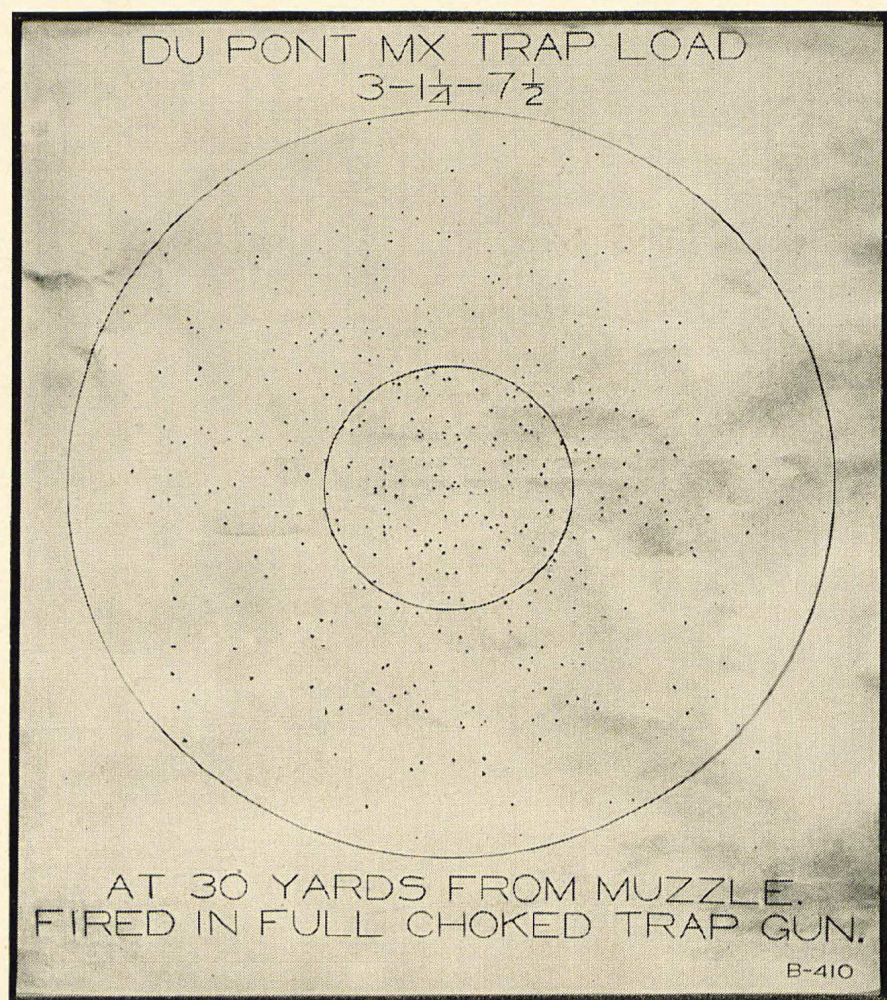




CONCENTRATED PATTERNS



Burnside Laboratory standard pattern circles—diameter inner circle 10 inches; outer circle 30 inches

DU PONT MX
REG. U. S. PAT. OFF.
SMOKELESS SHOTGUN POWDER
(multi-base)

*... the difference
between clean breaks
and chipped targets*

A GOOD, healthy, smashing break—when all you see is a disappearing puff of dust — who doesn't know the immense satisfaction of getting results like that?

A chipped target—with the edge just barely bitten into—well, such hits are marked up on the "good" side, but what shooter really likes them?

The difference between good and bad breaks lies in the pattern of the trap load. Only a powder which distributes shot uniformly . . which provides concentrated pattern . . can blow clay targets into dust.

DU PONT MX makes such a trap load. One of its chief advantages is "concentrated patterns." It is an advantage that shooters recognize as soon as they begin to shoot DU PONT MX. There are other advantages, of course. DU PONT MX leaves the gun barrel clean. It is unaffected by weather. Because of its balanced recoil, it is easy on the shoulder.

Specify DU PONT MX in your trap loads this year. It is a *better* powder.



THE DU PONT MAGAZINE

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MAY, 1934

No. 5

The Lafayette Centenary

We do well to honor the memory of a tried and true friend of the
American people

THE eventful career of Marquis de Lafayette, great friend of the American people, is brought freshly to mind this month because May 20th marks the 100th anniversary of his death. Soldier, statesman, valiant crusader for liberty, his services to the United States and to France were of a kind to earn the everlasting gratitude of both nations.

His interest in democratic institutions became apparent when he was only nineteen years old. On learning that the American colonists were fighting for independence, he resolved to go to their aid. He outfitted a ship at his own expense and with a group of companions prepared to leave his homeland.

Friends tried vainly to dissuade him; even the King forbade the trip, but Lafayette in disguise escaped arrest, sailed from a Spanish port, and after a six weeks' voyage landed near Georgetown, South Carolina in June, 1777. He offered his services to Congress, enlisting as a volunteer without pay. In August of that year he was made a member of George Washington's staff. Thus began a life-long friendship that profoundly influenced his career.

The brilliant Marquis proved his

mettle at the Battle of the Brandywine, where he was wounded, and after a six weeks' convalescence he rejoined the army, demonstrated his leadership and was made a major general. He remained with Washington during the fateful winter at Valley Forge, fought with valor at Monmouth and was an active leader in the field during 1778.

Early in 1779, he reentered military service in France, but returned the following spring with men, ships and supplies. Thereafter, he commanded a division of troops and served continuously until Cornwallis surrendered at Yorktown. Lafayette's part was praised in public by his beloved commander-in-chief, and with good reason, for the young man had contributed, not only his services but also about \$150,000 to the cause.

He returned to France late in 1781, but visited the United States in 1784 as a guest of the nation. Within the next five years he was destined to fight again for freedom in his homeland. During the French Revolution he was most active and influential, at one time controlling the destiny of the nation.

Nevertheless, the time came when he was forced to flee to Flanders to

avoid the guillotine. He was captured by the Austrians and held in prison from 1791 to 1797 when Napoleon secured his release.

After several years of retirement he again became influential in French politics. In 1824, he revisited the United States and was overwhelmed with honors. Congress voted him the sum of \$200,000 and a township of land for his services to the nation.

General Lafayette was a personal friend of du Pont de Nemours, and of his two sons. Victor was one of his aides for a time during the French Revolution, and E. I. du Pont was a member of the National Guard. It was therefore quite natural that General Lafayette should visit the family. In October, 1824, he attended the wedding of Victor du Pont's son at New Castle, Delaware, and in June, the following year, he was an overnight guest at E. I. du Pont's home. On that occasion he wrote in Eleuthera du Pont's album:

"After having seen nearly a half century ago, the banks of the Brandywine a scene of bloody fighting, I am happy to find it now the seat of industry, beauty and mutual friendship."

The following day he visited the old battlefield at Chadd's Ford.

(Continued on page 21)



One of the many scenic places along the new Trail Ridge Road. Note the rounded bank to prevent undermining and sloughing

Another Ute Trail Is Rejuvenated

- Indians alone once viewed the scenic wonders of Rocky Mountain National Park, but now any motorist can see them from the New Trail Ridge Road, built at a cost of \$1,250,000

By IVAN HOUK

THE old Ute Trail in Rocky Mountain National Park, north central Colorado, is again bustling with activity. But this time the sounds that penetrate the forests of fir and spruce are the hum of the motor-car and the honking of the automobile horn, rather than the tread of the moccasin. The narrow path of the early Ute has been converted into a well-built automobile highway, The New Trail Ridge Road.

The old one, which follows the summit of Trail Ridge from the grassy meadows west of the village of Estes Park to the headwaters of Colorado River, just across the Continental Divide, has been lying practically dormant for nearly a hundred years.

Many, many suns ago the Ute Indians occupied practically all the mountainous areas of the State, including the four hundred square miles now within the boundaries of this national park, which is about seventy-five miles northwest of Denver. At that time the Utes hunted and fished along the streams west of Estes Park, along the headwaters of Colorado River near the Never Summer Range, and along the shores of Grand Lake.

In those balmy days of old the Ute Trail felt the footfall of many an Indian pony as the painted braves and their trusty squaws traveled back and forth across the Continental Divide. But those days were not to

last. The Cheyenne and Arapahoe tribes, which lived on the plains east of the Front Range, joined forces, invaded the Utes in the Estes Park and Grand Lake regions, and drove them many miles to the west. Since then the old trail has been but little used. It has been lying in wait, as it were, for the gasoline braves of today.

Early histories of Colorado fail to show when the Ute Indians moved out of the mountain territory now included in Rocky Mountain National Park; or whether the Cheyennes and Arapahoes remained there long after defeating the Utes. However, available records do show that no appreciable numbers of Indians have lived

A typical view of construction work along the new Trail Ridge Road in Rocky Mountain National Park

on the eastern slopes of the mountains, since Joel Estes and his wife settled near the site of Estes Park village in 1860; or on the western slopes, along the headwaters of Colorado River, since Joseph Westcott built his cabin on the west shore of Grand Lake in 1867.

Old pioneers of the Grand Lake region tell an interesting legend regarding the abandonment of that section of the Rocky Mountains by the Ute Indians. As the story goes, the Arapahoes and Cheyennes attacked the Utes early one morning, while they were camped on the shores of the lake. The Ute braves put their squaws and papooses on a raft and sent them into the middle of the lake for safety; but a strong wind came down from the mountains, overturned the raft, and all on board were drowned. In the meantime, about three hundred Ute warriors were killed by the attacking party.

As a result of this unfavorable treatment by the gods of war and weather, the survivors of the defeated tribe concluded that the Great Spirit was angry with them. Consequently, they started a superstitious tradition about the place which has been handed down from generation to generation to this very day. The legend may or may not be true. Nevertheless, the Ute tribes have



avoided the park country since the first white man entered the valley.

The Indians, during the period of their occupancy, had some interesting and appropriate names for the more prominent topographic features of the region. For instance, Long's Peak and Mount Meeker, the highest peaks, which tower to elevations of 14,255 and 13,911 feet above sea level, respectively, were called "The Two Guides." They are located in the southeast corner of the park and are visible for long distances east of the Front Range as well as from nearly all the higher sections of the surrounding country. The valley in which Estes Park village is located was known as "The Circle," since it is surrounded by a ring of high mountains. The valley of the North Fork of the Colorado River, lying between the Continental Divide on the east,

and the Never Summer Range on the west, was called "Plenty-Jerked-Elk Meat." Specimen Mountain was known as "Mountain Smokes;" Old-Man Mountain as "Sitting Man;" Lily Mountain as "Beaver Lodge Mountain;" and Thatchtop Mountain, located just east of the Continental Divide, as "Where-the-Buffalo-Went-Up."

The story about Thatchtop Mountain is that a band of Arapahoes came into the park early one spring and saw a number of black specks high on its flattened summit. Climbing up the snow-clad slopes they found a herd of buffaloes that had evidently been grazing on the mountain side late the preceding fall and had been hemmed in by a heavy snow so that they had to spend the winter there.

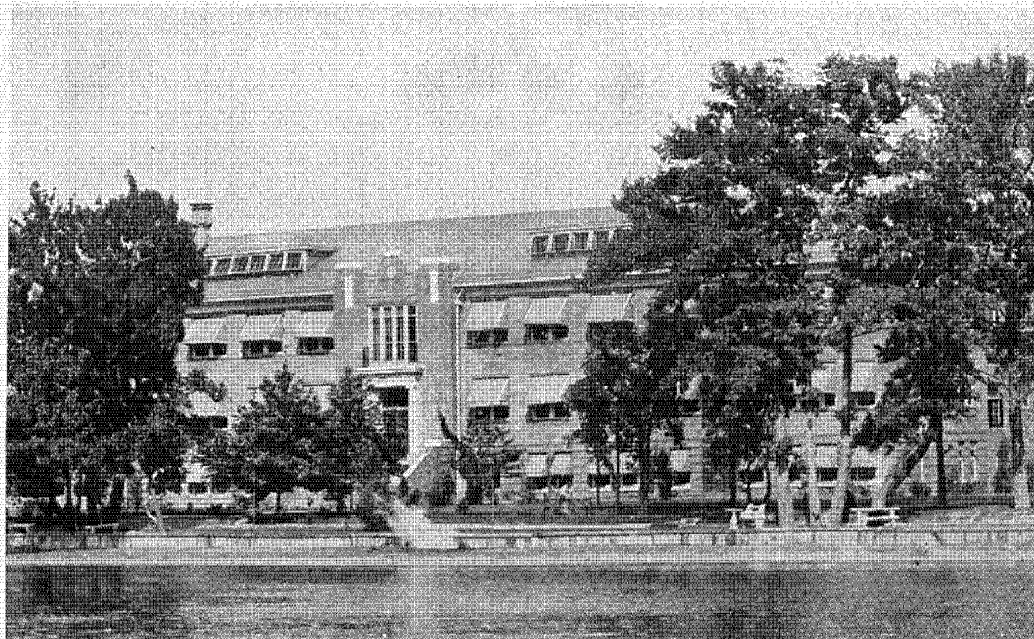
Rocky Mountain National Park can be reached by four automobile routes, three from the eastern slopes of the Front Range and one from the western slope of the Continental Divide. State Highway No. 16, running in a northerly direction from Granby, takes the motorist into the park by way of Grand Lake, Milner Pass, and Fall River Pass. This is the western entrance.

From the east the motorist can reach the park by the Big Thompson

(Continued on page 20)



Timber grillages were used to protect scenic cliff formations during the construction period. If all highway builders would follow the same practice, many a beauty spot could be preserved along our public roads



The Technical Laboratory of the du Pont Company at Deepwater Point, New Jersey, where dyestuffs are tested under plant operating conditions for fastness and other properties

Fast and Fugitive Colors

- Some facts and figures furnish a background for pertinent information about dyestuffs and fast-color guarantees . . .

By GEORGE H. JOHNSON

Director of Research, American Institute of Laundering

IT is unfortunate that the American consumer often still thinks that domestic dyestuffs are inferior in quality to those formerly imported from Germany. This belief unfortunately was strengthened more or less by experiences that occurred, especially during the World War. At that time many color troubles were encountered. Stockings, shirtings, gingham and percales often faded after a short period of wear or a few washings.

The public, today, is not aware that in 1914 the United States was producing only about ten per cent of the dyestuffs needed by American industries. When war came ninety per cent of the available color supply was cut off at once. In an attempt to cope with the situation, dyestuffs that had been abandoned for years in favor of faster colors were taken

from warehouses and mill storerooms and used. Even colors originally manufactured for the tinting of paper were sold to textile mills. In other words, they were used for the purposes for which they were never intended. The very colors the public condemned as being cheap, inferior, American-made dyestuffs in many cases actually came from Germany.

Another point should not be overlooked. Each organic dyestuff is a definite chemical possessing certain properties of its own. Wool Red B made in the United States, for example, is the same as Wool Red B made in Germany. True, their names may be entirely different, but a name makes a dyestuff neither better nor worse. Germany, as well as the United States, produces fugitive colors, public opinion to the contrary notwithstanding. The United

States, as well as Germany, manufactures fast colors. Indigo, for example, is produced in this country in tremendous quantities, and it is just as fast as the product imported from overseas before the war. Whereas in 1917, only 274,771 pounds of indigo were produced in the United States, 24,326,403 pounds were manufactured in 1930.

When the British blockade prevented the importation of German dyestuffs, makeshifts had to be employed in American industry. This again often caused misunderstanding among consumers. Those dyestuffs that were comparatively simple to make were manufactured at first to help meet the immediate demand. Meanwhile, research was carried on feverishly in an endeavor to produce faster colors. Additional capital was invested and new enterprises

were launched. As crudes and intermediates became more and more plentiful, greater progress was made. As soon as a faster dyestuff was produced successfully on a commercial scale, it was placed on the market to replace a more fugitive color. This practice has continued until in 1930 the United States supplied ninety-four per cent of the dyes actually consumed in America. In addition, more than 28,000,000 pounds of dyestuffs were produced for export. This growth is phenomenal, considering that in 1913 there were only seven small firms in existence in the United States, producing about ten per cent of the dyestuffs needed by the paper, textile, ink, paint and leather trades, and for the most part these were made from intermediates that had been imported.

Table I shows the dyestuff production of the United States for certain years between 1917 and 1930 in comparison with 1914 when the bulk of the coloring matter used in this country was imported.

The outstanding feature of the recent dyestuff output of domestic manufacturers is the increased quantities of reduction vat and other fast dyestuffs that are being placed on the market. This increase in consumption of the faster colors is indicative of the fact that the public is interested in fast colors and is willing to pay for the slightly increased cost of garments that have been dyed or printed with consumer-satisfying colors. Up to the period of the depression, the amount of vat dyestuffs consumed increased each year. It is to be hoped that converters, dyers and printers will not run the risk of destroying consumer confidence in "guaranteed fast colors" by reverting to the use

II. UNITED STATES DYESTUFF PRODUCTION BY CLASSES*			
Type	Quantity Produced in Pounds		
	1928	1929	1930
Acid.....	13,469,597	14,196,815	11,457,235
Basic.....	5,374,099	5,899,970	4,649,898
Direct.....	19,533,095	21,622,907	17,553,462
Lake and spirit-soluble.....	1,821,492	2,724,712	2,560,936
Mordant and chrome.....	4,403,934	4,846,228	3,137,164
Sulfur.....	19,001,910	22,605,799	14,232,076
Vats (including Indigo).....	32,375,812	38,784,337	32,304,300
(a) Indigo.....	25,861,680	29,320,270	24,326,403
(b) Other vats.....	6,514,132	9,464,067	7,977,897
Unclassified and special.....	545,512	740,737	584,929
TOTAL.....	96,625,451	111,421,505	86,480,000

* Table prepared originally by Chemical Division of U. S. Bureau of Foreign and Domestic Commerce.

of cheaper and often-times more fugitive colors in an effort to lower dyeing costs.

Table II gives the domestic production of dyestuffs by classes and, in addition, shows the import of dyestuffs for consumption.

The pounds of dyestuffs imported and their value follow:

Year	Pounds	Value
1929.....	7,316,605	\$8,154,435
1930.....	4,939,676	5,246,616
1931 (9 months)....	3,975,021	4,388,430

The domestic consumption of vat colors other than indigo, during recent years, is as follows:

Year	Pounds consumed
1914.....	1,945,304
1926.....	4,660,449
1927.....	6,650,422
1928.....	8,055,680
1929.....	10,813,948

These data refute the often-heard assertion that colors "used to be better," for the 1929 consumption of fast vat colors is many times the amount used in 1914, when practically all dyestuffs were being imported.

After all, fastness depends on the colors chosen for use by the dyer and printer. This choice, incidentally, is somewhat dependent

upon the price that is being paid for coloring and finishing. The dyestuffs manufacturer has little to do with the choice of colors. All he can do is to produce colors for which there is a demand and at the same time foster the use of better colors. The misrepresentation of fugitive colors as "fast" cannot be laid at the door of the American dyestuff manufacturer any more than it can be placed upon the shoulders of laundry owners and dry-cleaners. Color fastness is governed largely by the properties of the dyestuffs that are used and by the method of application.

WHAT IS THE COLOR SITUATION?

It may be said that the present interest in fast colors has resulted chiefly from consumer demands. Housewives have largely become color conscious. Just as they are no longer content to wear cotton hose—they prefer rayon and silk—so they are demanding fast colors.

This is shown by the returns of a nation-wide questionnaire directed to women by the *Good Housekeeping Institute*. In a preliminary survey conducted as long ago as 1926, it was reported that more than eighty per cent of women purchasers were asking retailers for fast colors. Although in many cases the colors sold as fast had faded, only about two per cent of the total number of consumers reported that they returned the fabrics to the point of purchase. In the 1928 survey, nearly thirty per cent reported asking for adjustment when so-called "guar-

(Continued on page 20)

I. UNITED STATES DYESTUFF PRODUCTION*				
Year	Number of firms	Pounds of dyestuffs produced	Value	Average price per pound
1914.....	7.....	6,619,729.....	\$ 3,470,096.....	\$0.37
1917.....	18.....	45,977,246.....	57,796,228.....	1.26
1918.....	78.....	58,464,446.....	62,026,390.....	1.06
1927.....	55.....	95,167,905.....	37,115,483.....	0.39
1928.....	53.....	96,625,451.....	40,582,589.....	0.42
1929.....	54.....	111,421,505.....	47,909,247.....	0.43
1930.....		86,480,000.....		

* Based on U. S. Tariff Commission reports.

Keep the Cobwebs Off Your Guns

- New sports furnish rifle shooters with open-season thrills as moving targets representing large and small game come into view on the range . . .

By C. B. LISTER

Sec'y-Treas., National Rifle Association

No one would consider buying an automobile, even an inexpensive, second-hand car, driving it once and then allowing it to accumulate dust and rust in a garage. There would be too much pleasure taking the car out frequently and driving it, and too much of an investment involved to allow it to go unused.

It is strange how many gun owners have as much money tied up in guns as they would invest in a low-priced car, and yet these guns are permitted to stand for the greater part of each year in a closet or gun cabinet, collecting dust and perhaps rust. Why are they not used regularly, so that the owner can collect the full dividends of recreation and good fellowship to which his investment entitles him?

The introduction of Skeet has shown thousands of shotgun owners how to enjoy their guns throughout the year just as much as they enjoy them during the open season for ducks and upland birds and game. Until recently, rifle and pistol owners, men who bought their guns primarily for hunting purposes, have not had any sport, other than shooting at station-

ary paper targets, to keep their guns in use to advantage the year round. There has been a definite impression among sportsmen that rifle and pistol target shooting was a rather dull, uninteresting pastime because of the employment of these stationary bull's-eye targets. This situation has already been partially changed and will probably be entirely changed during the 1934 outdoor shooting season.

For the benefit of the owner of the .22 caliber light hunting rifle, Gofort has been introduced, using silhouettes of crows, gophers and similar vermin. These targets appear at ranges varying from twenty to fifty yards out of the grass or brush and are immediately knocked down when hit. The targets are operated from a central trap behind the firing line, and many of the elements of small-game shooting in the field are well simulated.

The muzzle heavy .22 caliber target rifles are not so well adapted to this snap-shooting sport as the light hunting-type rifles, so that thousands of owners of the light-weight .22's now have an opportunity to get out into a field during the long summer evenings

or over the week-ends and shoot to their hearts' content.

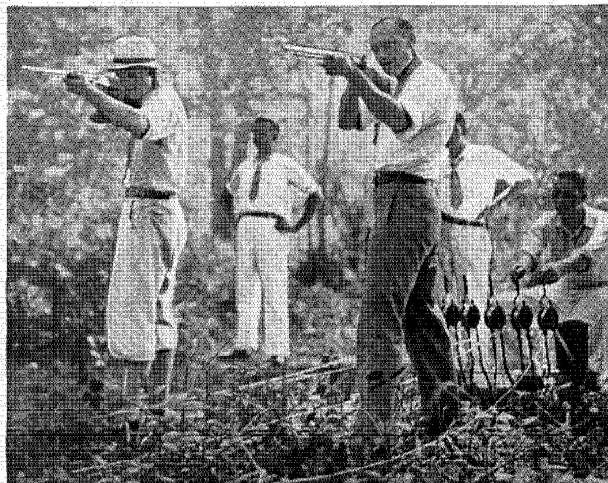
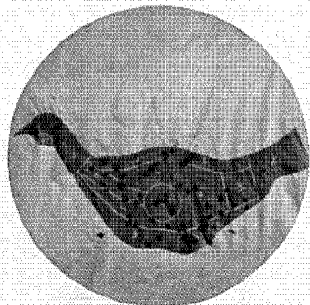
Gofort, like Skeet, while providing many of the interesting angles of actual field shooting, also adds the benefits of organized competition. In addition to disappearing targets, it is expected that rapidly-moving ones simulating rabbits or weasels scooting through the grass will also be added to the Gofort range set-up during the next few months.

The cobwebs appear likely to be brushed off many a .22 caliber hunting rifle this year, and investments of ten to thirty dollars will begin paying dividends to their owners.

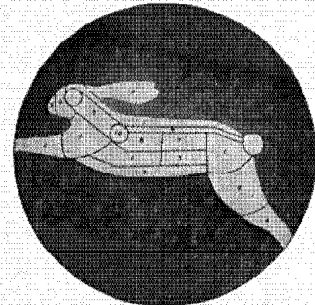
The need of a similar form of sport for owners of high-powered hunting rifles becomes even more apparent with the development of Gofort. The problem seems so comparatively easy that we wonder why it was not solved long ago. We may visualize a hunting range as one that will include a running-deer target, two or three rising-bear targets and perhaps a charging bear. All these ideas have been put into successful practice as individual units of equipment installed by va-

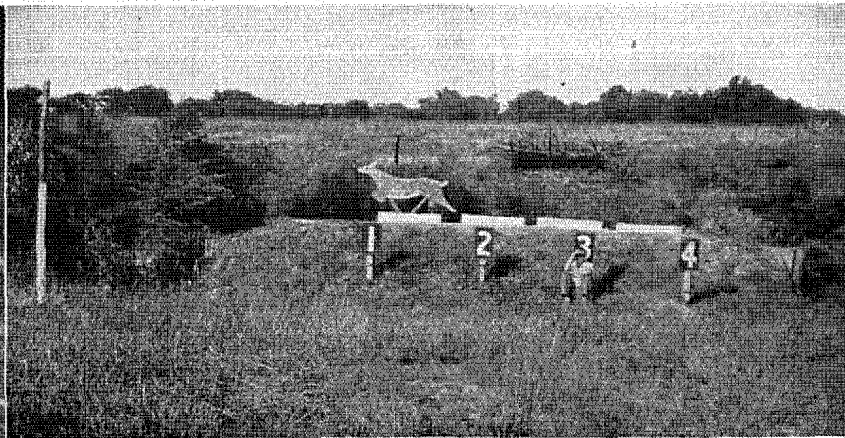
Right — Shooting Gofort in a typical woods setting. Note the target-operating equipment and the use of light rifles

Below — A turkey target used by a Massachusetts Rifle Club in one of its interesting matches



Below — This rabbit target is stationary, but it takes a good shot to score a "ten." The high numbers, of course, indicate the most vital areas corresponding to the smaller rings of the conventional bull's-eye





rious rifle clubs for many years past.

Various kinds of running-deer targets, operated in as many different ways as the ingenuity of club officers could devise, are to be found in almost every locality where the rifle club members are deer shooters. In other clubs we find rising-bear targets popping out from behind trees or bouncing up from behind logs and operated by all manner of mechanisms and manual labor. In one or two cases clubs have devised a charging bear or other animal that runs straight at the shooter until a metal plate suspended behind the target is struck by a bullet. The shock of impact is sufficient to halt the career of the "animal."

But in no case have all these ideas been incorporated on one range, and there is no standard equipment available nor any standard set of rules and regulations to turn this rather haphazard form of target practice into a competitive game.

The National Rifle Association now has a standardized form of running-deer equipment under test and will supplement this with rising bear, and it is to be hoped that some kind of a "charging" target can also be designed with target carriers and operating equipment that will be safe enough and rugged enough to meet the requirements of the Association.

However, a local shooting club need not wait for official specifica-

tions for a range of this kind. In every sportsmen's club there is usually some individual with a special talent for making such contraptions work.

Running-deer targets can be operated with garage-door hangers from an overhead track or by suspending the target from ordinary pulley wheels strung from an overhead cable, or they can be run on a wooden or well-packed cinder track, using a carriage mounted on discarded bicycle wheels. In some clubs the "deer" is even mounted on the end of a rake handle, and each shooter takes his turn in running the length of the target pit, carrying the deer in the air over his head! After a few such trips, when the shooter goes to the firing line, he is in much the same condition for a quick shot as he would be if he had scrambled up and down a brush-covered mountain for three or four hours looking for a deer!

The primary essential of a running-deer range, of course, is adequate protection for the men who operate the drive pulleys or who carry the "deer" over their heads. If the operator is not located in a pit, he should be behind a barricade of at least six feet of a well-settled dry earth.

Left — A Gofort gopher target exposed, but the sportsman must shoot quickly, for it drops down out of sight in just five seconds

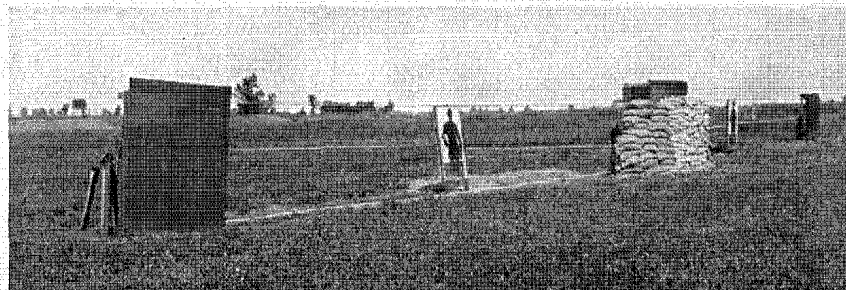
Right — A "running-deer" target in action on the American Legion and Civilian Gun Club range at Struthers, Ohio

A rising-bear range calls merely for a pair of stout hinges firmly fastened to a "dead man" well anchored in the ground behind a log or in a clump of bushes. The bear is cut from a piece of builders' board in such size and shape as meets the fancy of the local shooters. It is jerked up into position with a piece of sash cord by someone standing behind the shooter at the firing point. The ranges where this kind of shooting is done can depend entirely on the ability and equipment of the local marksmen.

The official running-deer range, when rules are finally issued by the National Rifle Association, will undoubtedly be 100 yards, and the deer will travel across an exposed space of about 25 yards in perhaps five or six seconds. The rising-bear targets will probably be placed at ranges of 70 to 125 yards and will be exposed for a period of three to five seconds.

(Continued on page 15)

At Camp Perry, Ohio, policemen are trained to shoot straight. This view shows a running-man target. Note particularly the cables and the running-track line



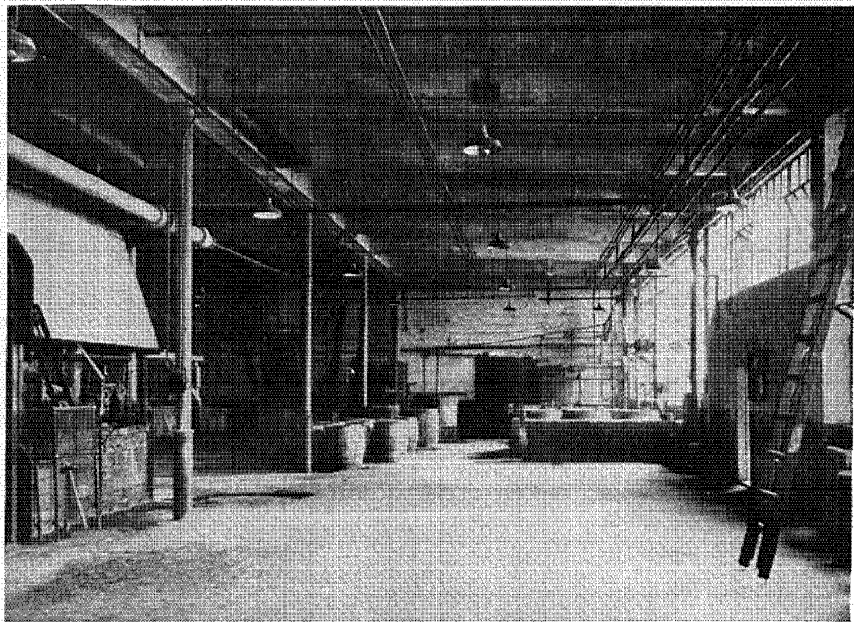
Poor illumination is poor business. Countless plant surveys show that inadequate lighting is responsible for accidents, waste and spoilage; that it encourages employee inefficiency and results in excessive production costs

INDUSTRY today is just awakening to the vast importance of better light as a production aid and as a morale builder for workers.

After surveying 1,907 industrial plants, the Edison Electric Institute found that the average intensity of light in these factories was only 2.85 foot-candles — hardly enough for casual seeing, let alone careful workmanship. That seems meager indeed when you consider that near a window in the daytime 200 foot-candles are commonly recorded. Outdoors in the shade 1,000 foot-candles are registered.

Some industries have made notable strides in improving lighting conditions. The textile group, the leather goods industry, the printing and paper trades and some branches of the food industry are notable examples. Industry as a whole, however, seems slow to realize that better illumination means increased efficiency, improved production, fewer accidents and happier workers.

The effect of proper illumination on production is so positive it is a wonder that there are any dark places left in industry. Poor light puts workers under a strain; fatigue sets



Better Light—Better Sight

- The high cost of poor lighting comes out of profits. Better lighting pays dividends

By DONALD BAUDER

in sooner, loss from "rejects" is excessive, fewer units are produced. On the other hand, improved illumination speeds up production, reduces work hazards, results in lower costs all around.

In most factories today, production heads are proud of their low-accident records. Wonderful strides have been made in improving conditions, yet too many injured workers say, "I didn't know I was so close," or "I couldn't see what I was doing." Good light is good insurance against accidents.

Well-lighted plants are kept cleaner. In the dull, dingy factory, workers grow careless; tools are not returned to their proper places, waste is thrown on the floors, dark corners fill with refuse. But dirt does not fit into a brightly-lighted plant; it is too evident. The well-lighted factory not only looks cleaner—it's bound to be cleaner.

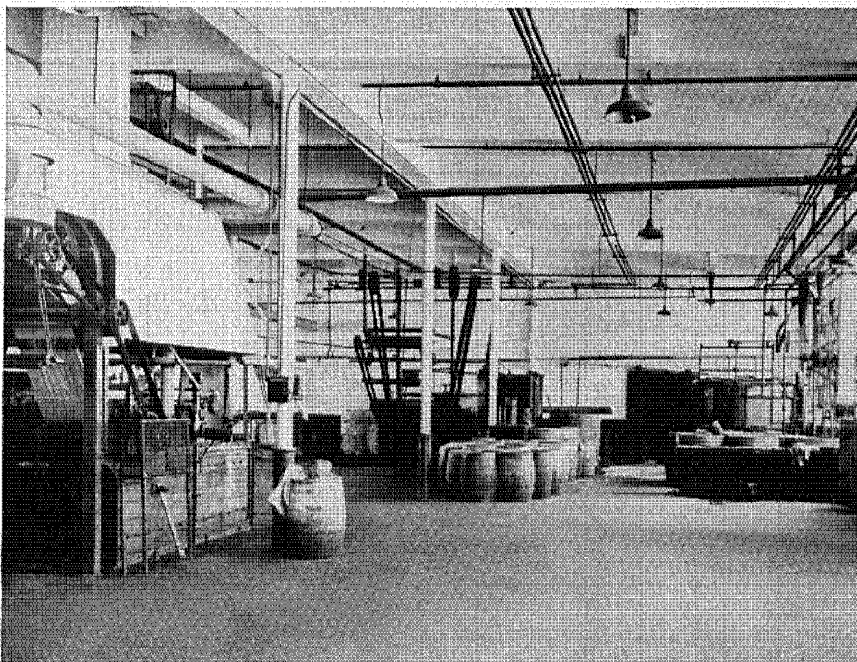
The workers in a properly-lighted plant are more apt to be happy workers. Eyes are essential tools. When poor lighting dulls their edge, the worker suffers — the manufacturer suffers. Proper illumination means less energy expended for a given piece of work. Contented workers are an employee's best capital.

"Better Light—Better Sight" are efficiency companions. They mean dollars earned by increased production.



This ingenious device, used for making illumination surveys, measures light intensity in various parts of the plant

COURTESY WESTINGHOUSE ELECTRIC & MFG. CO.



Good lighting is good business. This is the same factory interior illustrated on the opposite page, but shown here after it had been given the "sunlight treatment" with Mill White finish. No more light enters the windows, yet the difference is strikingly apparent.

Paint for Better Light

- Du Pont recommends "Dulux" Mill White—the mill white that stays whiter—for better light today and for years to come

superiority in original whiteness, in durability, ease of application, hiding power, coverage, gloss, and resistance to dirt and hard wear.

With these requirements in mind, du Pont chemists developed "Dulux," the new Mill white that stays whiter. The unusual properties of this finish are due to the use of an entirely new vehicle — "Dulux" vehicle — and a totally different combination of mill-white pigments.

Because it is whiter, "Dulux" reflects more light at the start; it has given a new meaning to the word white. In addition, "Dulux" actually stays whiter. It resists the elements which tend to yellow ordinary mill whites. It gives maximum light reflection not only at the beginning, but throughout its long life. And, because it dries to a hard, smooth, tile-like surface, free of brush marks, it stays cleaner, giving little footage to dust particles.

As might be expected of a finish having all these qualities, "Dulux" cuts maintenance costs. It can be washed repeatedly without injury. It stands unusual abuse. Fewer paintings are necessary. And that is true economy.

To the industrial executive who is alert to the dollars-and-cents value of proper lighting, the du Pont Company commends without reservation this new factory finish. "Dulux" Mill White is offered in Gloss, Eggshell, and Flat Undercoater for every interior need.

BEWARE of walls and ceilings that have grown dark and dingy! They are the sneak-thieves that steal light—the precious kilowatts that you have intended to turn into increased production.

Walls coated with "factory film" absorb up to sixty per cent of the light that strikes them. And worst of all, this film gathers so slowly, so slyly, that you hardly realize you are being robbed.

White paint is lighting's greatest aid. Once paint was considered merely as decoration. Today, it is considered a definite part of a factory's lighting equipment.

White-painted walls reflect the maximum of light. Even in brightly-lighted areas, reflected light plays an important part in giving a more even distribution of illumination and in

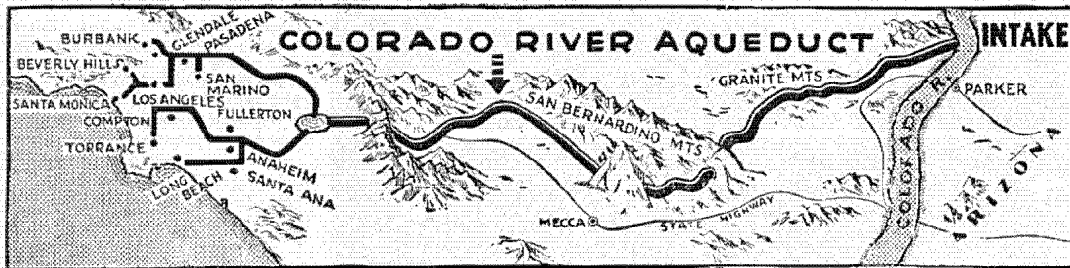
eliminating glare. Workers see more clearly when their work is evenly illuminated; strong lights cause glare with resulting eye-strain and fatigue. Were it not for reflected light, objects not directly lighted could not be seen at all. White-painted walls and ceilings help to "round out" the lighting of any room.

The requirements placed on white paint by industry are particularly severe. The industrial engineer says, "I want the whitest finish that can be made. More than that, I want a finish that will stay white. The mill white I choose must give me better lighting, better appearance, better protection, at lower cost."

That's a large order. It means

"Dulux" Mill White can be applied by brush or spray. It dries quickly—gets painters out of the way in a hurry





COURTESY NEA SERVICE

Carrying a River Across Mountains and Deserts

Miles of du Pont "Ventube" are being used to supply fresh air for drillers on the record-breaking tunneling jobs of the Colorado River Aqueduct

By J. L. LOVELL

IN one of the greatest engineering undertakings of all time, part of the flow of the Colorado River is being diverted to Cajalco Reservoir, near Los Angeles, 241 miles away.

From its intake near Parker, Arizona, more than 100 miles below

Boulder Dam, the aqueduct threads its way across the great desert and the mountain country of Southern California to the storage basin at Riverside, from which point the water will be distributed. Mountains have to be pierced, canyons bridged. Tem-

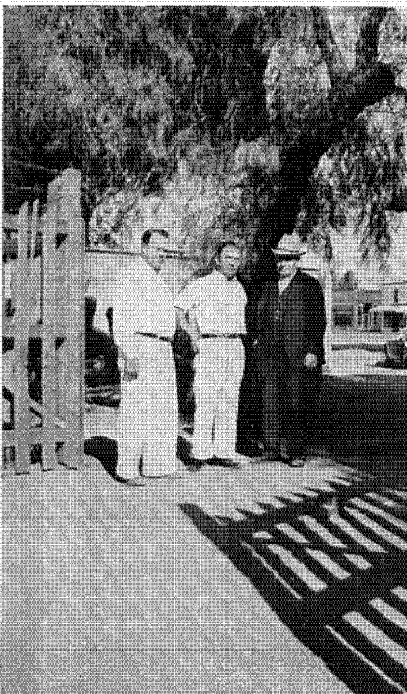
peratures as high as 140 degrees in the sun are encountered. All of man's building science has been called into play to bring this gigantic undertaking speedily to a finish.

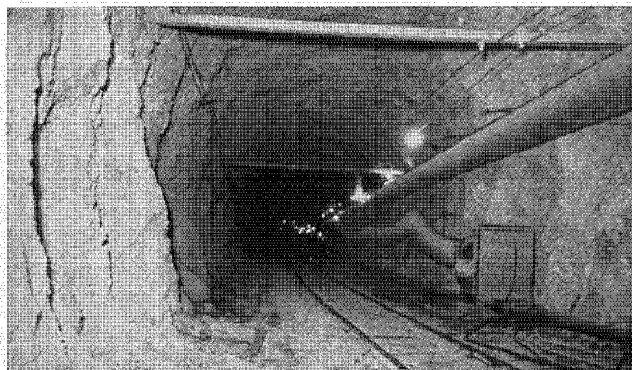
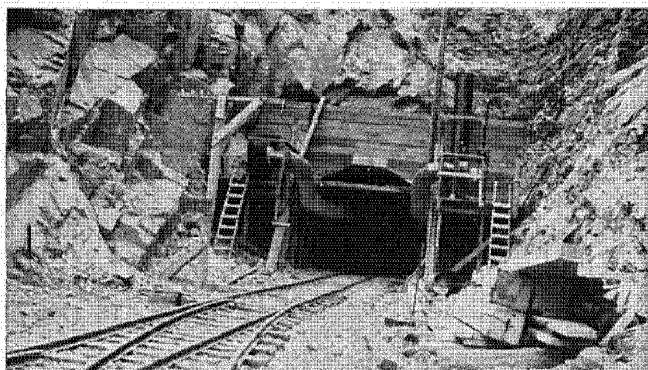
The entire project will cost \$220,000,000. This will provide not only for the building of the 241-mile feed aqueduct but for the construction of the additional 210 miles of distributing aqueducts that will serve the thirteen cities comprising the Metropolitan Water District of Southern California.

The construction work necessary for providing communications, water and power before a single tunnel could be started represents a major construction job in itself. The District built 175 miles of oil-surfaced road at a cost of more than \$1,000,000. These were primary routes only, and the seventeen successful contractors for the tunnel driving had to construct many additional roads before they could begin their work. A water supply system costing \$700,000 was established to serve 200 miles of the aqueduct route. Almost 450 miles of high-voltage transmission line has

Left—The San Jacinto Tunnel is being constructed by Wenzel & Henoch Construction Company. Left to right, Walter Hart, chief engineer, Walter Hoenecke, general superintendent, and Otto Seefeld, general manager

Below—Site of Parker Dam, the intake for the Colorado River Aqueduct. The view looks upstream with Arizona on the right and California on the left. Note the diamond drill boats on the river





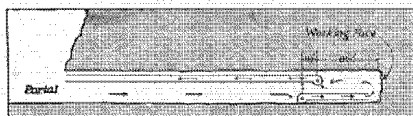
been erected to carry power into the construction camps. More than 330 miles of telephone and telegraph lines were installed in extending communication facilities to every camp.

Along the line of the aqueduct will be sixty-five miles of lined canal across deserts, fifty-six miles of covered conduit, and approximately ninety-one miles of sixteen-foot diameter tunnels, made up of twenty-nine individual bores through the mountains. Tunneling presents the greatest difficulties on this job, which has been termed the most extensive tunneling undertaking ever attempted on any engineering project. The tunnels range in length from 325 feet to eighteen miles, and have to be driven through all types of rock and soil, at greatly varying depths.

The thirteen-mile San Jacinto tunnel, in which the two shafts are 44,000 feet apart, represents one of the longest boring jobs in history. It has, therefore, become the tunnel laboratory of the world. New methods and new equipment have been

Left—Copper Basin Tunnel Adit, with 15-h.p. low-pressure Buffalo blowers exhausting the air from each heading through 22-inch steel pipes.
Walsh Construction Company

Right—Whipple Mountain Tunnel, showing the du Pont system of ventilation as used on all the Walsh work. Five-h.p. blowers force fresh air to the heading through 20-inch "Ventube," and the smoke is picked up some 500 feet back by the metal line and carried off to the portal



This rough sketch illustrates the du Pont system of tunnel ventilation. As the work advances, both blowers are moved up every 700 to 1000 feet and set up at a safe distance back from the face. Note the constant one-way flow of air and the short section to be ventilated. With motors developing a total of 20-h.p., one mile of large-diameter tunnel may be ventilated efficiently

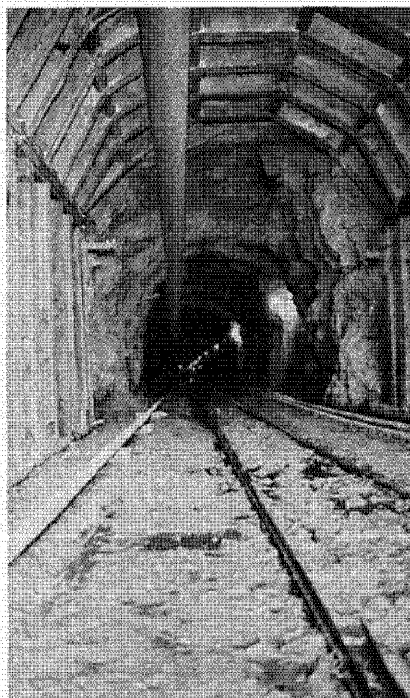
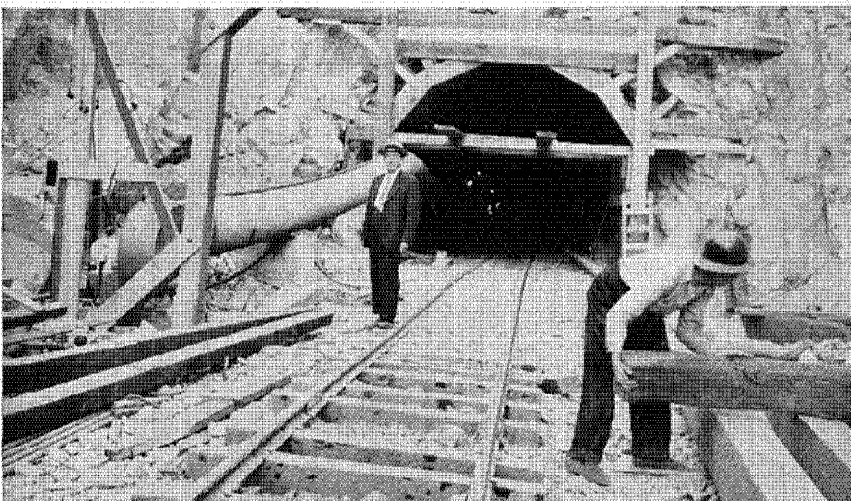
Below—The first ventilation of the Copper Basin Tunnel, with a 10-h.p. low-pressure Buffalo blower delivering fresh air through 20-inch "Ventube."
Walsh Construction Company

Right—In the Bernasconi Tunnel, where 20-inch du Pont "Ventube" conducts the much-needed fresh air to the men working at the heading. The line is carried high in order to pass the King "grasshopper" at the face.
Hamilton & Gleason Company

given opportunities to prove their worth, while equipment with established records of performance has of course been awarded its share of the job.

One of the most important tasks in the driving of tunnels is to insure the men at the working faces an ample supply of fresh air. Du Pont "Ventube" is being used for this purpose in a great many of the individual tunnels on the Colorado River Aqueduct. Contractors are finding it an invaluable aid in pushing their work forward with record speed. Just prior to blasting, it is removed, and immediately after blasting set up again so that it impinges a stream of fresh air on the working face, driving away gases and permitting the quick return of the workers.

(Continued on page 19)



Some Familiar Products Appear in a New Line

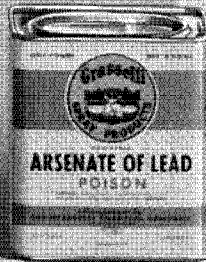
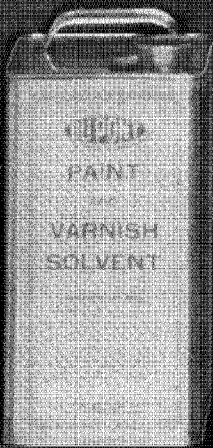
For identification purposes we show
and as they now go forth to market,
catch your roving eye when you are

HARDLY more than a generation ago manufacturers paid little attention to the packages that carried their factory products to market. If a container protected the goods in transit through the usual trade channels to the consumer's home, what more could anyone expect? Utility was the prime consideration; appearance was secondary. Only in isolated cases did a manufacturer attempt to make his package attractive through the arts of design or decoration.

Today, modern packaging is an essential factor in merchandising products of every kind, with special emphasis on display value. Only those that are well dressed are given space on the dealers' shelves, which is another way of saying that art has gained a definite place as a sales stimulant. In the battle for business the package that combines beauty, utility and convenience is a major sales weapon in merchandising campaigns.

We are assured that eighty-five per cent of all sales are made through an appeal to the eye, and that opens the gate wide for package designers to apply their skill in a very broad field. Developing a container for a new product or restyling an old one is not an easy task. It involves an intimate knowledge of the product, and the many conditions surrounding its manufacture, sale and use. In designing a container, questions of size, shape, texture, color and the like have to be considered carefully. But if the work is done expertly, the result is usually a package that wins the consumer's acceptance and patronage.

Some of the packages in the new line are the most attractively designed yet. The new Zero One Anti-Rust Anti-Freeze is a new name for the old "Manganor Rust Inhibitor" and is the one-gallon "Zero One" container.



New Dress and Respectfully Bid for Your Attention

ses we show the packages as they were
 uth to market, more becomingly attired to
 when you are seeking products of quality

Notable strides in package designing have been made during recent years. A wealth of new materials has come into use with a more advanced technique in their application. In many instances containers not only protect and display merchandise effectively, but are also designed for re-use. Packaging standards generally are moving to higher levels under the pressure of sales competition.

The illustrations show some of the package changes made by the du Pont Company and certain of its subsidiaries during the past year. In new dress they reflect the modern trend toward simplicity of design and better display of product names. Unfortunately, the new color effects cannot be reproduced here, but most of these containers are in colors selected for their special appropriateness.

Incidentally, some of these units were shown at the American Management Association's Fourth Packaging Exposition, held in March of this year at Hotel Astor, New York City. Hundreds of packages were entered in the competition and awards were made on points of merit as determined by a distinguished body of judges. The "Zerone" unit, with its non-spillable spout, was accorded second place, and the Aluminum Paint can, third place in the "tin container" group, while the "No. 7" cans won second place in the "family group."

But that is aside from the present purpose, which is to show these products in their more attractive dress, so that you may be able to identify them more readily.



of the packages in these illustrations are
 ners on the market, notably "Dutox" Cleaner and
 for automobile furniture, and Thickote, an
 heavy black paint intended chiefly for use
 and bodywork on auto tops. "Floragard"
 w name chosen for product formerly known
 angonier Rose. New also to consumers is
 3-gallon "Zerone" container.—Editor



Some Unusual Applications of "Cellophane"

- Perhaps you know of others equally noteworthy, for ingenious people are always finding new uses for this cellulose film . . .

By ROLAND HINTERMEISTER

FIRST place on the list of unusual uses of "Cellophane" we unhesitatingly award to the anonymous builders of the bird-nest shown in the accompanying illustration. Who knows, possibly even the birds have noticed the modern trend toward transparent wrapping and have decided to keep some "Cellophane" handy for wrapping their future broods. The nest was recently found near Gouldsboro, Pennsylvania.

Out of another Pennsylvania town comes the news that a beautiful "stained-glass" window decoration was created in the local library by

the simple expedient of cementing strips of colored "Cellophane" to an ordinary window. Attractive design was achieved through variations of color and by separating the areas with black-painted lines simulating the appearance of leaded glass.

From the field of medicine we hear that an operating mask of moisture-proof "Cellophane" is the latest thing. Doctors claim that masks of this type are practically germproof as compared with the ordinary gauze mask. This cellulose film is also being used as a protective covering for wounds, so that a physician or nurse

may look through it and observe the various stages in the healing process without first removing the bandage.

Recently a sportsman wrote us a glowing letter about his success with "Cellophane" as a fish lure. He discovered this use by accident when he lost his bait box and decided to try the shiny wrapper from his cigar.

Motorists are using amber "Cellophane" on auto headlights, having found it renders them more efficient in penetrating fog. The idea is based upon the principle that yellow light has a greater penetrative depth in fog than white light.

During the past winter "Cellophane" was also used by many motorists to prevent the formation of frost on wind-shields. This was accomplished by fastening a sheet of the material to the inside surface of the glass, using adhesive at the edges only. Frost formation was prevented by the dead-air space left between the "Cellophane" and the glass.

Farmers are now using "hot caps" made of "Cellophane" instead of oiled paper to protect cauliflower plants and other vegetables during early stages of their growth. Complete visibility of the plant and passage of ultra-violet rays are advantages of the new-type cap.

Perfect roses are being grown by placing a small bag made of "Cellophane" over the tender buds to guard them against sudden changes in temperature and the ravages of insects. This same form of protection has also been applied with success in the raising of fruit, to insure a first-grade product.

Coin wraps of "Cellophane" are now used in place of opaque paper to facilitate easy counting and the detection of "slugs."

Turning to the field of art, we find

"Cellophane" on a priceless museum piece at the Metropolitan Museum of Art in New York City. Here it is



Bags of "Cellophane" are being used to protect rosebuds against sudden atmospheric changes and the attacks of insects. Note one of the holes at the base of this bud to allow free circulation of air

used as a covering for a gold and satin bedspread two and a half centuries old. It appears on the historic

Charles II bed from Rushbrooke Hall, England. Curiosity tempts many visitors to touch the spread on this lovely antique, but "Cellophane" wards off the inquisitive fingers. It shields the object effectively while also showing it.

From art to archaeology—and again we find "Cellophane" doing duty. A well-known explorer who recently returned from an expedition into the Honduran Jungles brought back with him more than six hundred specimens of Indian ethnology which were individually wrapped in "Cellophane." This was done not only for protection, but also because the specimens could be readily identified through the transparent wrapping.

The foregoing is a mere "sampling" of the many unusual uses of "Cellophane" which have come to notice during a comparatively short period of time. People are just beginning to learn how many ways there are to take advantage of its unique properties. More and more we find revealing evidences of its adaptability to many activities in widely divergent fields, some of them never before dreamed of as possible avenues of consumption.

Keep the Cobwebs Off Your Guns

(Continued from page 7)

With such equipment installed at the base of a protecting hillside and with all rocks that might cause ricochets carefully removed behind the targets, any sportsman can enjoy in fifty-two weeks many of the thrills he now gets only once a year on his annual hunting trip. Furthermore, he will enjoy throughout the year that companionship and good fellowship which is one of the basic reasons why men undergo the mild discomforts of a modern big game expedition.

Another important advantage of this type of shooting is that regular practice enables the sportsman to handle his gun safely and also keeps him from being a menace to his companions in the woods during the hunting season.

For the pistol shooter there can be developed the same type of moving

and disappearing targets. As a matter of fact, Gofort with its present equipment can be used for all types of handgun shooting up to and including the .38 Special. The targets are not rugged enough to handle the .45's. Running-man targets, built in exactly the same way as the running-deer targets, have been used for several years for police instruction, and a charging-bandit, similar to the charging bear, has been used by at least one pistol club.

No sport seems to have the inherent appeal to Americans that shooting does. It is unfortunate that so many sportsmen have felt that they could enjoy it only once a year. As has been rather sketchily indicated, there is no good reason why the millions of dollars which are tied up in firearms in this country should not be made to work regularly for the pleas-

ure and mental and physical benefit of gun owners.

The National Rifle Association will be glad to assist any sportsmen's club or sporting goods dealer in the development of ranges that will make it possible for sportsmen to keep the cobwebs off their guns the year round. The Association is also keenly interested in photographs and working sketches of any ranges of this type which are already in operation.

Correspondence may be addressed to the National Rifle Association, Barr Building, Washington, D. C.

EDITOR'S NOTE: More information about Gofort Targets may be obtained from Parker Brothers, Meriden, Connecticut, makers of the Parker-Everett Target, or from the X-Ring Products Company, Peoria, Illinois.

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VOL. XXVIII MAY, 1934 No. 5

Wings Aloft

IN THE summer of 1900, when two young bicycle mechanics from Dayton, Ohio, started for the sand dunes of North Carolina to test their first man-sized model of the future airplane, they hoped to prove that man could fly, but one wonders if their expectations really rose higher than the glider did at that time. Undismayed by failure, they returned to Kitty Hawk year after year, studied diligently, worked hard, and on December 17, 1903, managed to keep a heavier-than-air machine aloft for almost a minute. They had flown.

No doubt they visioned the possibilities of commercial air transport, of aerial forces battling in the clouds, but they probably considered that only a remote prospect. Yet aviation was to play a thrilling part in world affairs within fifteen years. Wilbur Wright did not live to see the great impetus of war-time airplane building or the subsequent development of air-transport services; he died in 1912. But his brother Orville witnessed the unveiling of an impressive monument at Kitty Hawk, on the twenty-fifth anniversary of their first motor-propelled flight. He has watched the industry grow from infancy to its present mature stage, supplying planes for use in every part of the world.

There is no need of any statistical review of this growth or any listing of discoveries and inventions that have contributed to it. The industry has forged ahead with amazing rapidity and is apparently destined to

function with ever-increasing importance in the transportation field.

The du Pont Company has been interested in the progress of aviation almost from the start, and has supplied essential materials to aircraft manufacturers since planes were first built in quantity. When the need arose for a protective waterproof coating to be applied on the wings of fabric construction, du Pont chemists developed the first satisfactory airplane "dope" to be manufactured in this country. We recall that the N.C. 4, first airplane to cross the Atlantic, was upholstered with the product called "Craftsman Fabrikoid." And we are told that Charles A. Lindbergh looked through a "Pyralin" windshield on his epic flight to France.

Transparent "Pyralin" and "Plastacel" sheetings are used extensively by makers of airplanes, and the big air-liners are equipped with safety glass, one component of which is cellulose sheeting to give it non-shatterable properties. It may be noted, too, that "Dulux" and other du Pont finishing materials give protection and add beauty to many a plane you see flashing across the sky.

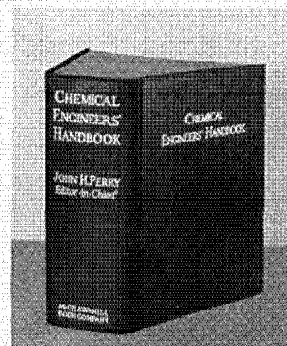
The cover illustration, from a print by Rittase, is merely symbolic of an industry that has already made tremendously long strides in transportation service. One cannot doubt that the progress so far made is only a new starting point for even more significant developments in the future.

Quality and Price

MUCH has been written around this theme in recent years, but these lines penned by John Ruskin, long ago, still ring as true in our day as they did in his:

"All works of taste must bear a price in proportion to the skill, time, expense and risk attending the manufacture. Those things called dear are, when justly estimated, the cheapest. They are attended with much less profit to the artist than those which everybody calls cheap. A disposition for cheapness and not for excellence of workmanship is the most frequent and certain cause of the decay and destruction of arts and manufactures."

Bound in "Fabrikoid"



Chemical Engineers' Handbook. John H. Perry, editor-in-chief, W. S. Calcott, assistant editor. 2609 pages. McGraw-Hill Book Company, New York, 1934. \$9.00.

THIS volume is designed to supply both practicing engineers and students with a reference work that covers comprehensively the field of chemical engineering as well as important related fields. It also is suitable for courses in technical schools.

The book is composed of thirty major divisions, covering every phase of the industry. It contains a large number of new tables, charts and sketches, and a valuable bibliography. Much of the information included is not available under single cover elsewhere, for this is the first all-inclusive reference work of its kind that has appeared in ten years.

The different sections were written by specialists recognized as authorities in their particular branches of chemical engineering; the handbook presents the efforts of sixty contributing experts. In addition, more than 150 chemists and engineers aided with advice and suggestions. We notice, incidentally, that eighteen of the authors, including the editor and his assistant, are associated with the du Pont organization.

The following chapter headings, chosen from the table of contents, give some idea of the subjects covered: Gas Absorption, Distillation, Materials of Construction, High-Pressure Technique, Fuels, Refrigeration, Electrochemistry, Accounting and Cost Finding, Safety and Fire Prevention, Flow of Fluids, etc. There are even sections on such subjects as Reports and Report Writing, Patents and Patent Law, and so on.

Bandella Stripe is News!

Knitted from "Acele,"
Du Pont's dependable
cellulose acetate yarn,
this vivid new fabric
is the pride and joy
of active sportswomen.



Crestwood Mills is responsible for making this colorful fabric—so satisfactory to wear in warm weather, because it resists perspiration and does not stick to the body after a game of golf or tennis.

The dress illustrated here is a special

model shown by Bergdorf Goodman, but David Crystal has made many other interesting models which can be purchased at such leading Fifth Avenue shops as Bonwit-Teller, Peck & Peck and Best & Company.

The "Acele" Department is always glad to furnish information about fabrics and garments made from this yarn



Zinc—in its Guardian Rôle

It is extremely valuable in protecting steel from the ravages of atmospheric corrosion

By F. EDEL

A BILLION-DOLLAR loss is a staggering total, but, according to some authorities, the economic waste caused each year by the corrosion of iron and steel products alone amounts to three times that sum. Rust, the flameless fire, takes a tremendous toll.

Chemistry and electrochemistry are powerful allies in the fight against natural corrosive agents such as air, smoke, fumes, salt spray and moisture. To combat these destructive forces, research has developed more resistant protective coatings and more efficient methods of applying them. Because no one method meets all requirements, a wide variety of materials are now used.

Among metallic coatings, however, zinc is still supreme. It is one of the oldest protective metals. While others have come into commercial use for protection and ornamentation in recent years, authorities still agree that where corrosion resistance is the prime consideration, zinc coatings should be used. The low initial cost of zinc is also an important factor.

Galvanized iron is one of the best known examples of a protective zinc

coating over a base metal. Although the zinc itself may gradually corrode, the iron will not rust so long as it is covered. Because of this feature, zinc offers better protection than most other metallic coatings.

In galvanizing, the zinc deposit is formed by dipping a sheet of iron into molten zinc, although it is difficult to apply an even coating. Treating irregularly-shaped and recessed articles by this method results in an even less uniform layer. In modern operations, most articles are coated by applying the zinc electrolytically, because the thickness of the deposit can then be readily controlled.

For a long time the straight cyanide solution was considered one of the most efficient for the electrodeposition of zinc, but with industry always demanding improvements, further research was carried on and about ten years ago this work was rewarded. Investigators found that adding mercury to the zinc cyanide solution resulted in a more effective method of electroplating, and that the zinc-mercury deposit also gave better protection than straight zinc.

In this respect, the coating behaves similarly to amalgamated zinc anodes in storage batteries, where the presence of mercury cuts down the corrosion of zinc itself, and thus prolongs its life.

The "Duo zinc" plating process, developed by The "R. & H." Chemicals Department, is of this type. The mercury is admitted to the cyanide plating solution by means of anodes of "Duo zinc," a zinc-mercury alloy, the only method whereby the proportion of the constituents can be accurately controlled.

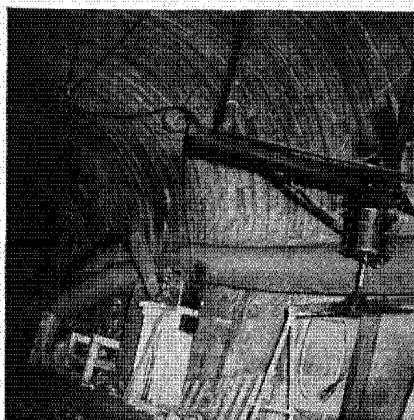
"Duo zinc" is used for plating almost all types of steel articles, of which hardware, radio parts, electrical equipment, lighting fixtures, parts of stoves and washing machines, automobile wheel rims and brake bands, metal windows are representative. It has also been used to protect structural steel. In all cases, it adds value to the articles by increasing their resistance to atmospheric corrosion.

The "R. & H." Chemicals Department of the du Pont Company will be glad to furnish more information about this process on request.

Carrying a River Across Mountains

(Continued from page 11)

Ten of the thirteen contractors are using "Ventube," and the du Pont system of ventilation. This is a straight blowing system, with results identical to the blow-and-exhaust method.



At the west portal of the San Jacinto Tunnel, showing the first set-up of the du Pont system. Note the "Ventube" lines; a 20-inch tube for exhaust, and a 12-inch line to carry fresh air to the heading. In the foreground is a "cherry picker" car pass.

Wenzel & Henoch Construction Company

Right—Portal of the Bernasconi Tunnel. One 15-h.p. low-pressure Coppus blower, mounted on the platform, forces fresh air to the working face through a 20-inch "Ventube" line. Hamilton & Gleason Company

Below—Hayfield Tunnel No. 2. This view shows a 10-h.p. Buffalo low-pressure blower delivering air to the face through 20-inch "Ventube." The blower will soon be taken inside.

Floyd Shafner and J. N. Gordon, contractors

Below, right—Whitewater Tunnel No. 2, showing the du Pont system of ventilation. A 10-h.p. Buffalo low-pressure blower forces fresh air to the face through 16-inch "Ventube," with a Roots pressure blower at the portal exhausting through 22-inch steel pipe.

West Construction Company

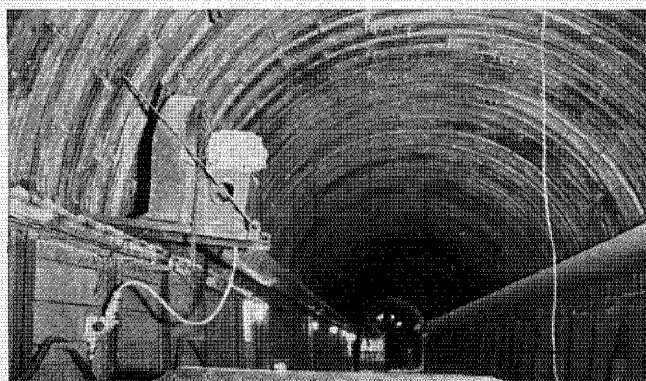
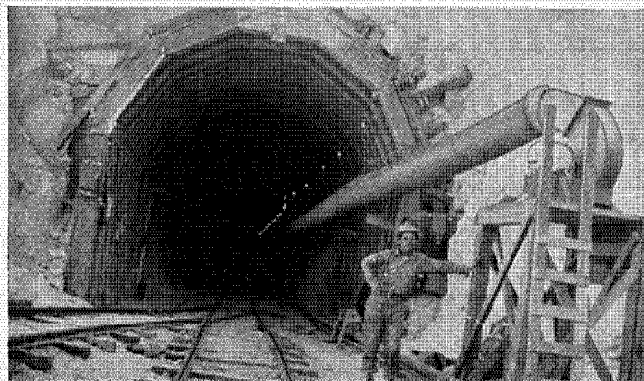
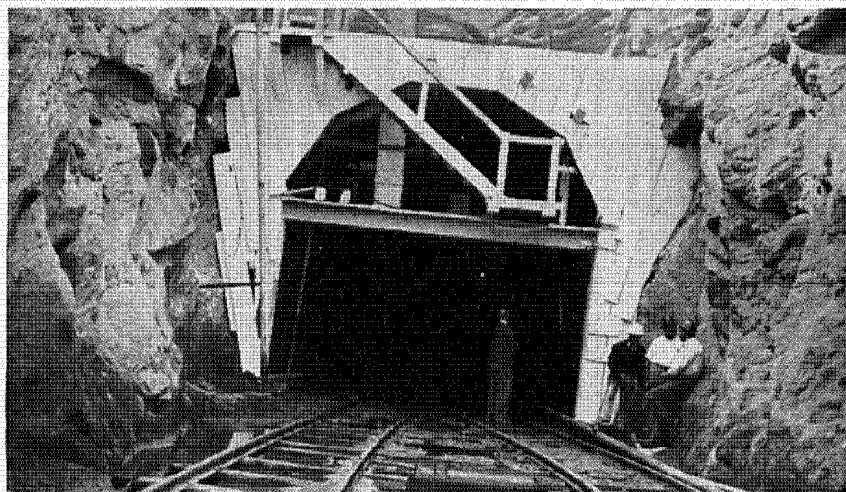
In some cases, pressure blowers with rigid pipe are being used for a straight exhaust, while small auxiliary fans and "Ventube" provide large volumes of fresh air to the headings.

Wenzel & Henoch, who have contracted for "Ventube" throughout the entire thirteen miles of the San Jacinto tunnel, will use the du Pont

plan. They will carry small Coppus blowers inside, blowing out with fifteen horse-power fans through twenty-inch diameter "Ventube." Fans will be spotted as boosters every six or seven thousand feet, while five horse-power blowers and twelve-inch "Ventube" will carry fresh air to the face.

The following is a list of contractors, with the length of tunnels on which they are working:

Dravo Contracting Co.	Pittsburgh	Valverde Tunnel	37,150 feet
Hamilton & Gleason Co.	Denver	Bernasconi Tunnel	6,220 "
Wenzel & Henoch Construction Co.	Milwaukee	San Jacinto Tunnel	67,415 "
West Construction Co.	Boston	Whitewater Tunnel	10,206 "
Morrison-Knudsen Co.	Boise	Mecca Pass Tunnel	5,927 "
J. F. Shea Co.	Portland, Ore.	Cottonwood Tunnel	20,105 "
Shofner & Gordon	Los Angeles	Hayfield No. 2 Tunnel	5,375 "
Hunkin-Conkey Co.	Cleveland	Hayfield No. 1 Tunnel	9,677 "
Dixon & Bent Bros.	Los Angeles	West Eagle Tunnel	10,649 "
Broderick & Gordon	Denver	West Eagle Tunnel	15,911 "
Broderick & Gordon	Denver	East Eagle Tunnel	9,460 "
Winston Bros.	Minneapolis	Coxcomb Tunnel	17,795 "
Utah Construction Co.	Ogden, Utah	W. Iron Mt. Tunnel	16,172 "
Winston Bros.	Minneapolis	E. Iron Mt. Tunnel	23,633 "
Walsh Construction Co.	Davenport, Iowa	Whipple Mt. Tunnel	32,225 "
Walsh Construction Co.	Davenport, Iowa	Copper Basin Tunnel	12,261 "
Walsh Construction Co.	Davenport, Iowa	Colorado River Tunnel	5,640 "



Another Ute Trail Is Rejuvenated

(Continued from page 5)

Canyon Road, another section of State Highway No. 16, running in a westerly direction from Loveland; by the North St. Vrain Road, State Highway No. 66, running north-westerly from Lyons; or by the South St. Vrain Road, State Highway No. 7, running westerly from Lyons, then northward along the eastern slopes of Long's Peak. The last-mentioned route is now being relocated and rebuilt in accordance with the present Federal standards.

Prior to the construction of the Trail Ridge Road, the one automobile route across the Continental Divide within the park boundaries was the Fall River Road. It was built about twenty years ago, along the north side of the river and just across the valley from Trail Ridge. This is a narrow, winding road, located on steep grades, with several switchbacks and sharp curves at dangerous locations. The new Trail Ridge Road is a modern automobile highway, twenty-four feet wide, shoulder to shoulder, with easy grades, and with widened, long-radius curves, as specified by the United States Bureau of Roads.

The Trail Ridge job was one of the first major highway projects where special efforts were made to avoid damaging natural scenery along the right of way during the progress of the work. The precautions taken were based primarily on proper planning and careful control of blasting operations, as was mentioned in an article previously published in the April, 1933, number of this magazine.

The motorist from the East reaches the new Trail Ridge Road by the High Drive, running west from Estes Park. Leaving the drive at Deer Ridge, after traveling about seven miles, he passes through Hidden

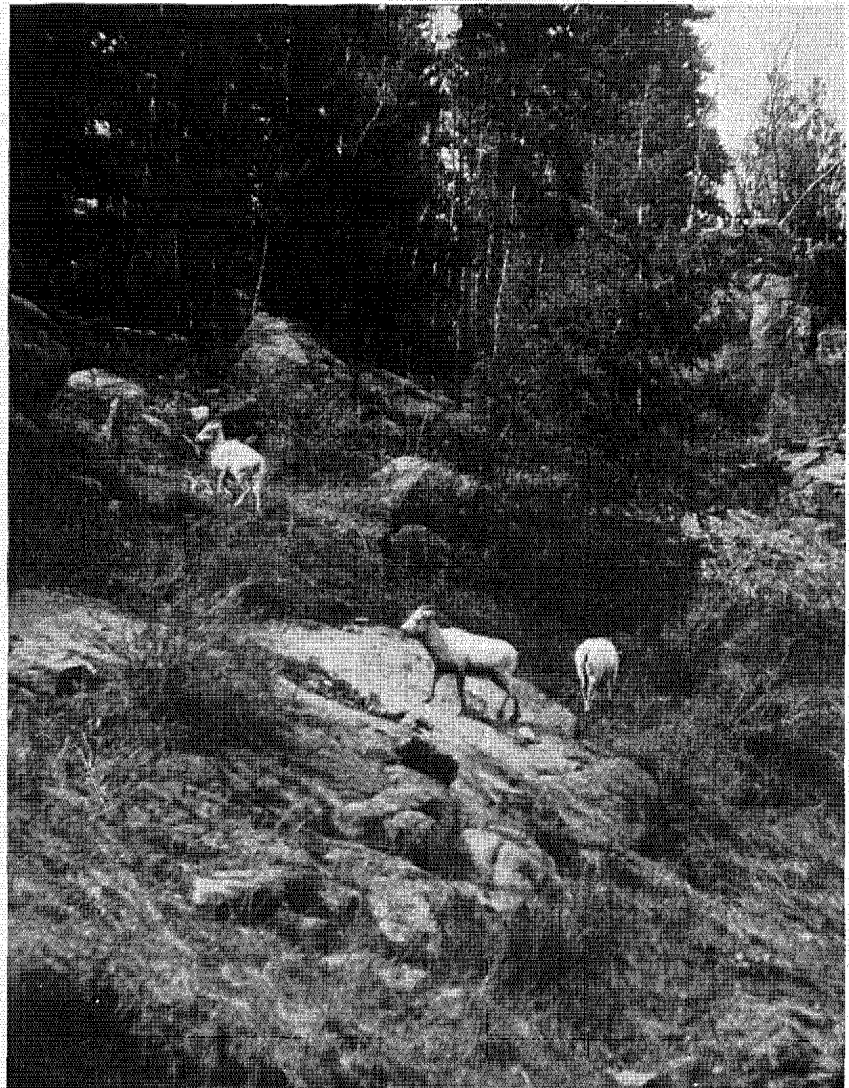
Valley, with its beaver dams, beaver huts, and quaking aspen forests; then climbs to the summit of Trail Ridge and follows the route of the old Ute Trail toward Specimen Mountain, the summer habitat of the Rocky Mountain big-horn sheep.

Just before reaching the highest point on the road, 12,183 feet above sea level, he passes Iceberg Lake, where mirrored images of clouds can be seen mingled with cakes of ice floating on the glassy surface of the pool 350 feet below.

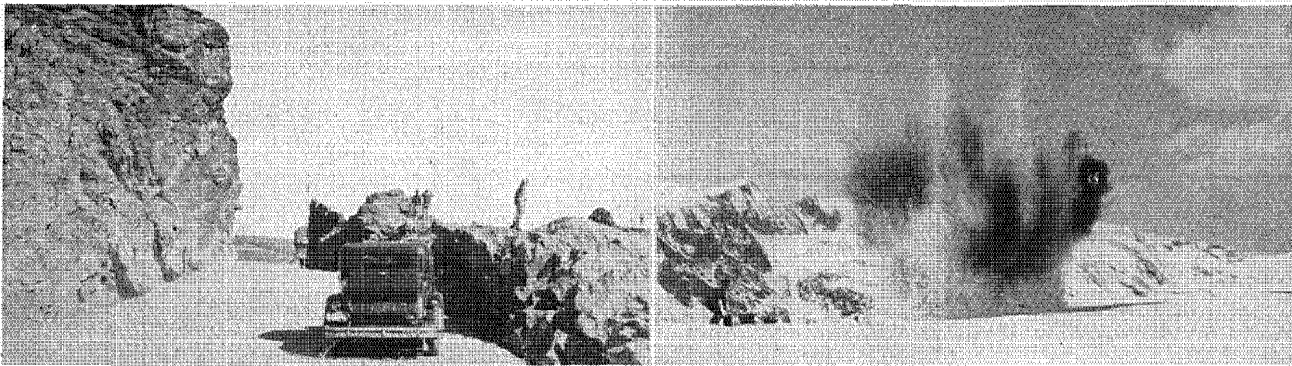
Leaving the summit, the motorist descends to Fall River Pass, at an elevation of 11,797 feet; drives along the headwaters of the Cache La Poudre River to Poudre Lakes and Milner Pass, 10,759 feet above sea level; then circles down the moun-

tain side to the North Fork of Colorado River and thence in a southerly direction to Grand Lake. If he so desires, he can continue through Granby and Tabernash to Berthoud Pass, 11,315 feet above sea level, and on to Denver by way of Empire, Idaho Springs, and the Denver Mountain Parks.

Thanks to the untiring efforts of the late Enos A. Mills, which finally resulted in the formation of Rocky Mountain National Park, the scenes along the new Trail Ridge Road are essentially the same as they were a hundred years ago. As the motorist drives along the summit of the ridge he sees the same species of wild animal life contentedly browsing by the roadside. He sees the same virgin forests, the same narrow canyons, the



Even the wary big-horn sheep are often seen browsing on the mountain slopes in the vicinity of Colorado highways. This scene was photographed from the Fall River Road, and just across the valley is the new Trail Ridge Road



COURTESY, U. S. BUREAU PUBLIC ROADS

same emerald pools, and the same rugged mountain slopes that the Ute brave saw in the olden days.

On his left, beyond the densely-wooded Forest Canyon, the motorist sees the Continental Divide, with its glaciers, glacial cirques, precipitous Alpine peaks, and countless lakes of icy water. On his right, beyond Fall River Valley, he sees the high mountains of the Mummy Range; Mounts Chapin, Chiquita, Ypsilon, Fairchild, Hagues, and Mummy, nearly all more than 13,000 feet above sea level.

The new Trail Ridge Road was built at a cost of approximately one and a quarter million dollars. It was excavated and graded during the working seasons of 1930, 1931 and 1932, and was surfaced with gravel during the summer of 1933. It will be oiled this summer. Sections of the road were opened to tourist travel soon after the grading contracts were completed.

W. A. Colt and Son of Las Animas, Colorado, built the 17-mile section from the High Drive to Fall River Pass, the greater part of which is above the timberline. This section required the excavation of approximately 200,000 cubic yards of solid granite rock. As a general rule drill holes were spaced about as far apart as they were deep, and they were sprung with about one stick of sixty per cent dynamite per foot of depth. Final loads per hole averaged about one pound of forty per cent dynamite

Left—A scenic location on the new highway where vertical cliff formations were circled during the period of construction. Note the fine outlook

Right—Du Pont dynamite not only helps to construct modern roads, but also to maintain them. This view shows the blasters removing snow from the Trail Ridge Road, near Iceberg Lake

per cubic yard of excavation. A total of ten carloads of du Pont explosives were used on the job. Incidentally, du Pont explosives are now being used in removing snow from the roadway, before opening the road to traffic, as shown in one of the accompanying illustrations on this page.

L. T. Lawler of Butte, Montana, built the eleven-mile section of the highway descending around the mountain side from Fall River Pass to the North Fork of Colorado River, approximately three thousand feet

below. This section required the excavation of about 126,000 cubic yards of rock.

Acknowledgments for some of the information included here, as well as for some of the accompanying photographs, are due Senior Highway Engineer C. E. Learned of the Bureau of Roads, who is in charge of Federal road construction in the national forests and parks in this district. Edmund B. Rogers is superintendent of Rocky Mountain National Park.

The Lafayette Centenary

(Continued from page 1)

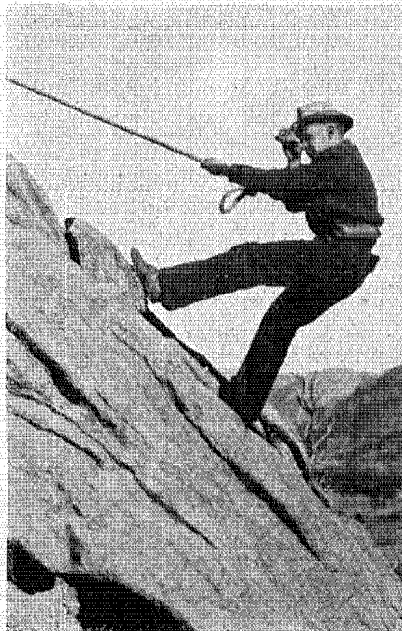
Incidentally, the ship that carried him back to France in December, 1825, after his American tour was the frigate "Brandywine."

He was active in the Chamber of Deputies and at the advanced age of seventy-three was again commander of the National Guard during the three-day revolution of 1830.

In February, 1834, in retirement, General Lafayette caught a severe cold while attending the funeral of a friend and died at his home, La Grange, on May 20, 1834.

When the news reached the United States, President Jackson ordered that the same military honors be paid to his memory as had been accorded to George Washington at the time of his death. Memorial services were held in practically every city in the United States.

American citizens do well to pay a tribute of respect to many brave and generous men. General Lafayette's contribution to our nation's freedom should never be forgotten.



Will the rope hold? Let's hope it does. Surveying a dangerous location on the South St. Yvain Road, which is one of the approaches to the new Trail Ridge Road in Rocky Mountain National Park

Fast and Fugitive Colors

(Continued from page 1)

anteed" colors failed to live up to claims made for them.

The following experiences usually are reported:

1. Some dealers attempted to evade responsibility by blaming the soap used in the home laundry.

2. Others stated that commercial laundry methods were at fault, usually without bothering to get in touch with the laundry being criticized in order to obtain information concerning the complaint.

3. Many consumers felt that no adjustment of any kind could compensate them for the trouble caused by the fugitive colors. They preferred to make their purchases elsewhere.

The following points were firmly established as a result of a 1928 questionnaire:

1. Nearly ninety-five per cent of the women are willing to pay more for fast-colored fabrics.

2. It is important that colored wash dresses hold their color.

3. There is a definite demand for draperies of fast color.

4. The majority of women shoppers ask for fast colors.

5. In spite of the almost universal demand for fast colors, only a comparatively small percentage in 1928 reported getting what they wanted.

6. Women do not always complain to retail shops. Less than thirty per cent of those replying to the questionnaire carried their complaints back to the point of purchase.

As a result of facts, such as these, plus the suspicion that has arisen in the public mind with respect to some professed guaranteed-fast colors that have proved to be fugitive, many of the leading manufacturers and retailers of the country have insisted upon producing and selling colors that actually give reasonable satisfaction. As an indication of the manner in which the textile industry, up to the depression period, had adopted fast colors, it was reported from a survey of the advertising pages in some forty magazines that over fifty different trade-marked brands of fast-colored fabrics were being nationally advertised.

A frequently-heard declaration by those who have used the cheaper and often less-fugitive types of dyestuff, in spite of consumer demands to the contrary, or by those who have reverted to more fugitive colors in their attempts to reduce costs under depression condi-

tions is this: "Although we are not using the faster vat and naphthol colors, we receive practically no complaints from our consumers."

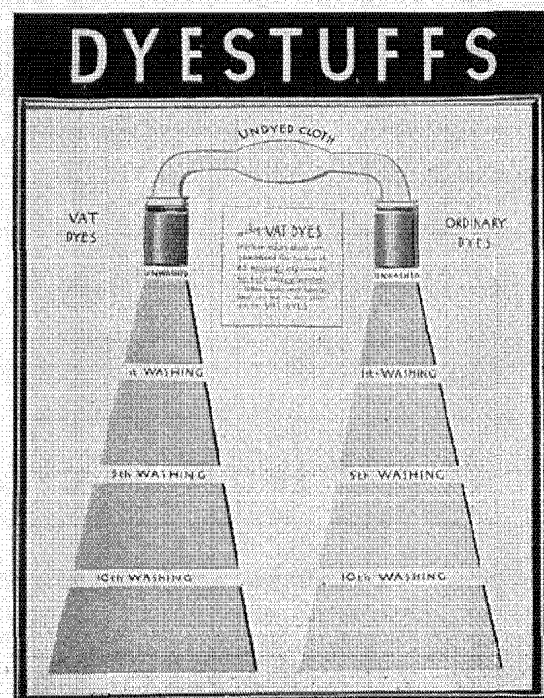
However, it cannot be assumed that the absence of many complaints necessarily means that the consumer is satisfied with fugitive colors. It has been shown by surveys, for example, that the majority of women want to purchase fast-colored materials and are willing to pay the slight added cost resulting from the use of such dyestuffs.

Again, it will be recalled that only two per cent of the women purchasers, who reported trouble in 1926 with colors, returned the article itself to the store at which the purchase had been made. Granting that the *Good Housekeeping* questionnaire of 1928 indicated that thirty per cent of the women replying, carried their complaints back to retailers, it is very doubtful if this is a country-wide average. Even so, what about the seventy per cent who did not complain? By far the majority of women, when dissatisfied with a purchase or with a service, fail to complain either to a retailer or a laundry manager. They do not like unpleasantness. They prefer to go elsewhere to make their purchases. And it is this great group that must be given consideration.

Consumer resistance can be and often has been created by a failure to understand the facts. If this were not true, women would soon cease making the false assertion that "colors used to be faster;" that "American-made dyes are not so fast." But there is still a demand for consumer-satisfying colors, and the wise business man will do well to recognize it by continuing to use the fastest colors that are available.

GUARANTEED FAST COLORS:

For years there has been a tendency on the part of some merchandisers to issue unconditional guarantees with their fabrics and garments. Wash goods and dress materials frequently



This illustration, from an unretouched photograph of a panel on exhibit in the du Pont Building, shows the effect of washing samples of cloth of the same texture, weight and color. The one at the left was colored with vat dyes; the other, with ordinary dyes.

The box note reads as follows:

"Only vat dyes produce colors which are guaranteed fast to repeated washings, exposure to sunlight and perspiration. When buying wash fabrics, don't just ask for fast colors, ask for vat dyes."

have been sold as "guaranteed fast colors." Draperies and hangings occasionally have been "guaranteed" to be fast to light. Shirts have been offered to the trade with the assurance that they were "guaranteed unshrinkable," "guaranteed not to shrink," or were "shrink-proof."

In many cases retailers, wholesalers, converters and manufacturers have been perfectly justified in making guarantees of one sort or another. With full faith in the quality of their merchandise, many have signed their names to the guarantees. With such as these, the laundry industry has no quarrel.

Unfortunately, other business men have offered "guaranteed" merchandise to the public apparently without bothering their heads about how the materials would wash. Thus, in some instances, the term "guaranteed fast colors" has been applied to fabrics that have been dyed with dyes of "commercial" fastness only. Similarly, until a federal trade ruling prevented the practice, the United States was flooded with "guaranteed imported English broadcloth" that had been "imported" from Massachusetts and Georgia.

It is largely because of experiences with materials of the above type that the term "guarantee" has fallen into disrepute in the minds of many women. There have been altogether too many cases where a "guarantee" has simply meant replacing a garment, if a customer complained. As a result, the innocent retailer, who has been perfectly justified in "guaranteeing" his materials, has suffered because of the indiscretions of certain of his competitors.

EXTRAVAGANT CLAIMS:

Another policy that has tended to injure the former prestige of the term "guarantee" has been over-statements of fact. For example, several years ago a shirting was widely advertised as being "guaranteed to launder 365 times." Perhaps the copywriter selected the number because there are 365 days in a year. At any rate, if the guarantee was intended to be taken seriously, 365 launderings meant seven years' service, assuming that the shirts

A glimpse of the commercial laundry unit at the American Institute of Laundering, Joliet, Illinois—the proving ground of the industry

were laundered once a week. If, however, such a garment were worn during one week and laundered during the next—the more customary practice—then the shirting had been guaranteed to last fourteen years. No wonder "guarantee" means so little to many customers! It is unconditional guarantees with no scientific backing that have caused trouble for everyone who handles fabrics.

There are at least two good reasons why the term "fast-color" is confusing to consumer and laundry owner alike.

1. Colored materials may be advertised as fast-dyed or printed and yet cause consumer dissatisfaction because no standard definition of fastness has been accepted by the trade. What is or is not satisfactory color fastness often varies with individual beliefs and opinions. What one business man may regard as fast colored, another may believe to be commercially fast only.

2. Certain concerns have had their product dyed or printed with colors other than vat or naphthol dyestuffs and have sold the finished product as a "guaranteed-fast color" fabric, thereby saving a few cents cost per yard that could be passed on to the consumer who, in most cases, is perfectly willing to pay for the fastest colors, if she can get them.

UNSCRUPULOUS PRACTICES:

In the past, it has been possible for an unscrupulous merchant to apply the term "guaranteed" to fugitive colors and find the proposition profitable in the following ways:

1. Produce an inferior article and add a substantial amount to the cost price to act as insurance against "come-backs," gambling that the value of the pieces returned will be less than the amount that was originally added to the price.

2. Produce an inferior article that will undersell fast-dyed or printed materials and then go out of business at the proper moment.



As a result, home managers at times have purchased so-called wash-fast, tub-fast, or light-fast colored material only to learn that a guarantee does not mean anything.

Of course, this statement does not apply to all dyed and printed cotton materials that are sold as "guaranteed fast," but it has been the case so often that "guaranteed" has fallen into disrepute in some quarters.

More and more reputable mills and merchandisers are controlling the use of the term "guaranteed," realizing full well that it is being used by every unprincipled dealer in the country. Naturally, no ethical firm desires to be connected in any way with any group that intentionally misrepresents its merchandise.

Furthermore, it is not altogether imagination that prompts leaders in the textile industry to believe that the time will come when those who misrepresent the ordinary "commercial" colors as "guaranteed" fast will reach the end of their rope. Such a policy, profitable for a time, eventually becomes a "boomerang."

WHY BLAME THE LAUNDRY?

And there is another phase of this question that deeply concerns the maintenance division of the textile industry. Let us assume that a dress or a child's wash-suit has been sold as a "guaranteed" washable color; also, that the garment was sent to a commercial laundry where it was handled according to approved standard practices. Not

infrequently, in spite of temperature control, and particularly when the ordinary direct cotton colors have been used, considerable bleeding occurs during washing. When the customer has entered a complaint at the store from which the article was purchased, the retailer has frequently said, "I'm sorry; take it back to the laundry. It is a guaranteed fast color."

Note the inconsistency of that position. The laundry owner had nothing to do with the choice of colors or their application. And yet many people expect a laundry owner to make good somebody else's guarantee, and they are much put out if he refuses to do so.

SETTING OF COLORS AT HOME:

Many women apparently still cling to the opinion that colors may be "set" at home by treating them with salt solution, vinegar, turpentine, sugar of lead, and so on. It is extremely doubtful if any of these so-called "setting" processes have any merit whatever. If fastness of fugitive colors could be improved greatly by such treatments, dyers and printers the world over would be among the first to use them, and there would be no such thing as "commercial" colors. It is true that certain colors are after-treated in the mill with such ingredients as sodium perborate, sodium bichromate, copper sulfate, either to alter the shade, prevent sulfur colors from tendering the dyed fibers, or improve fastness to light and to washing, but the fact remains that the value of further "setting" of colors in the home has been greatly exaggerated.

Stump Blasting . . . Questions and Answers

Q. What are the principal types of stumps?

A. There are lateral, semi-tap and tap-rooted stumps. Most stumps such as white pine, fir, maple and cedar have lateral roots extending to the sides in all directions. Southern

yellow pine, red or Norway pine, fir and hickory stumps have main roots extending straight down into the ground. These are known as tap roots. White oak, elm, chestnut, gum and similar stumps have semi-tap roots; that is, several large roots extending down deep in the soil.

Q. Should stump blasting be done when the ground is wet?

A. Yes. The secret of using explosives to advantage is to confine thoroughly the explosive gases, and this is best accomplished when the spaces in the soil are filled with water.

Q. What is the proper type explosive to use in stump blasting?

A. In general, an explosive with a slow speed and heaving effect is most desirable, because it has a tendency to blast the stump and the roots out of the ground, usually breaking the stump in pieces that can be handled.

Q. How should lateral-rooted stumps be loaded?

A. The method of firing will determine whether one large, or several small charges must be used. Where the cap-and-fuse method is employed, the center of the charge must be placed under the center of resistance. Often the roots and not the stump offer the most resistance to the explosive force. The depth of the hole will vary with the size of the stump. Deep holes need more explosives than shallow ones. Charges in light or sandy soils must be deeper than in stiff soils. The bore hole under a lateral-rooted stump can be made with a driving bar and sledge, soil auger or spoon.

Q. How should large, heavily-rooted stumps be loaded?

A. With a very large stump, the charges may be distributed around it in the places where they will be most effective. Usually one charge is placed beneath the center of the stump to split it. The other should be placed under the larger roots. Some large stumps, if they are rather close to buildings, may require as many as seven holes. Wherever more than one

hole is used, the electric method of shooting must be followed, and the wiring must be in series.

Q. How should tap-rooted stumps be loaded?

A. The three common methods of placing charges to blast tap-rooted stumps are (1) In the tap root; (2) One heavy charge against the tap root at a good depth; (3) Two or more charges against the side of the tap root. Tools required are a spade and a wood auger.

Q. What is the proper size of charge?

A. Because of the various factors which materially influence the blasting of stumps, such as age, condition and kind of stumps; nature of soil and its moisture content, no absolute rule can be developed which will give the definite necessary charge for blasting stumps of different sizes. It is also well to make several trial shots. Tables are available as a guide for determining trial charges for use under various conditions.

Q. How should the hole be loaded?

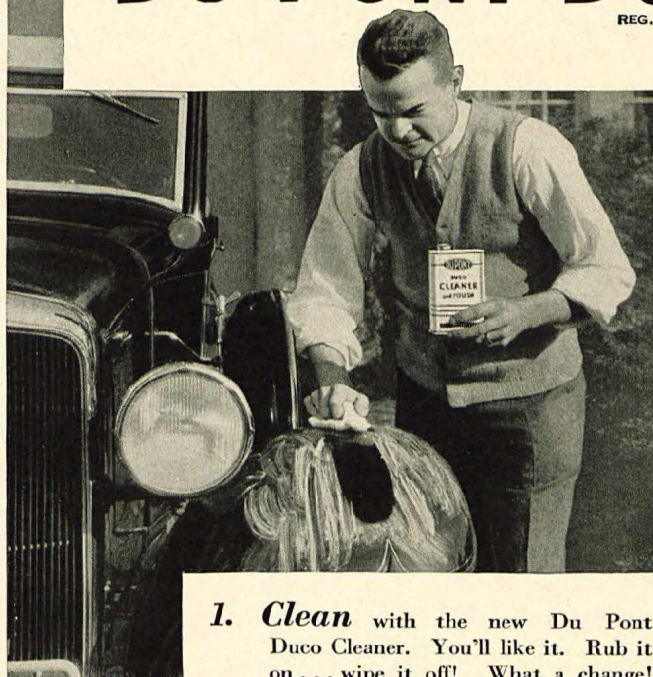
A. First, thrust the tamping stick down to the bottom of the hole to make sure there are no obstructions. If the charge consists of more than one cartridge, and there is no standing water in the hole, it is good practice to slit the cartridge wrappers lengthwise with a sharp knife before putting them in the hole. Then press each cartridge in place with the tamping stick until the explosive completely fills all available space. Load all the charges except the last cartridge, which is to be primed. Its wrapper should never be slit.

Q. Is tamping important?

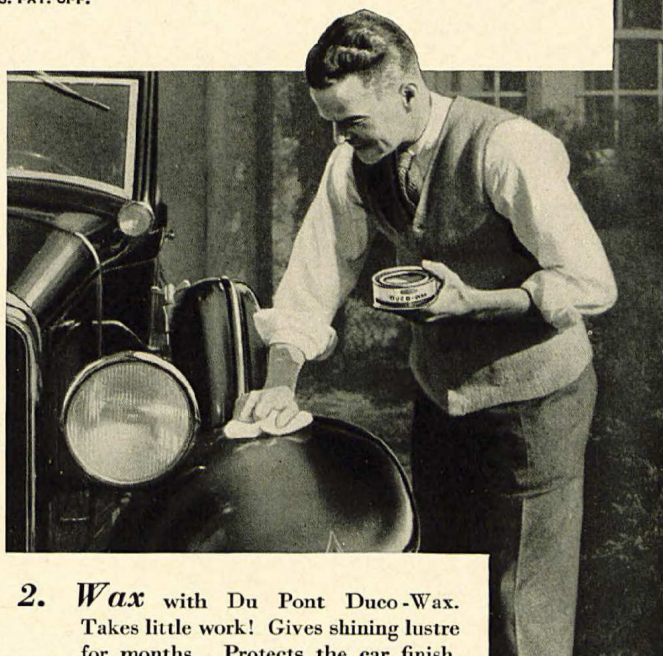
A. If the hole is not tamped, some of the explosive force will be wasted. Wooden sticks only should be used for tamping; and moist dirt is very effective. The material should be pressed firmly the first two to four inches over the charge, after which it should be rammed tightly in the hole so that the tamping is at least as solid as the surrounding earth.

New! Easier, quicker way to keep your car beautiful! **DU PONT DUCO-WAXING**

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1. Clean with the new Du Pont Duco Cleaner. You'll like it. Rub it on... wipe it off! What a change!



2. Wax with Du Pont Duco-Wax. Takes little work! Gives shining lustre for months. Protects the car finish.

... it costs you less than 3c a week!

DU PONT, maker of Duco, offers a new, easier, quicker way to keep your car *good-looking!*

It's Du Pont Duco-Waxing! You do two things as simply as one, two! First, use Du Pont Duco Cleaner—the new liquid cleaner just developed by du Pont. It's easily applied. Contains no acids or harsh abrasives. Absolutely harmless to finish. Quickly, it removes all grimy traffic film. Quickly, it restores the original color and lustre of your car!

Then—to preserve that beauty for months, apply Du Pont Duco-Wax. It forms a hard, glossy, transparent film. Keeps out dirt. Prevents weathering. Protects!

Du Pont Duco-Waxing—the new process! Requires less work. Saves time. Reduces car washings. Gives car beauty and finish protection all year long for less than 3c a week!*

No. 7 DUCO POLISH: Car owners who do not wish to wax their cars will, of course, still use Du Pont No. 7 Polish (Speed Blend)—the world's most popular liquid polish.



LOW PRICES!

Pint of Du Pont Duco Cleaner
(enough for 2 cleanings)

7 ounces of Du Pont Duco-Wax
(enough for 4 waxings)

Each only **50c**



SEND FOR BEAUTY KIT

Contains enough Duco Cleaner and Duco-Wax to
polish hood and front fenders.

(Offer good only in U. S. A.)

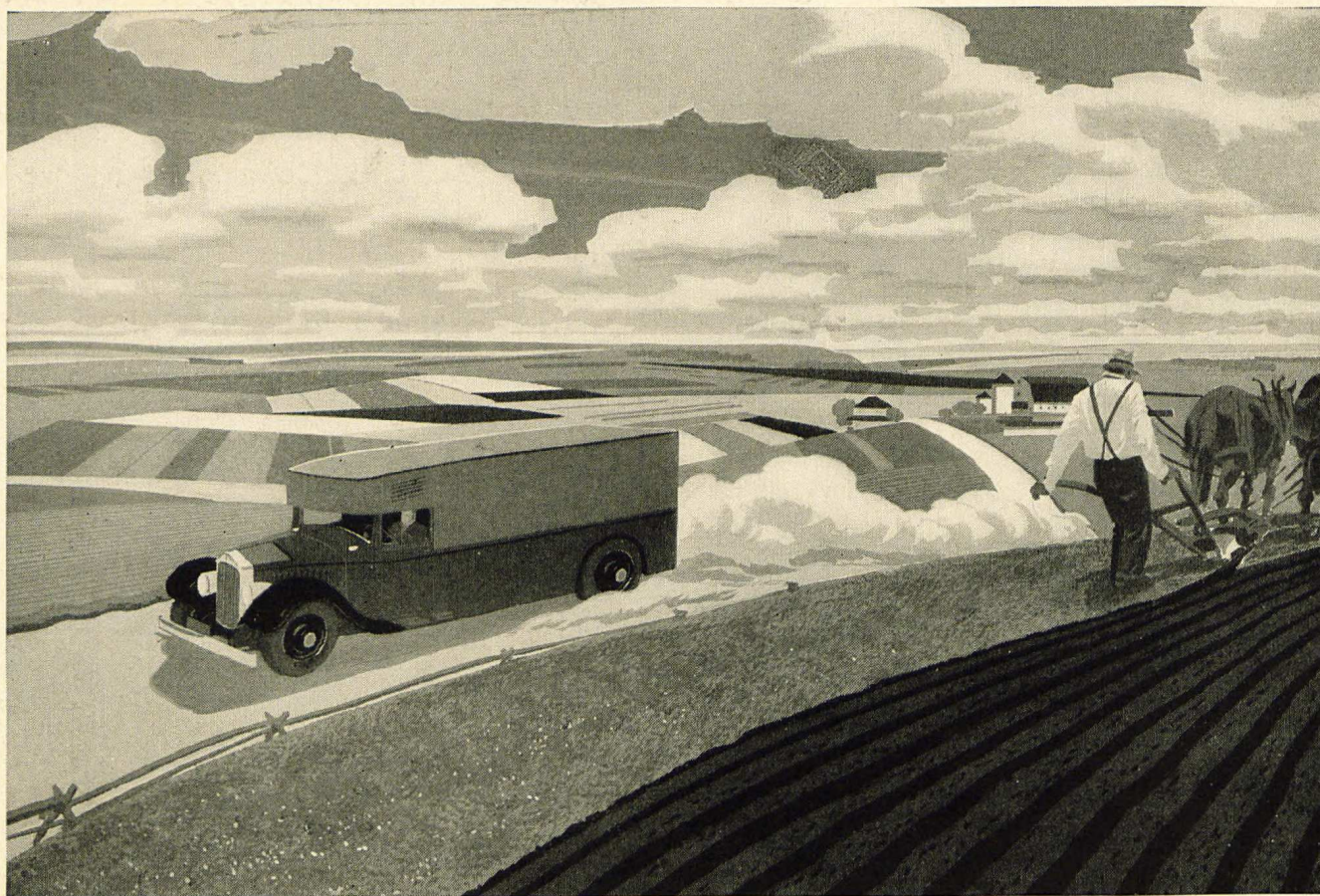
E. I. DU PONT DE NEMOURS & Co., INC., Dept. DM-1, Wilmington,
Delaware. Send me Beauty Kit. I enclose 6c in stamps to help pay cost
of mailing.

Name.....

Street.....

City.....State.....

*2 cans of Cleaner and 1 can of Wax will last a year... costs less than 3c a week.



THE GOOD EARTH TURNS GANGSTER!

MOTHER EARTH. Truly, all things to all men. Sustenance. Shelter. Comfort. Life.

And yet this same good earth, so wondrous in creating and maintaining life, is also a deadly destroyer.

Out of the earth spring dust and dirt. These gangsters join forces with Nature's racketeers—wind and rain, heat and cold—to scatter a machine gun fire of destruction on man-made things, robbing them of beauty and usefulness.

No one, perhaps, has paid more penalty to these despoilers than the owner of commercial trucks and vehicles. Who would help him reduce this toll?

Du Pont did. From the same laboratories that produced Duco came a new finish for commercial vehicles—Automotive Dulux. Its extraordinary wearing qualities, its resistance to dirt and changing temperatures, its longer-lasting beauty, make it the outstanding finish in its field today.

This achievement, a distinct service to industry, is but one of many in du Pont history. In their effort to obtain finishing materials of greater service value, du Pont chemists have been responsible for many of the major developments in finishes in the last ten years.

Consider these: Duco for passenger cars. Dulux Marine Finishes for ships. Dulux Mill White for mill interiors. Dulux for refrigerators. Brush Duco and Paints and Varnishes that give beauty and protection to the home. Du Pont Finishes for radios and washing machines, dynamos and oil derricks, and countless other things.

In the future, as in the past, du Pont will meet the demands of industry and home for more beautiful, more lasting, more economical finishes. E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware.



FINISHES

for industry and home

DUCO...PAINTS...VARNISHES...DULUX

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