on each side of the pole, were placed in position, and the water, under pressure, made the hole through which the charge was forced down to the required depth.

Note on the accompanying map, the two mud points. The first work was done in the area designated as A, where charges spaced five and one-half feet, eight feet back from the face in a single row, were placed at a depth of eight feet. Blasts were fired November 13-14, and 1,250 pounds of dynamite were used. Mud-point B was shattered ten days later with a total charge of 750 pounds of dynamite, distributed in a single line of holes set back from the face ten feet, with the charges placed eight and one-half feet deep. In both cases the propagation method, as in ditch shooting, was employed.

The blasts set off on Cedar Point Bar—and one of them is illustrated here—accounted for the displacement of more than 2,100 cubic yards of material. That in itself was not so impressive as the effect upon the adjacent areas, for more than 68,000 square feet of mud and sand were severely shaken, and this had an important bearing on the results to follow. Incidentally, it may be noted that more yardage per pound of explosives and a more extensive agitation effect resulted from the blasting at mud-point B than was obtained from similar work at A. The most significant fact was a marked increase in scouring, as the river current immediately attacked the agitated areas and cut away the banks there and subsequently all along the face of the bar. Conditions were again right for the Mississippi to go to work at an accelerated rate—and it did.

Comparative figures on conditions before and after these blasts are rather interesting. They were compiled immediately following the blowing of mud-point B on November 23. The increased average rate of scour at the mud points showed 217.7 cubic yards per day per 100 lineal feet of bar face, an increase of 460 per cent over the average for the entire bar during a 136-day period. In the vicinity of the mud points, the increase was 939 per cent. The cost of blasting was computed to be a little over two cents per cubic yard for material displaced and scoured, not including the yardage that would have washed away under normal conditions. Explosives had rendered a service at low cost, but now comes the sequel.

Shortly after these blasting operations the river began to rise, reaching its crest December 12. Meanwhile, a dredge had moved in and had started work at the lower point of the bar. Following the high-water period, a further survey was made, December 17, to determine the effect of scouring on the areas exposed.

It was not possible to compute the effect of high water alone at mud-point A and to draw conclusions, for the dredge had been working there. But during the period of its service in that area, the average hourly output of material was 3,264 cubic yards as

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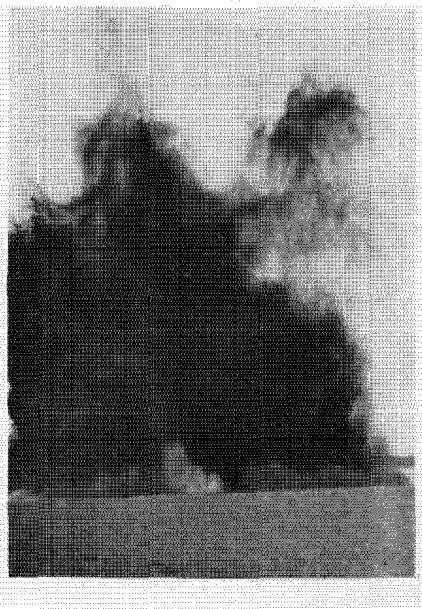


Twenty-three loaded charges in action sheared off a strip of the bar fifteen feet wide and 165 feet long, also agitating and cracking the shore line seventy feet inland. *See illustration on page 24*

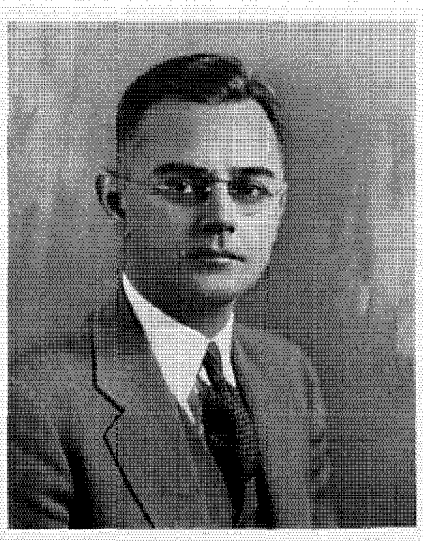
Pioneering in Medical Service

A new chapter in the history of medical research is being written at the Haskell Laboratory of Industrial Toxicology

By GEORGE HELLER

With the opening of the Haskell Laboratory of Industrial Toxicology, near Wilmington, Delaware, the du Pont Company has given to the field of medical research a new instrument for service. The far-reaching significance and value of this, the first industrial laboratory of its kind to be established in this country, can hardly be overestimated. Now, for the first time, the toxicity of chemical compounds, and any industrial hazards which might result from their manufacture and use, will be carefully studied in advance.

For many years, the medical staff of the du Pont Company, under the direction of Dr. G. H. Gehrmann, has made a diligent study of occupational diseases. Many outstanding industrial companies have similarly devoted themselves to the problems and responsibilities of their workers' health and safety. With the diverse and extensive development of the chemical industry, however, new compounds and new processes have created new problems. Some of these have been recognized, others have pressed for attention, but the proper research facilities have been lacking.



Dr. G. H. Gehrmann, medical director of E. I. du Pont de Nemours & Company, Inc.

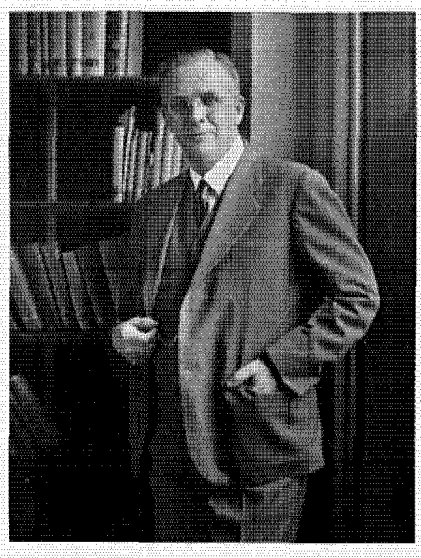
We can thus appreciate the value of the new laboratory and the research which will be carried on there. We cannot doubt, as we trace the development in recent years of the relationship between industry and medicine, that the investigations to be made will contribute a great medical service to industrial workers.

The first workmen's compensation laws were enacted in 1911. They were designed to provide payments to injured employees, covering loss of time from work, surgical and medical expenses, and payment for permanent or partial disabilities. Besides providing both employer and employee with financial protection, these laws had the further effect of extending the scope of medical service to workers employed in industry.

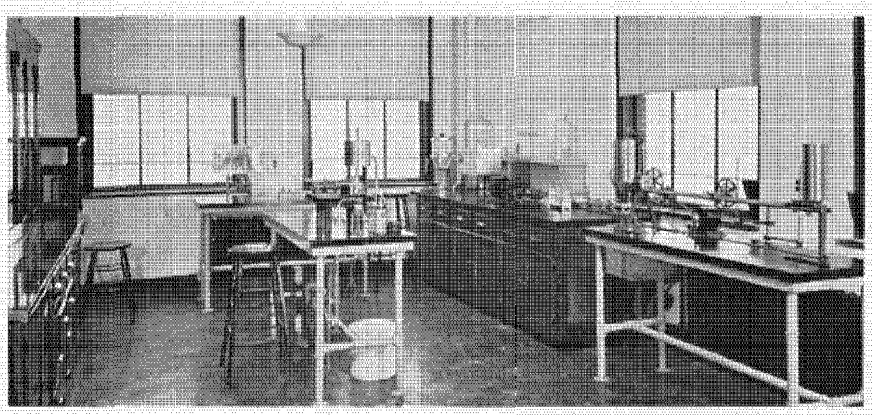
Along with the introduction of medical supervision in industry came the organized safety movement, which had the effect of developing improved machinery and more suitable protective devices. Intensive training in safe methods of working was given employees. They were taught to recognize hazards and to handle their tasks in such a manner as to avoid accidents and injuries. And medical examiners selected, for specific positions, those men and women who were best fitted to perform safely the duties to which they were assigned.

The development of the physical examination by the use of clinical, laboratory and X-ray methods was the next step toward improved medical service. The clinical laboratory reveals many conditions which might otherwise be overlooked—potential hazards of an occupational nature. For example, a few years ago the use of benzol was developed in several lines of manufacture. No one seemed to know anything about it other than how to make it and the purposes for which it could be used. Consequently, the serious toxicity of benzol was not realized in advance of its use in various processes in which it was employed. Today, of course, proper methods for handling benzol have been developed, without danger to the workmen employed in the plants in which it is used.

Numerous other examples might be cited to show the need for toxicological studies of chemical compounds. Absorption through the respiratory tract is presumably the most common route for the entrance of toxic substances used in industry, while exposure to such substances as aniline, nitrobenzene, carbon disulfide and nicotine may result in absorption through the skin. Some



Dr. W. F. von Oettingen, Director of the Haskell Laboratory of Industrial Toxicology



One of the thirty rooms in the new laboratory

compounds act rapidly; others have an accumulative action, and still others require years of exposure before they produce any symptoms.

So it is not only necessary to study each substance with regard to its toxic action, but also to consider the different conditions under which it is used. These may result in decomposition of the substances and the formation of wholly new compounds, the toxicity of which may give an entirely different picture.

Thus, as we look backward over years of experience, we now realize the importance of securing knowledge of occupational diseases before they can be contracted by workers. We know that much suffering and disease could have been avoided, if the toxicity of some compounds had been investigated before the process of manufacture was started. To ascertain these facts, to determine the acute and chronic effects of chemical compounds, there must be adequate facilities for such a study.

The new Haskell Laboratory of Industrial Toxicology will make this possible. It is equipped with every needed scientific device and instrument, and with an unusually complete reference library. It is manned with a group of well-trained, experienced and capable research workers. The entire laboratory and all its research activities are under the direction of W. F. von Oettingen, Ph.D., M.D., who has done clinical and medical research work for the past twenty years. He received his chemical training at the University of Jena and at Göttingen, Germany, his Ph.D. degree at the University of Göttingen and his M.D. degree at the University of Heidelberg. He specialized in internal medicine and pharmacology at the University of Heidelberg, has written extensively on toxicology, and was formerly assistant professor of Pharmacology at Western Reserve University, Cleveland, Ohio.

Dr. von Oettingen is assisted by Dr. W. C. Hueper, a graduate in medicine from the University of Kiel, and for six years a director of laboratories at Mercy Hospital, Chicago; also by Dr. Frank W. Wiley, Ch.E., University of Denver, who received his Ph.D. at the University of Michigan and later held the National Research Council fellowship at the University Hospital, Ann Arbor, Michigan.

The staff also includes a number of specially-trained assistants for various other phases of the work.

With the addition of this laboratory to the already established facilities of clinical medicine, the industrial medical department of the du Pont Company as now organized will be able to correlate physical signs, symptoms and clinical laboratory findings with research laboratory findings. It will now be possible to learn what symptoms indicate the absorption of certain materials, what organ or organs are likely to be attacked, and the changes that may occur.

The Haskell Laboratory staff will, among other things, engage in several major fields of research. The acute and chronic toxicity of compounds now being manufactured will be determined. The toxicity of new compounds will be studied. Finished products will be tested before they are made available for public purchase and use. And finally, special appropriations will permit the pursuit of fundamental research. The results of these activities will be made available to other industrial companies, and to any interested research workers in the fields of medicine and hygiene.



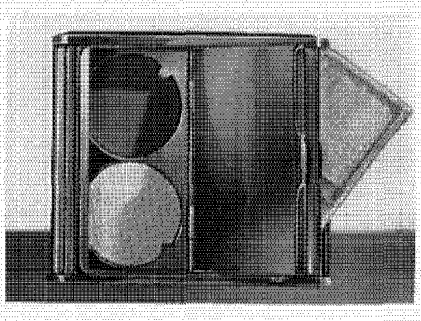
The Haskell Laboratory of Industrial Toxicology overlooks Brandywine Creek near the du Pont Experimental Station just outside of Wilmington, Delaware

The Way of the Glyd-a-Way

How the use of "Pyralin" sheeting helped a manufacturer develop a new case for cigarettes and cosmetics . . .

WHOEVER invented the roll-top desk probably never dreamed that the same principle would some day be applied to articles small enough to fit into men's vest pockets and women's handbags. But just that has happened. Cigarette and vanity cases are now being sold in some jewelry stores, smokeshops and department stores under the trademark, Glyd-A-Way. The name is amply descriptive, for by a touch of the hand the covers, without any springs, catches or mechanical parts, glide away smoothly, exposing the cigarettes or cosmetic compartments.

The Glyd-A-Way case appeals to men smokers because of its streamline design, ease of operation and the fact that within there is no retaining fork to crush the cigarette across the middle. No holding device is necessary. Women also like the cigarette-case compact or the triple vanity, because it combines beauty and utility with the utmost convenience. Nothing more practical has been offered since the introduction of the "flapjack" compact several years ago.



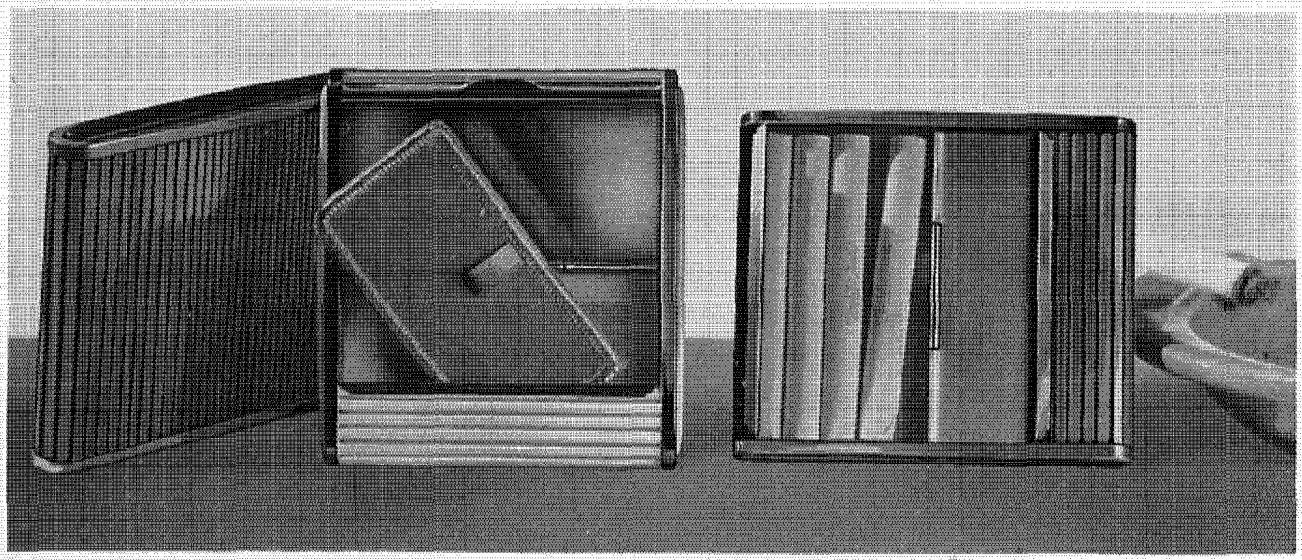
This version, the triple vanity case, should appeal to women who do not smoke. Rouge, lipstick, powder—they are all available, and yes, there's a mirror, too. Glyd-A-Way cases are available with or without the cigarette compartment

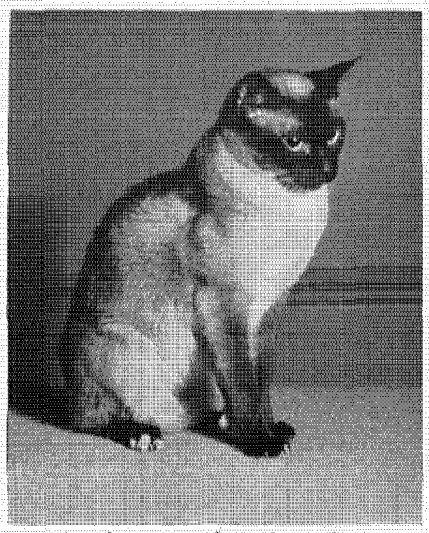
Six months of experimental work preceded the development of these articles. Making the basic box for a cigarette container was easy. The problem of providing a half insert for a cigarette-case compact or a whole one for a triple vanity was not especially difficult. The real hurdle was the cover—a rolling carpet designed to cover sixty per cent of the surface and to glide over end-rollers making a complete circuit. The use of metal was found to be impractical, for more than sixty-five parts would be required to make the carpet. Weight, details of assembly and polishing were other obstacles. Various materials were tried and discarded.

Eventually, experiments were made with the pyroxylin plastic, "Pyralin," in collaboration with du Pont engineers, and results proved its suitability. Its lustrous colors provided the vital eye-appeal; its flexibility solved the problem of smooth rolling and durability, and production costs made possible turning out finished products at a price that would be attractive to consumers.

So the roll cover is coming back and may some day be utilized extensively. More information about the products illustrated can be obtained by addressing an inquiry to the manufacturer, Exotic Vanities, Inc., 358 Fifth Avenue, New York City.

The illustration below shows the roll-cover construction to better advantage. On the right side is a cigarette case compact. These articles are manufactured in a variety of colors—red, blue, green, black, white and tortoise



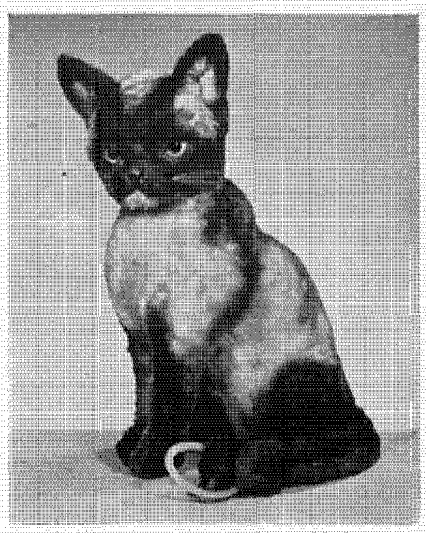


One of Mr. Hartman's greatly-prized pets

The Saga of the Siamese Cat

Behind the true story of a new rayon fabric made to cover a stuffed cat is a legend of a king and a ring that brought good luck to its royal owner

By E. C. HARRINGTON



And this is Feen-Feen with the good-luck ring

According to legend, an ancient Siamese king treasured above all other worldly possessions a large emerald ring. It was a talisman and under its magic protection no evil could or did befall him or his subjects for many years.

Alas, one day he lost the ring while traveling over his domain. Proclamations, rewards and bulletins were posted throughout the kingdom. An aroused nation—men, women and children—turned out to find that ring. The search continued for weeks and months without avail until a woodsman, returning home after a severe storm one afternoon, was attracted to a gleaming green object in the mud. No one could explain how it got there, but it proved to be the missing ring.

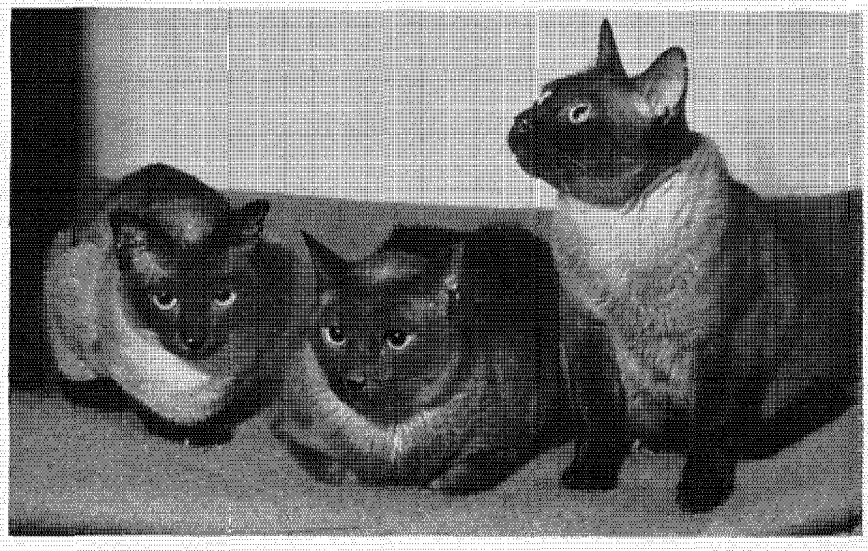
That night the woodsman and his wife debated how best to carry the precious object safely to the king's palace, for robbers were active in the land. Some simple strategy was required, and finally the wife suggested the one they adopted with the assistance of a Siamese cat, the household pet. The ring was slipped over the animal's tail and concealed in the fur, whereupon that appendage was tied in a knot. Next morning, Feen-Feen was carried, unmolested, to the king who removed the ring himself and placed it on his finger. A rich reward was paid to the couple for the service rendered, and the happy monarch proclaimed that henceforth Siamese cats were to be held sacred. To Feen-Feen's exploit is attributed the fact that even today Siamese cats are often seen with crooked and bent tails.

So runs the legend. The fact is, the royal Siamese cat is the most remarkable of all the Old-World domesticated breeds. The animals have tails either straight or kinked, but it is not known whether the latter feature belongs of right to the breed, or has been acquired by crossing with the ordinary black and taffy, kink-tailed cats of the country.

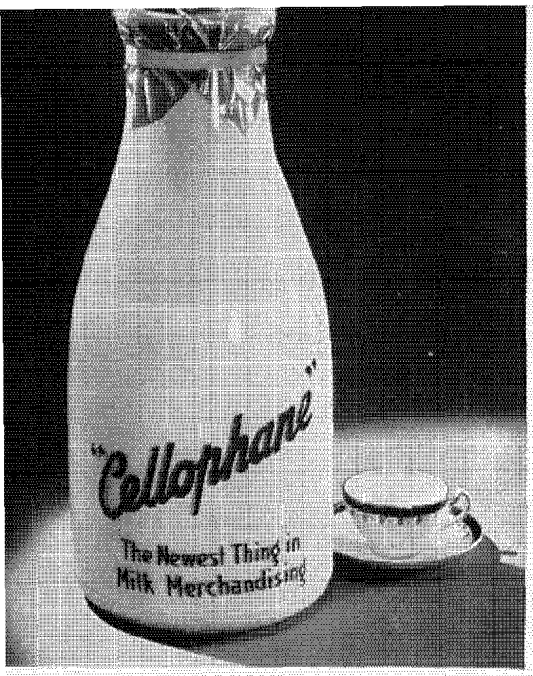
The origin of trends and vogues in pets is difficult to trace. However, we are assured the Siamese cat, aristocrat of the feline family, is the world's most fashionable pet at the moment. He moves about in smart society and is featured prominently in high-class publications. Some knowing advertisers have prevailed upon well-known women to allow their Siamese cats to be pictured, sometimes with the owners.

Perhaps some of the popularity these cats enjoy is due to the fact that they have an air of exclusiveness. More likely it is because they are beautiful, intelligent and loyal to people whom they like. At any

(Continued on page 24)



Pictured here are three more from the same household. Siamese cats, aside from their attractive appearance and distinctive coat colorings, are said to be the most intelligent and companionable of the feline family. They are much appreciated as show cats



Safeguarding Your Milk Supply

Hoods of "Cellophane"—for protection and identification—are steadily gaining in favor in dairy circles

By J. D. RANKIN

In the early days, milk distribution was far from being a standardized procedure. People either kept their own cows, or bought milk daily from some neighbor who had an extra supply for sale. Large producers peddled their milk in the city, and delivered it by the simple expedient of dipping it out from a can into whatever receptacle the housewife might have handy. There was no thought of sanitation, for then the peck-of-dirt-before-you-die theory held good, even for milk.

It was not until the invention of the so-called common-sense milk bottle, in 1889, that bottle distribution began slowly to supplant the can or loose-milk method. Six years later the first machine for pasteurizing milk was introduced. There has probably been no single health movement which has contributed more to the reduction of infant mortality and general public well-being than the crusade to make pasteurization a universal practice. Some idea of the progress made in this direction may be gathered from the fact that in 1900 only about five per cent of New York City's milk supply was pasteurized. Today, more than ninety per cent of it is protected from bacterial contamination by this process.

Despite these precautionary measures, the protective value of pasteurization is often lost at the time the milk is being dispensed from the bottle. Indeed, the instant it touches the pouring lip, germ contamination may result from accumulated dust and dirt, or from residue deposited by ice used in shipment. Unclean hands touching the top of the bottle during delivery are a further source of contamination.

It was natural that progressive milk organizations should seek further to safeguard the purity of their milk from farm to the consumer by covering the entire top of the bottle with a hood of "Cellophane", cellulose film. The product for this purpose is a special type, developed specifically for milk bottle protection. Note in the accompanying illustration how completely the hood covers the pouring lip, thereby eliminating the necessity of washing off the cap before the milk is taken from the bottle. Easy removal is another advantage appreciated by the housewife. Just a quick pull of one of the tabs extending below the sealing tape and the hood is off in a jiffy.

And to assist the milkman in identifying quickly the different kinds of milk, the hoods are supplied in various colors, thus reducing the possibility of any error being made when the milk is delivered. Some dairymen, for example, use red "Cellophane" for standard milk, blue for buttermilk, and green or amber to indicate other grades of milk or cream. Wherever this new form of protection for milk has been introduced, the reaction among housewives has been most gratifying. Already acquainted with the sanitary protection provided by "Cellophane" on baked goods, meat, candy, dried fruit and many other foods, they have quickly sensed its value on bottled milk.

It is too early to predict when you may find your morning's milk all dressed up in these colorful "Cellophane" hoods. However, the list of distributors who are using them is constantly growing longer, and one of these days the dairy serving your community may adopt this modern protective device.

For further details about this development write to the Du Pont Cellophane Company, Inc., Farm Products Section, Empire State Building, New York City.



A rustic scene in Norway, where milkmaids fill orders directly from the source of supply. Contrast this practice with the methods of delivery in this country

Protection for Hands That Work

A new vanishing cream forms an invisible glove, protecting the skin against dirt, paint and grease

Until a comparatively short time ago, men and women who handled paint, lacquer, grease, and a great many other hard-to-remove materials, were never entirely free from the problem of removing soil and stains from their hands. Indeed, the troublesome and time-consuming task of cleaning one's hands after a messy job has been a deterrent to even starting many a project that otherwise would have been undertaken with enthusiasm. That condition has now been rectified simply and effectively, for out of the chemical laboratory has come a new protective cream named "Pro-Tek," which prevents stubborn stains or dirt from adhering to the skin.

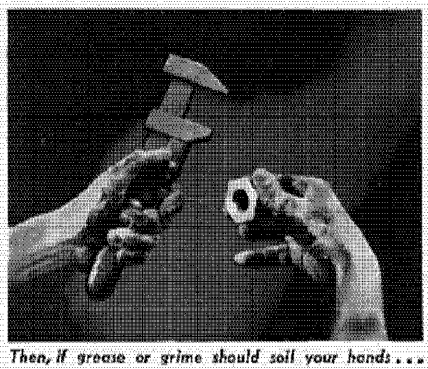
When you rub this soft, white cream on the hands, it forms an invisible film preventing dirt or liquids, other than water, from entering the pores or adhering to the skin. You may then handle paint, varnish, lacquer and many other soiling compounds without their contacting the skin. The job finished, wash the hands under running water and all traces of dirt disappear. The protective effect of the cream lasts for four hours, unless the hands become wet with water or perspiration.

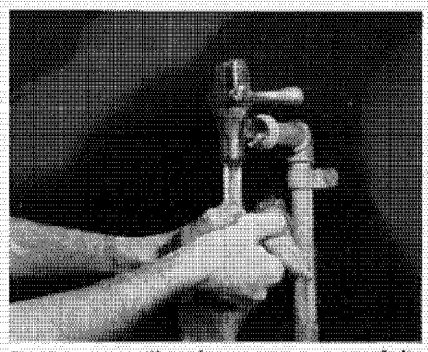
This product is not a soap, but a cream compounded primarily for protection, and it is entirely harmless and non-irritating to the skin. Dermatologists have also found that when "Pro-Tek" is used, the skin is protected to such an extent that dermatitis, a skin disease, heals more rapidly than would normally be the case. Another pleasing feature of its use is the fact that the cream when rubbed on the hands apparently disappears, leaving them dry and free from any feeling of stiffness or greasiness.

As is commonly known, it is difficult to remove congealed and dried lacquer from the hands without the use of lacquer thinner or other solvents which irritate the skin; yet lacquer rubs off quickly under running water, when "Pro-Tek" has been used. This is just as true of paints, grease, oils, printing ink, and varnish; and the cream affords skin protection also against cutting compounds, naphtha, gasoline, cleaning fluids, dirt, coal, metallic dusts, and similar substances.



Apply the cream thoroughly before starting work


Then, if grease or grime should soil your hands . . .


Running water will wash away every trace of dirt

The invisible glove, as "Pro-Tek" is called, has been widely adopted by plant physicians and executives for use by mechanics and factory workers. For painters, printers, garage mechanics, service station attendants, railroad men, pipe fitters, coal handlers, miners; in fact, for all who work with their hands, this cream supplies a long-felt need. And there is no necessity for using abrasives, solvents, alkalies and scrub brushes.

"Pro-Tek" is a great boon to the man who likes to work around the house. He can clean out the furnace, paint the screens, wax the floors, repair and polish the car, and work at the tool bench in the basement without having to scour the skin off his hands afterwards.

And it is a real aid for the housewife, too. If she applies "Pro-Tek" first, she can hang the curtains, clean out closets, polish the stove, and work in the garden without roughening or soiling her hands, or discoloring her finger nails. All the dirt and grime can be washed away just as soon as the work is done, leaving the skin soft, clean, and healthy.

Here, then, is the answer to a trying problem experienced alike by persons whose occupations involve contact with dirt in many forms, and by those whose hobbies and self-imposed tasks similarly require protection from all kinds of dirt and stains that are difficult to remove, and that in some instances may have a harmful effect on the skin.

"Pro-Tek" goes to market as one of the distinctive No. 7 Line products. It is now being stocked by drug stores, hardware and paint stores and by auto accessory dealers. If you cannot procure it locally, we suggest that you write to E. I. du Pont de Nemours & Co., Inc., Finishes Division, Wilmington, Delaware.



Vat Colors Make Fast Friends

The use of vat dyes assures color-fastness. Steadily increasing consumption of vat colors reflects a growing demand for fast-dyed merchandise . . .

By ANSCO G. BRUINIER, JR.

In the modern world, color touches life at many points and in many ways. The most casual stroll through a department store is stimulating because of the influence of color. Yet, the purchase of a glamorous garment or the most utilitarian fabric is often accompanied by a feeling of doubt. Will the color be fast? Will it be affected by washing? By sunlight?

It is not within the scope of the present article to describe the essential differences of various dyestuffs, and the problems which must be considered by the producers of textile fabrics. Recently, however, the consuming public has been insistent in the matter of color-fast assurance. It is not so long ago, during the so-called "buyer's market," that many manufacturers had to produce both finished garments and piece goods to meet a specific price range. Quality standards were lowered, with the result that colored fabrics frequently did not meet the customer's needs.

The durability of colors is as vital in satisfying the consumer as are style and value. Whatever affects the life of the color, affects the life of the fabric. And whatever affects adversely the life of the fabric reacts unfavorably upon the manufacturer and retailer.

With this brief re-statement of the importance of color-fastness, let's narrow the subject down to vat dyes and their unusual properties.

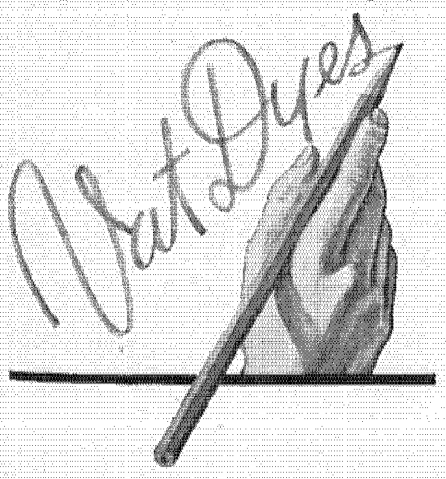
Vat dyes are so named because they must be reduced or dissolved in a vat before they can be used. From the standpoint of application, these dyes are distinguished by the fact that

they are, for the most part, insoluble in water and cannot be applied directly to a fibre or material unless they are made soluble. This is done by means of a reducing chemical, which changes the color to its soluble form.

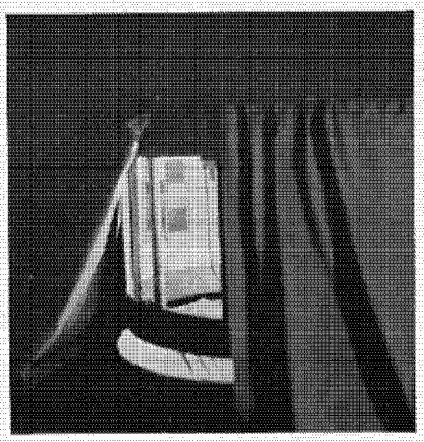
When maximum fastness is of prime importance, that is to say, fastness to washing, to light, and resistance to color-destroying agents, the fastest colors are the vat colors. In general, they are, if properly applied, the finest and best that can be obtained. There are varying degrees of fastness, and in that respect no dyestuff can be measured by any one standard. Fastness is a relative term and the degree is governed entirely by the final use for which the article is intended.

For many dyed materials, fastness is a secondary consideration, because the finished product may not be subjected to severe exposures. In such cases other properties may be of greater importance. But where the imperative requirement is fastness as, for instance, in cotton goods which must withstand repeated washings or prolonged exposure to strong sunlight, vat colors should be used for best results.

Chemically viewed, these dyes are extremely complex substances. Their manufacture requires great care, precision and chemical control. Before the vat dyes produced by the du Pont Company are placed on the market, they are put through a series of rigorous and exhaustive tests. These include actual dyeing or printing, in the company's testing laboratories, upon the fabrics and the materials for which they are intended. These materials are then subjected to every possible color-destroying agent such as washing, exposure to light and perspiration. Thus, the fastness properties of the dyes are predetermined before they are sold.



Vat dyed fabrics are rigorously tested in the Fadeometer, a piece of laboratory apparatus designed to accelerate any fading tendencies resulting from exposures to strong light. This view shows the curtain drawn back part way to give you a glimpse of a test under way



The du Pont Company is the pioneer manufacturer of vat colors in the United States, and while its line is already extensive, newer and better dyes with improved properties and characteristics are constantly being developed. In the fields of vat-color dyeing and printing, du Pont technicians are rendering valuable assistance in solving problems the industry is continually facing.

It is only natural that converters should raise the question of comparative costs. The fact is, vat dyes do cost a little more than other kinds. It follows, of course, that consumers, too, pay a small premium for a vat-dyed fabric. By the time a vat-dyed fabric has gone through all the various stages of processing until it finally reaches the consumer—either as piece goods or in finished garment form—the increase in cost over a non-vat colored article is at most only a few cents per yard to assure longer service life and increased satisfaction.

The retailer who aims to build his business on solid ground can reasonably insist on vat dyes, if the colored goods he buys for resale are to be fast to washing, to light, or to other color-destroying influences.

It should be remembered that the dyestuffs manufacturer produces those colors for which there is a definite demand. He must keep abreast with the color trends decreed by fashion, and he will prefer to supply the best type of dye for each specific purpose.

An index to the growing domestic consumption of vat colors—exclusive of indigo—is shown below.

U. S. Tariff Commission Figures

Year	Consumption
1914	1,945,000 Pounds
1925	4,672,000 Pounds
1933	10,881,000 Pounds

Between 1925 and 1933, the quantities of vat colors used were subjected to certain fluctuations. From 1930 to 1932, consumption declined. This may have been attributed in part to the reduced purchasing power during that period, and to some extent to lowered standards of quality. During the next year, however, the upward trend was resumed. Quality merchandise was coming back. Although official Government figures for 1934 are not yet available, all indications point to a still higher consumption of vat dyes. The early months of this year showed a marked increase.

The fabrics and materials which are dyed with vat colors include predominantly cotton goods, because they are more severely subjected to continued washings and to exposure to light than any others; and rayons, acetates and silks which must resist dry-cleaning, perspiration, light and hot pressing. The group includes printed and dyed shirtings, dress goods, children's wash and play suits, house dresses and aprons; pajamas, ginghams, towelings, bed linens, bed spreads, tablecloths, underwear, sewing threads, curtains, draperies, upholstery fabrics and men's work clothes.

When buying any of the items in this group, consumers will be assured of complete satisfaction with regard to color-fastness and serviceability, if they will specify vat-dyed materials.

In the production and sale of all colored fabrics and materials, manufacturers, converters and merchants may well remember that consumers are the final arbiters of value and of quality. They foot the bill, and the indication is clear that they want fast colors and are willing to pay for them.

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VOL. XXIX MAY, 1935 NO. 5

Three Hundred Years

AS THIS is written, news reports indicate that more than 10,000 chemists and chemical industrialists have gathered in New York City to attend the eighty-ninth meeting of the American Chemical Society, which is celebrating the tercentenary of the founding of the American chemical industry.

Historians have pointed out that skilled workmen were sent to America in 1608 to manufacture glass, pitch and tar at Jamestown, Virginia. And the first cargo of exports from that colony included what are termed "trials of pitch, tar, glass, frankincense and soap ashes." But the business was apparently not successful.

According to the records, in 1635, fifteen years after the Pilgrims landed at Plymouth, one John Winthrop, Jr., returned from England with chemical apparatus and after building a laboratory began to manufacture chemicals. And the tercentenary celebration looks back to that enterprise as the starting point. But more than a century and a half passed before the industry secured a stable footing. In 1793, following the Revolutionary War, John Harrison built a small sulphuric acid plant. He is generally considered to have laid the first stone in the permanent foundation of the American chemical industry.

During the early years of the nineteenth century, relatively slow progress was made, for domestic manufacturers of that day had only a limited market. Moreover, strongly entrenched foreign competitors held control over prices, and they did so for many years. But with an establishment of transportation systems and the development of natural resources, chemicals became increasingly important and the industry moved forward at an accelerated pace. While long strides have been made, particularly during the past thirty years, the American chemical industry is really an old one—a fact that needs emphasis, for too many people have the mistaken impression that it is merely a post-war development.

Chemistry is today the handmaiden of practically all industries. From its laboratories have come many discoveries that have added incalculably to the world's wealth. And from the same source more of them may be expected to come in the future, for Science and Industry are still forging ahead.

The Alcohols

IN A recent advertisement, the publishers of *Chemical & Metallurgical Engineering* asked non-technical laymen a question, after warning them not to answer too quickly. The query was "How many kinds of alcohol are there?" And presumably there were few among those addressed who could name offhand more than two or three. Most of us recall that back in high school days the chemistry professor talked about wood alcohol and grain alcohol, but were there any others? Certainly not many.

And so with amazement we "oldsters" read today:

> "There are more kinds of alcohol than industry knows what to do with. Many new types have been developed since the depression. Allyl, ceryl, lauryl, octyl are a few of them . . . In the aliphatic family alone there are twenty-three different alcohols now commercially available, all of which can be made synthetically. Uses for many of them are now being worked out in the laboratory . . . "

Alcohols that were either unknown or were only of academic interest a decade or two ago are now being produced on a large scale, which reflects much credit upon research chemists and chemical engineers. For the members of the alcohol family are indispensable to hundreds of industries.

The names of these alcohols, old and new, are familiar enough to professional chemists. Probably laymen will never even try to fix them in mind. Why should they? But at least a better understanding among laymen of the importance of solvents in industry and chemical manufacture will be helpful.

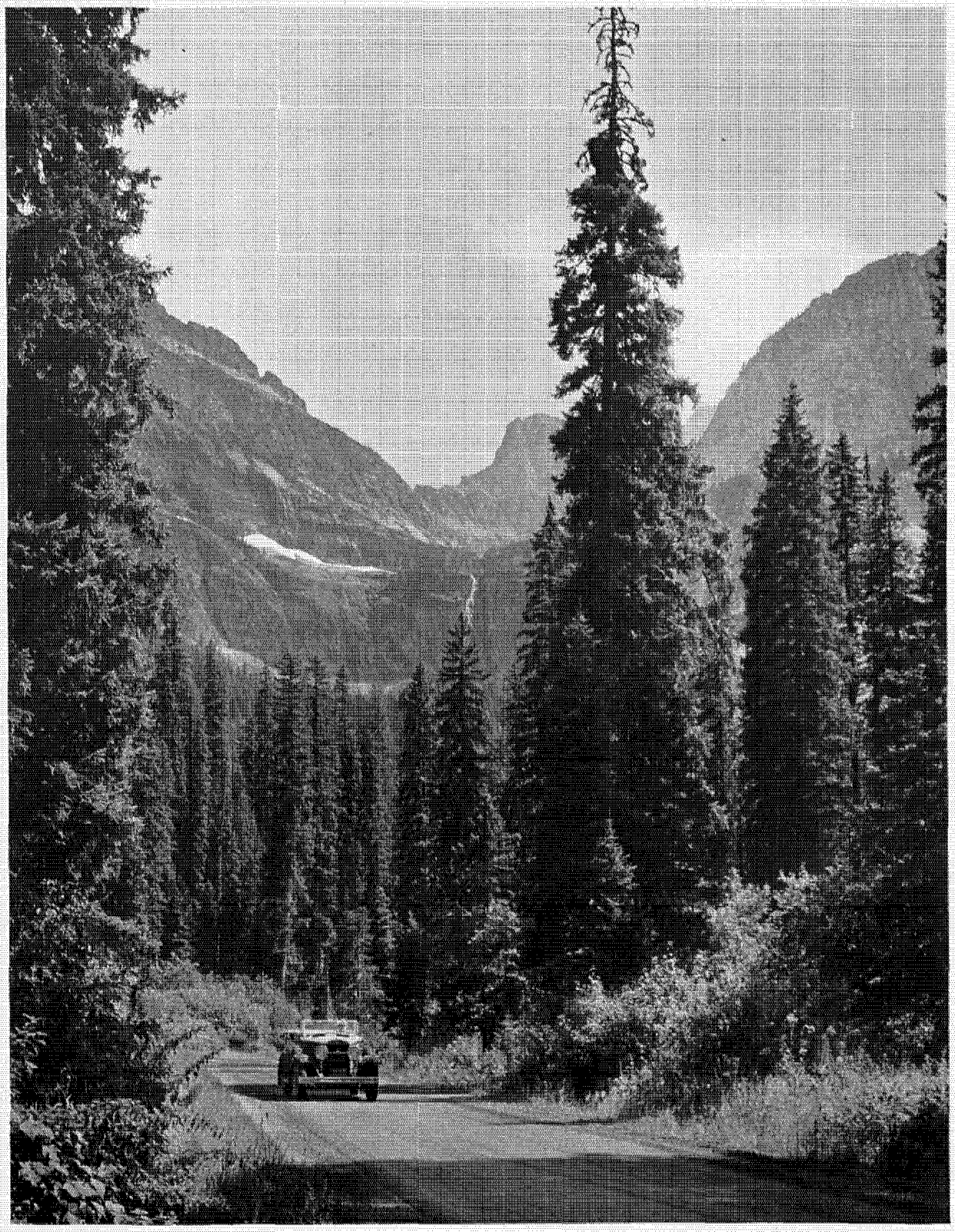
Large quantities of alcohols are produced by the du Pont organization for use in making a wide range of products. Merely to mention anti-freeze compounds, paints, varnishes, lacquers, thinners, plastics, denaturants, anti-foam preparations, cosmetics and perfumes, detergents, insecticides, fungicides, metal cleaners and dyestuffs is to suggest a few groups. And, of course, particular types of alcohols are required for specific purposes. As a family group, the alcohols rate next to water as the most universally used solvents. They are still growing in numbers.

An Award of Merit

THE 1934 All-America Package Competition, sponsored by *Modern Packaging*, was held last February in New York City, where more than 6,200 packages were entered and appraised by a distinguished committee of judges. Their decisions were based on details of appearance, sales value and construction value, and as one writer has paraphrased a famous line, "many were culled but few were chosen."

In the Family Group the judges awarded the Silver Medal to the du Pont Company in recognition of the beauty and sales appeal of its No. 7 Line of packaged products.





JOHN MERRIL

Towering forest trees fringe the Going-to-the-Sun Highway in the heart of Glacier National Park. One of the most scenic in the world, this highway hugs sheer walls of cliffs thousands of feet high, skirts the shores of beautiful lakes and climbs up and over the Continental Divide through Logan Pass. In this photograph, the camera has captured some of the breath-taking grandeur which awaits visitors to this "Switzerland" of America

For Woman's "Crowning Glory"

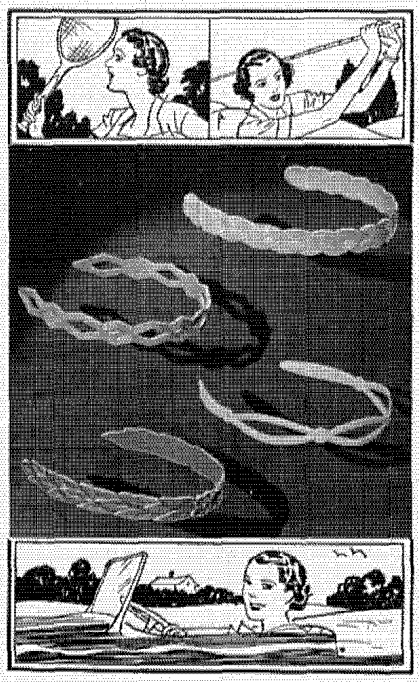
The new "Pyralin" Diadem Bandeau is in step with the newest coiffure fashion

By MAX ROSEDALE

Like the historic shot which was heard around the world, Fashion's edicts seemingly reach the four corners of the earth as soon as they are decreed. When Fashion says "do this," or "this is what women will wear," styles in the feminine world change overnight. What was accepted as fashionable yesterday, becomes obsolete today.

Let us see how the newest and most popular of ornaments for woman's "crowning glory" follows the mode for 1935. This year, the "bob" is supreme. What is declared to be one of the newest and loveliest of coiffures features short hair with curls or other soft effects at the top of the front of the head. Here the new Diadem Bandeau lodges artistically in the hair, investing the wearer with a distinctive charm which harmonizes with the entire ensemble.

Many stylists advocate the arrangement of coiffures to match individual personalities. Whatever the style adopted, a hair ornament of some kind is always in good taste. For many years, Du Pont "Pyralin" has played an important role in the creation of these ornaments, because of the wide and versatile range of effects and colors in which this product is made. The unusual qualities of this pyroxylin plastic have been definitely serviceable in this field.

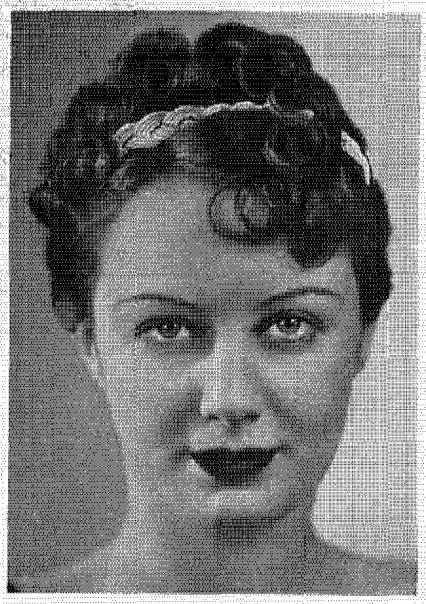


The new Diadem Bandeaux have become especially popular for two reasons. First, they are extremely decorative. And second, they render a needed service which every woman appreciates. Semi-circular in shape, they are so fashioned as to fit comfortably. They stay securely in place, and permit milady to go through a busy day's activities without the slightest worry about disarranged hair. With the aid of these ornaments, the most fastidious coiffure can be arranged in the morning and carried gracefully and undisturbed through a round of golf, a motor ride, a tennis match or any other sport and diversion.

Diadem Bandeaux are made in numerous patterns and colors to please the most discriminating taste. A few of the more popular styles are illustrated. This merchandise is on sale in department stores, specialty shops, and in chain stores. There are styles for women of all ages and for their daughters, too. They are made by the Du Pont Viscoloid Company, Inc., 350 Fifth Avenue, New York City.

The coiffures shown were created by Dumas, Savoy Plaza, New York.





In the new "Pyralin" Diadem Bandeaux, utility and good taste are admirably combined. Moreover, these distinctive ornaments for the hair are designed to be in keeping with the current mode

An Achievement in Piano Making

The W. W. Kimball Company, founded in a small shop in 1857, is today one of the world's largest manufacturers of pianos

Although references to the piano occur in the correspondence of musical instrument makers during the latter part of the 16th century, it appears that the first piano was invented in Florence, Italy, about 1709, by Bartolommeo Cristofori, a Paduan harpsichord maker. The genius and the craftsmanship which he devoted to his work may be appreciated from the fact that two grand pianos built by Cristofori are still in existence. One is dated 1720; the other, 1726. They are said to be of perfect construction and to embody all the essentials of piano movement. Incidentally, the first one is now housed in the Metropolitan Museum of Art in New York City.

The history of the piano, which is probably the most extensively used of all musical instruments, thus dates back more than two centuries. We can only speculate about the methods employed by the early pioneers of piano building. Today, a standard type of grand piano consists of over 14,000 parts, and 95 per cent of these are hidden. Because of the nature of the very exact work to be performed by a piano action, and the limited space that can be used, these parts must be made with the utmost precision if they are to function well over a long period of years.

Among the outstanding manufacturers of pianos in the United States is the W. W. Kimball Company of Chicago, Illinois. This business was founded seventy-eight years ago by William Wallace Kimball, whose name is included in the *Encyclopedia Americana* as one of an illustrious group who have made piano history in our country. The third generation of the Kimball family is now active in the business.

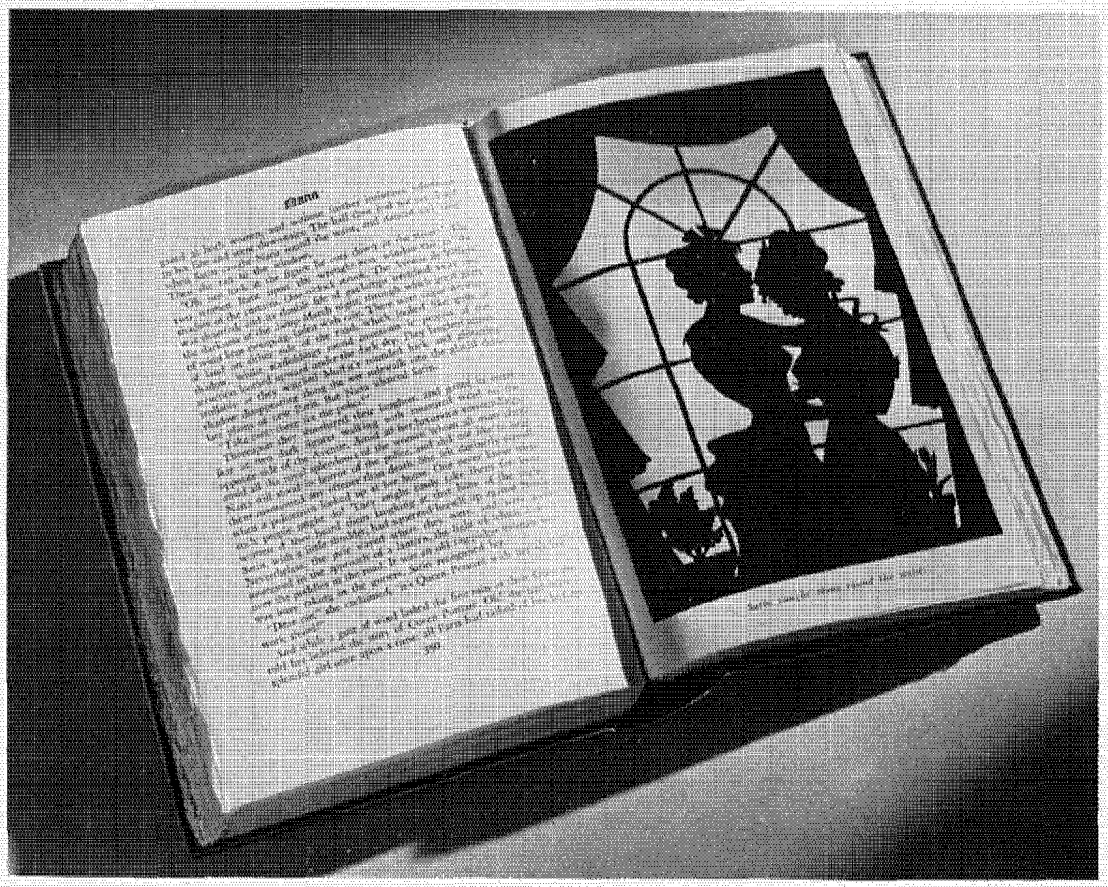
Every important part of a Kimball piano is made in the company's own factory. These include soundingboard, keys, action, hammers and strings; the metal plate which holds the strings; all the woodwork and all the hardware, even the casters. All of this involves the operation of a modern, complete metal foundry, machine shops, mill rooms, dry kilns, plating works, and the like, equipped in many cases with special machines designed by Kimball engineers. Altogether, the factory is said to occupy more than a million square feet of floor space.

The piano, as we all know, consists of a series of stretched, graded and tuned wires, which are struck by felt-covered hammers actuated from a keyboard. This sounds very simple, but we have already seen that the instrument consists of thousands of parts, and it is this invisible, complicated mechanism that enables the instrument to function. The quality of tone in Kimball pianos is attributed by the maker to "Kimball equal low-tension scale," which is to say there is the same tension on each string. This scale, it is said, is a departure from the usual methods of construction in which the tension of the wires may vary from 135 pounds to 250 pounds per string.

In appearance, design and finish, Kimball pianos rate high. The woods are carefully selected for strength and beauty, and undergo a long seasoning process before they can pass the final inspection. All instruments, including organs, are finished with du Pont "Duco," which is well known for its lasting durability and beautiful appearance. The fine craftsmanship of every detail of construction in Kimball products is reflected by the choice of this unusual finish for enduring luster.



One of the distinctive models of the extensive line of Kimball pianos. Piano building by Kimball stresses unusual tone quality



In this edition, bindings, printing, paper and illustrations attain a high standard of excellence

Old Treasures in New Bindings

The Plaza Edition of popular classics will appeal to book lovers for its high quality at a low price

By EDWARD SAMPSON

CHEAP pasteboard covers, poor printing, and paper that turned yellow within a short time have from the beginning characterized the popular editions of the classics. The necessarily low prices have made it impossible to give them "class." Book lovers who cannot afford to buy special and de luxe editions have humbly accepted these less distinguished offerings, despite their lack of beauty and durability. But they have not done so without a sigh and a fond dream, for they have long desired to buy books not only to read, but also to keep and treasure.

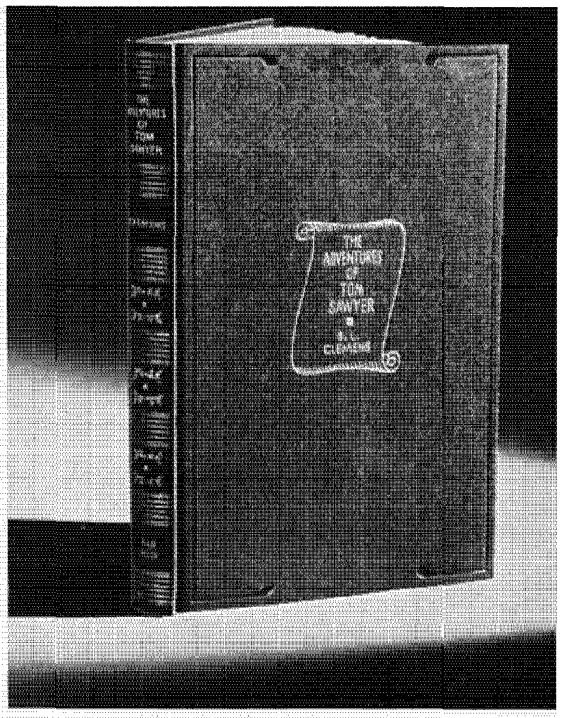
The popular classics have been like rich jewels in cheap settings. The problem of overcoming these physical limitations has long engaged the thoughtful consideration of progressive publishers.

The Three Sirens Press, in New York City, has scored a remarkable coup in producing classics in beautiful format that sell for the remarkably low price of seventy-nine cents. At present there are twenty volumes in the set. Handsomely bound, with original illustrations and printed on deckle-edged paper, these books have received a deservedly warm welcome from discriminating buyers. They are currently on sale at the leading book shops throughout the country. It is interesting to know that the *Rubaiyat of Omar Khayyam*, the perennial favorite, is leading in sales.

Many little touches that appeal to book lovers have been given these attractive volumes. The French custom of selling books with paper covers, to be bound later by the purchaser according to his own taste and library requirements, has never had any great popularity in the United States. The publishers' dictum seems to have been unprotestingly accepted.

Generally, the people who buy popular editions have been extremely humble and undemanding. As a result, many factors of importance to the book owner have been neglected, because they have been considered of little influence in the sale of the books. The matter of backbones, for instance, is worth the consideration of anyone who owns books. The fact that the cover or jacket is used for display purposes in selling the books explains why the backbone has so often been slighted. For with that part concealed by the paper covering, which is designed and printed to catch and hold the eye, the book buyer often does not take the trouble to remove it and to inspect the details of binding as closely as he would otherwise.

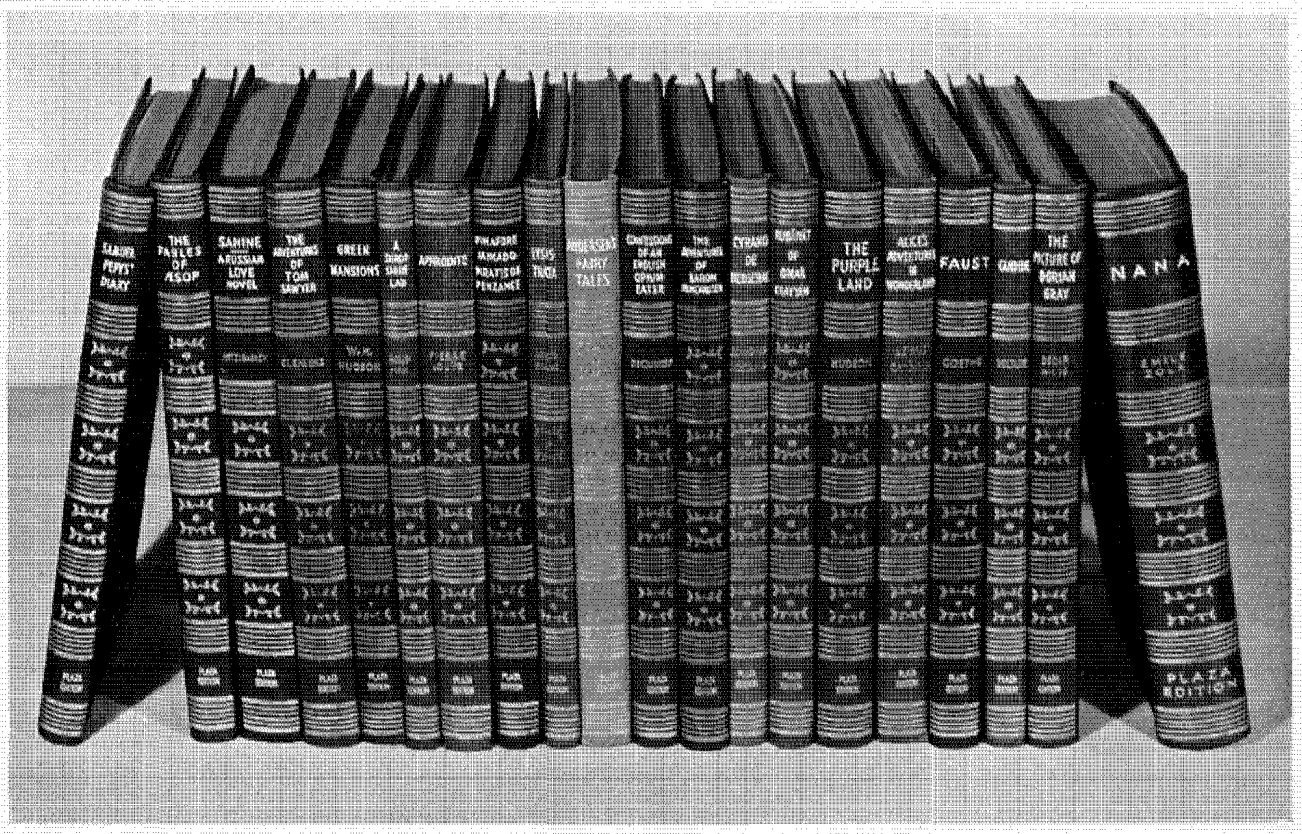
J. J. Little & Ives Company, 435 East 24th Street, New York City, has done a fine piece of work in binding these books. Their treatment of the backs lends the books a definite character and an air of distinction. In looking for a material combining beauty of texture with durability, they found full-coated "Fabrikoid" ideal for their needs.



Popular prices now bring many famous books such as "The Adventures of Tom Sawyer" within the reach of book lovers who cannot buy special or de luxe editions

Among the twenty volumes are such favorites as *Cyrano de Bergerac*, *Aesop's Fables*, *Alice's Adventures in Wonderland* and *Looking Through the Looking Glass*, *Green Mansions*, *Nana*, *Confessions of an English Opium Eater*, *A Shropshire Lad*, *Samuel Pepys' Diary*, *Faust*, *Candide*, *The Lyrics of the Best Known Gilbert and Sullivan Operas*, and other titles well known to book lovers. In view of the continuing evidence of interest in this edition of popular classics, it is not surprising that the publishers have included from time to time new volumes. Many more are in prospect and no doubt they will meet the same popular favor.

Perhaps your local book dealer is already handling the Plaza Edition of these classics, but if not, we suggest that you write to The Three Sirens Press, 104 Fifth Avenue, New York City, for a copy of a folder that illustrates and describes the set—an unusual value at a price that is making publishing history.



The present edition of twenty books ranges from Samuel Pepys' Diary to Emile Zola's "Nana." By examining the illustration below closely you will be able to identify the titles of many books that are old friends

What's New

Brief notes about developments, products, booklets, and the like

The Grasselli Chemical Company, Inc., has just issued a new folder, *Fixtan for Heavy Leathers*, which is being distributed to the trade. The product is a high-grade filling material and color stabilizer of blended tannins. Summing up its advantages, we quote:

"It improves color by making it brighter and more uniform; increases yield of leather obtained; increases plumpness; it is more readily used and penetrates better than dry fillers; improves the quality of your leather, rather than degrading it."

* * *

"Aridex" is the name of a new product recently announced by the Fine Chemicals Division of the du Pont Company. It is a white, waxy emulsion for use in producing a water-repellent finish on textiles of all kinds; also for impregnating silk, rayon, cotton, linen or wool and for treating leather and paper. It is an outstanding development in this field, and textile processors who have a demand for waterproofing of any sort will doubtless be interested to obtain complete details from the headquarters office at Wilmington, Delaware.

* * *

The current number of *Department Store News* describes and illustrates, with actual samples of material, the 1935 spring colors and grains of 4800 Quality "Fabrikoid" for women's pocketbooks. Doric grain held the spotlight in one of the previously-issued numbers. This time a new one, called Kayvet, is featured. Other grain effects shown are Cobble, Alligator, Ostrich, Calf, Cedar, Boxwood and Wormwood. The publication is distributed free to buyers and merchandise managers of department stores.

* * *

A new 16-page booklet entitled *Here's the Way to Profitable Dry Cleaning* has been issued by the "R. & H." Chemicals Department. It discusses the early development of the fluid sold under the trade-mark "Tri-Clene," the advantages gained by its use, and data compiled following a field survey made last year. Owners and operators of dry-cleaning establishments will be interested.

* * *

Listed for the first time in the current "R. & H." Quarterly Price List is Olivine, a natural mineral which is rich in magnesium and available in a variety of forms. It is being used as a refractory material for furnace linings.

* * *

If you want to protect your lawn and keep it green, you will do well to start the battle now against destructive larvae in the ground. For within the next few months the lawns in many districts will probably be attacked by grubs of Japanese beetles, Asiatic beetles, sod-web worms, cut worms and earthworms. How combat these pests? One of the most effective ways is to apply to the turf arsenate of lead powder.

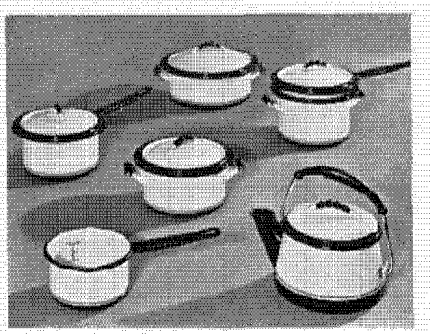
An informative folder entitled *How it Kills the Grubs* has recently been issued by The Grasselli Chemical Company, Inc., Cleveland, Ohio. Your copy is now available and will be mailed upon request.

Now Kitchen Ware Goes Streamlined

In step with the colorful, up-to-date kitchen of today is the Kook King line of enameled ware manufactured by the Vollrath Company, Sheboygan, Wisconsin. Its modern "streamline" design, an achievement of Count Alexis de Sakhnoffsky, internationally-known designer of automobiles and motorboats, not only provides distinctive beauty and charm but greater convenience in use.

As shown by the sauce pan in the ensemble pictured here, the utensils have a handy measure, graduated in cups and pints, permanently marked on the inside. The length of the handles has been scientifically determined to provide good balance and easy handling. All attachments such as spouts, ears and handles are gas-welded, and cover lifters are made of porcelain-enameled steel so they will not burn or work loose. Covered dishes have well-rounded double rims to prevent the escape of food flavors.

The Kook King line is available in a complete range of sizes and in a choice of four colors—red, cream, green or white, all with black trim and pure white linings. Tin oxide, color oxides and other enameling materials of the "R. & H." Chemical Department are used in the decoration.



A representative group of the Vollrath Company's Kook King utensils. They are expertly designed and colorful

Chemical Family—IV

(Continued from page 1)

Further extension produces picramic acid, an intermediate for eleven additional dyes, and so on.

In our brief account of how toluene is used we mentioned a group of "rubber chemicals" derived from its intermediates. These belong to the class known as accelerators, used to speed up the vulcanization time of rubber. Diphenylamine, another of the intermediates being produced before the du Pont Company went into the dyestuffs business, yields nine separate dyes, of which Metanil Yellow, a paper dye, is best known. But diphenylamine is also the source of a second class of rubber chemicals, the antioxidants, the use of which has greatly prolonged the life of automobile tires. Having developed certain products for the rubber industry, the du Pont Company next became interested in others that might be made from intermediates already at hand. The result has been an extensive line of rubber colors as well as an additional group of chemicals for rubber-working.

By the same token, having come into close contact with the textile industry through its dyestuffs, the Company incurred a responsibility for showing users how to apply the various types of colors most effectively. Hence, there was developed a wide range of "textile assistants." This group includes wetting and dispersing agents, penetrating and leveling agents, mercerizing assistants, and detergents, many of which are made from the same intermediates as the dyes with which they are used.

Since organic chemistry deals with more than 200,000 different compounds, it can be seen that the number of products that can be made from coal-tar and its intermediates is very large indeed. The possible number is chiefly limited by two considerations: First, will the product serve some useful purpose or will there be a demand for it? Second, can it be made economically?

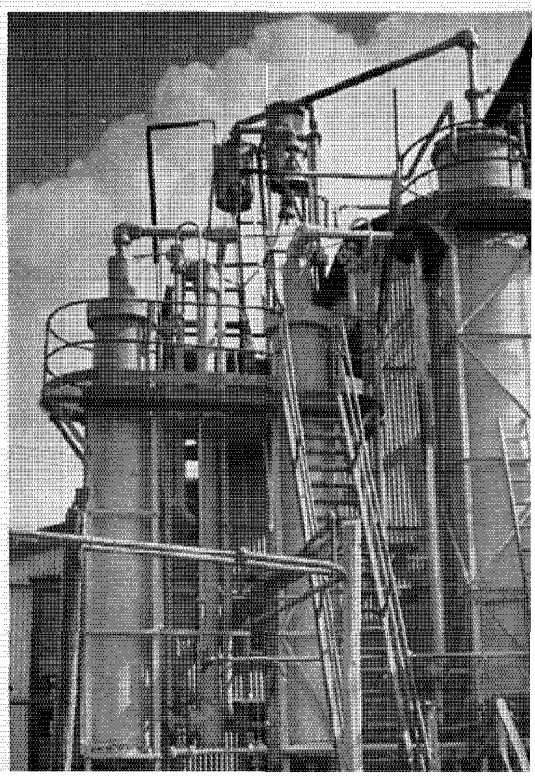
In carrying out the policy of diversification, which is such an essential factor to success in this field, the du Pont Company has produced several groups of collateral products, such as the rubber accelerators, antioxidants and photographic developers already mentioned; tetra-ethyl lead, the anti-knock fluid for "Ethyl" gasoline; extreme pressure lubricant bases, for increasing the strength of oil films; perfume bases; pharmaceutical chemicals, and others. Almost without exception these products are either derived from dyestuffs intermediates or they represent extensions into a field originally entered because of its close connection with the dyestuffs industry, or both.

But we are chiefly concerned here with those coal-tar derivatives used for producing color. Only enough has been told about the related carbon compounds to show the connection between the dyestuffs business and the du Pont Company's subsequent organic chemical developments, which will be discussed in a later story. While the Company was extending its activities along kindred lines, notable progress was being made in the dyestuffs business itself. An outstanding example was the production of "Ponsol" colors, a group of so-called vat dyes, exceedingly fast to light. They are generally regarded as anthracene products, which brings up another illustration of the chemist's ingenuity in taking liberties with the materials Mother Nature has set before him. These fast colors were originally made from the anthracene obtained directly from coal-tar. A way was found, however, to make a synthetic anthracene derivative from naphthalene and benzene, thereby substantially reducing costs.

In the early days of cellulose acetate rayon, one thing that impeded its progress was its peculiar behavior with respect to dyes. Colors that had been developed for other fibers—even for other types of rayon—had no affinity for this yarn. So, entirely new dyes had to be formulated. The du Pont Company entered this textile field not only through the manufacture of its acetate yarn, "Acele," but through the development of a line of acetate colors, now known as "Acele" dyes. Beautiful cross-dyed effects can now be secured by subjecting fabrics composed of acetate yarn mixed with other fibers to two different dye baths; one color will affect one type of textile and not the other, and vice versa. Thus, a characteristic that once proved the yarn's greatest handicap has, through the development in dyestuffs, been converted into one of its most important assets.

Different types of dyes also have been perfected for cotton, silk, wool, viscose rayon, leather and even gasoline, not to mention the rubber and paper colors already described. Most of these materials require special types all their own. Therefore, in addition to the manufacturer's classification, wherein the different dyes are grouped according to their chemical derivation or their composition, another one has been devised by the color-using industries. This groups them according to their action towards various textile fibers; that is, according to the different methods of applying them. The two classifications do not necessarily coincide; different dyes made from anthracene, for example, may be applied in various ways.

Some types, such as the acid colors, have a particular affinity for animal fibers but not for vegetable fibers.



Most of the chemical equipment at the Deepwater Point Plant is housed indoors, but when these units loomed up in front of the cameraman, he couldn't resist making a shot. In these towers sulphur dioxide, commonly known as sulphur gas, is purified

Some need a "mordant," a substance that makes them "take hold," before they will dye a fabric. Others are suitable only for vegetable fibers such as cotton. The different types vary widely in their fastness to light, washing and acids. The vat colors, previously mentioned, have the greatest resistance to nearly every color-destroying agency. They are peculiar in that, when in solution in the dyeing bath, they usually show no color whatever. But after the cloth is taken out of the vat and exposed to the air, the color appears in all its brilliance.

Obviously, if a manufacturer is to extend real service to the color-using industries, he must maintain a tremendously diversified production. He must not only be able to supply scores of colors, shades and tints, but must make them in numerous types of dyes, each adapted to different materials and methods of application. The Dyestuffs Division of the du Pont Company now lists more than 1,200 dyes. And if anyone cannot find what he wants among this group, special dyes will be made up to meet his requirements.

Such output as this, reduced to the most efficient and economical basis, has helped to bring color and beauty to the daily lives of everyone. Once only kings and nobles could surround themselves with such brilliance, but today even the lowliest servant-girl can have a chemical rainbow 'round her shoulders. Surely this comes under the heading of what we call progress!

EDITOR'S NOTE: A forthcoming article in this series will review the organic chemical developments which have sprung directly or indirectly from the du Pont Company's original interest in dyestuffs manufacture.

"Blowing" the Bar

(Continued from page 7)

compared with 2,413 cubic yards per hour when the dredge was operating under similar conditions in the same locality last spring. The increased output was attributed to agitation as a result of the blasting operation.

At the same time a survey was made at mud-point B, where no dredge had worked, and where the scouring effect upon agitated and adjacent areas was computed accurately for a twenty-day period and found to be 28,511 cubic yards. Altogether, the amount of material displaced and scoured away at both points as a result of blasting was 51,323 cubic yards, and the estimated cost was seventy-two one-hundredths of a cent per yard.



Aside from the volume of material cast out bodily, the blast had the effect of shattering the mass of mud and sand for a considerable distance inland, as will be noted in this picture. Rapid scouring followed during a high water period

Unquestionably, the rise in the river encouraged a more rapid scouring effect than would have taken place otherwise, but the fact remains that dynamite did shatter those two mud points and shook up the adjacent areas so completely that the Mississippi River could—and did—make a good job of scouring. Needless to say the U. S. Engineers were pleased that so much material was removed at this extremely low cost. They displayed a keen interest in the work and extended enthusiastic coöperation in carrying it through to a successful conclusion. The results of these experimental shots suggest that there may be a potentially large field for explosives as an adjunct in Mississippi River control work and elsewhere.

The Saga of the Siamese Cat

(Continued from page 11)

rare, Siamese cats are very rare in the United States, and generally speaking, they are difficult to raise. Consequently, they are fairly costly.

Harris V. Hartman, a New York architect, is the owner of four unusually beautiful living specimens. Inspired by a story written by Ransford Beach, which was based on the ancient fable, he created a lifelike stuffed model of one of these cats. His friends urged him to have duplicates made for them. The demand grew to such an extent that F. W. Woolnough Company, 200 Fifth Avenue, New York City, a concern that has built a reputation for reproductions of famous animals, is now producing stuffed Siamese cats for sale.

It was, of course, necessary to have a covering for the "animal" that would simulate closely the natural fur and markings. After much experimentation, Sidney Blumenthal & Company produced a pile fabric made of Du Pont Rayon—a fur fabric that might cause even a live Siamese cat to give a second look.

And, in accord with the fable, a good-luck ring is attached to the tail of each model. Each purchaser also receives a copy of the ancient legend which explains that good fortune follows the owner of the cat.

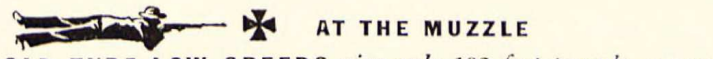
The F. W. Woolnough Company model—called "Feen-Feen"—will be on sale at the better department stores, gift shops, and other retail outlets. It is expected that they will serve as mascots, toys, for home decoration or for any ornamental purpose.

We've harnessed Greater Power for your .22 rifle!



100 YARDS FROM MUZZLE

KLEANBORE HI-SPEEDS (L. R.) *give 110 foot pounds energy*



AT THE MUZZLE

OLD TYPE LOW SPEEDS *give only 102 foot pounds energy*

Sensational Kleanbore Hi-Speed .22's give more smash 100 yards from gun than ordinary .22's give at muzzle

COST NO MORE!

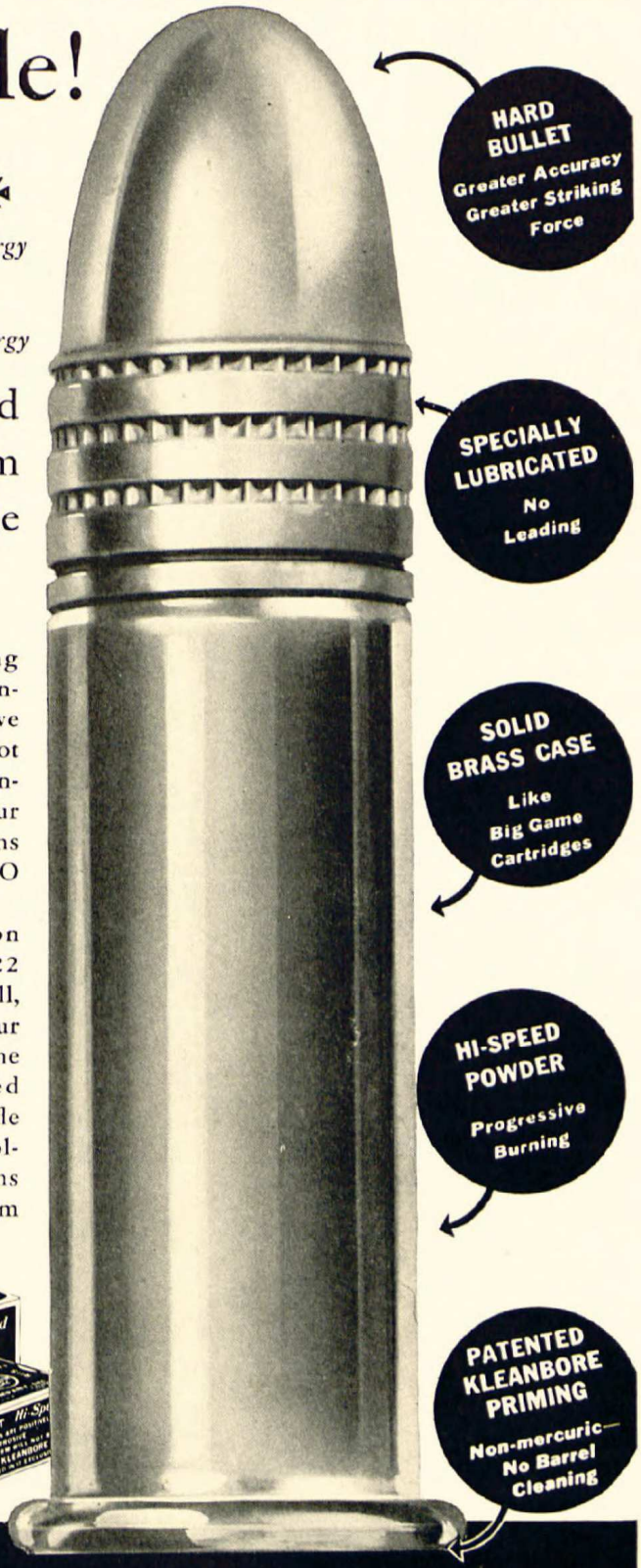
YOU'LL take new pride in your shooting skill once you try the king of .22's—Kleanbore Hi-Speeds. How they travel—flat, straight and true. With lightning-like getaway. With a business-like *zz-zing*. With a striking force *100 yards away* that more than equals that of old-type low speeds at the muzzle.

These .22 speed kings are built like big game cartridges—with solid brass cases. Strong—to hold the extra power of our special Hi-Speed powder. The lubricated bullet is special, too—extra hard for greater accuracy, greater striking force (shoot hollow point Hi-Speeds if you want an expanding bullet).

The quick-action priming is patented Kleanbore—non-mercuric, another exclusive feature. No matter how hot or moist the climate, Kleanbore will not fail. Harm your rifle? Never! And that means no rusting, no pitting, NO BARREL CLEANING!

Send for free folder on Remington Kleanbore .22 Ammunition or, better still, get the information from your dealer who sells the full line of Kleanbore Hi-Speed Short, Long and Long Rifle Cartridges, regular or hollow point. Remington Arms Company, Inc., 825 Barnum Ave., Bridgeport, Conn.





HARD BULLET
Greater Accuracy
Greater Striking Force

SPECIALLY LUBRICATED
No Leading

SOLID BRASS CASE
Like Big Game Cartridges

HI-SPEED POWDER
Progressive Burning

PATENTED KLEANBORE PRIMING
Non-mercuric—No Barrel Cleaning

Remington
DUPONT

KLEANBORE

REG. U.S. PAT. OFF.

America's Fastest Selling Ammunition

Washable du Pont "Tontine" Is an Essential Window Shade

This beautiful window treatment using a du Pont TONTINE washable shade is by Delineator Interiors. Valance, draperies and curtains are spotless and crisp. The du Pont TONTINE shade harmonizes perfectly with its immaculate surroundings.

To preserve this atmosphere of irreproachable cleanliness, it is essential that all the factors that go into the making of this beautiful window be cleanable. You can keep du Pont TONTINE clean as the curtains by scrubbing with a brush, soap and hot water. If you would like to have the name of the authorized TONTINE dealer in your city, write E. I. du Pont de Nemours & Company, Inc., Newburgh, New York.



DU PONT

TONTINE

THE *WASHABLE* WINDOW SHADE

FABRIKOID DIVISION
NEWBURGH, N. Y.

PRINTED IN U. S. A.