
The
DuPont
Magazine
August 1923

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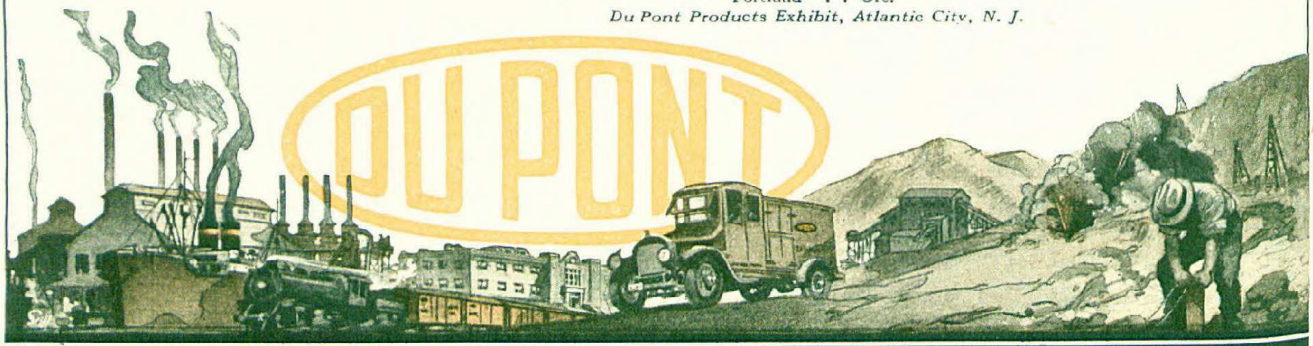


EXPLOSIVES ~ SERVICE

THE
DU PONT
MAGAZINE

Vol. XVII AUGUST, 1923 No. 8

The Outlook Continues Good

Conditions point to no marked recession in business in the immediate future

By F. LESLIE HAYFORD
Economic Statistician
General Motors Corporation

IN spite of the fact that a number of pessimistic prophecies have been heard recently, confidence in the business outlook is warranted by the continued soundness of fundamental conditions. The action of the stock market, the weakness of wholesale commodity prices, the postponement of building projects, and the reduction of forward orders in many lines are the most important of those events of recent months which have been given unfavorable interpretation. Yet these things of themselves do not afford adequate reasons for expecting any marked reduction of business activity in the near future.

Is the Stock Market a Reliable Business Barometer?

The severe decline of stock prices during the past three or four months has led a good many people to believe that an early business depression is coming. This belief is based upon the fact that in the past marked declines in business activity have been preceded by marked declines in stock prices.

But it is also a fact that there have been more or less marked recessions in stock prices—some of them almost, if not quite, as severe as the recent one—which were not precursors of a business recession. The vital question of how severe the stock market drop must be in order to forecast a business slump has not been satisfactorily answered by the supporters of the stock market barometer theory.

The Harvard Economic Service most aptly says: "Not a declining stock market alone, but this condition coincident with a strained condition of the money market has, in previous business cycles, constituted the danger signal foretelling the approaching culmination of an upward movement of business." It is clear why under such conditions a stock market decline would be followed by a business decline, since business cannot long flourish when credit strain exists; but it is not reasonable to suppose that a mere drop in stock prices, unaccompanied by any fundamentally unfavorable economic factor, inevitably foreshadows adverse business conditions. Whence can the sellers of stocks derive an infallible knowledge of the future? There are adequate explanations of the recent stock market decline without resort to the theory that exceptional powers of prophecy are possessed by those who operate in the market. The facts that stock prices had enjoyed a very considerable rise; that there were fears of money tightness—not realized, to be sure—that the failure of certain brokerage houses and rumors of the insecurity of others engendered alarm; that a speculative service having a very large clientele suddenly reversed its position and became bearish; that forward buying of goods began to decrease; and that commodity prices weakened; all tended to undermine the confidence of speculators. But none of these things indicates that we are nearing a business depression; nor, in view of the entire lack of credit stringency, does the drop in stock prices to which these things undoubtedly largely contributed.

The Decline in Commodity Prices

For three months or more wholesale commodity prices have been weak, and this fact has made not a few people doubtful of the business future. Yet the decline has been, on the average, as measured by the index numbers

of the U. S. Bureau of Labor Statistics and of Bradstreet's, only somewhere between 4 and 6 per cent. This weakness of wholesale prices, apparently unaccompanied by any general weakness of retail prices, and coincident with an easing money market, does not point to any marked decline in business during the coming months. The fact that credit is abundant and relatively cheap indicates that the price decline has not been due to forced liquidation of goods, and supports the belief that the decline will not proceed far.

The Decline in New Orders

The fact that a very conservative attitude still prevails and that new business in many lines is apparently smaller in volume than a few months ago has been interpreted by some as a sign that business is about to fade away. And yet there is good reason to believe that such is not the meaning. If one can accept the belief that this slowing down of new business was the result of an attitude of caution and conservatism, and was due neither to the presence of large accumulations of stocks of goods nor to inability to finance purchases, then the condition ceases to be dangerous and becomes healthy; it simply means a less speculative attitude on the part of business men, and, consequently, a more stable, if a less feverish, condition of business. If the productive activity of the early part of the year did not result in the accumulation of a supply of goods which is at present greatly in excess of the early consumptive needs of the country—and it is believed that such was not the case—then those consumptive needs are going to keep business from going forthwith into a decline.

The Farmer's Plight

Dollar wheat has again focused attention on the relative lack of prosperity of the farmer and his consequent unsatisfactory purchasing power. It is true that the prices of farm products, with a few exceptions, such as cotton and corn, have remained too near the low points reached in 1921. But the cotton growers have fared very well and appear likely to do so again this year. In the grain-growing regions purchasing power may perhaps be less than last year, although this is not at all assured; but there is little doubt that the total purchasing power of the country, with industrial labor pretty fully employed, is greater now than a year ago.

Other Apprehensions

Fears that present industrial wages are so far "out of line" as to hasten a business slump seem to be unwarranted. While wage increases have been numerous, it is only in a few industries, such as the building trades, that they have begun to reach alarming proportions. Certainly, high wages and general employment provide a purchasing power that will go a long way toward sustaining the demand for goods.

Fears that new construction will be so sharply curtailed as to reduce disastrously the demand for steel and other building materials and for labor do not appear justified. While there has been much postponement of building, much is still under way and it appears extremely likely that there will be enough additional building started to maintain operations at a high rate during the remainder of this year at least.

Favorable Factors

After all, fundamental conditions are, in general, sound. Credit is available in abundance and at relatively low rates. The country's purchasing power, in spite of poor agricultural conditions, is at present large, not only in terms of dollars but also in terms of the goods those dollars will buy. Stocks of goods are said not to have accumulated greatly, and although no direct evidence is obtainable on this point, it is believed that the statement is correct. The indications, both of the relatively small increase in demands for credit during the past year and of the smallness of the commodity price decline during the recent period of weakness, point to little speculative buying of commodities having taken place. There is no indication that industrial inventories have been allowed to become unwieldy. A very strong probability exists of continued large railroad buying, and a continued high degree of building and road construction activity over most, if not all, of the rest of this year.

These things are all favorable to the continuation of good business.

Still Good After 35 Years

SPORTSMEN of Yankton, South Dakota, were interested a few weeks ago in the tests of some old du Pont powder which was recovered from a hiding place where it had been for 35 years.

In 1888 a group of lively boys raided a magazine on the outskirts of Yankton to obtain powder for a small cannon with which they intended to celebrate the Fourth of July. One of the boys, Will Bordeno, after using part of the powder, stored it in a barn. Before the next Independence Day rolled around, his family moved to Kansas City, Kansas. Bordeno returned to the old home town this summer and searched for the powder he had hidden so many years ago, and recovered it. The incident created considerable comment. The powder was tested and pronounced "as good as ever."

The powder had a historic interest because it was believed to be some of a consignment sent out in old frontier days. It was packed in one-pound cans and pictures of buffaloes and Indians adorned the labels. The cans bore the inscription, "Du Pont Superfine H. F. Gunpowder, Wilmington, Delaware, 1859."

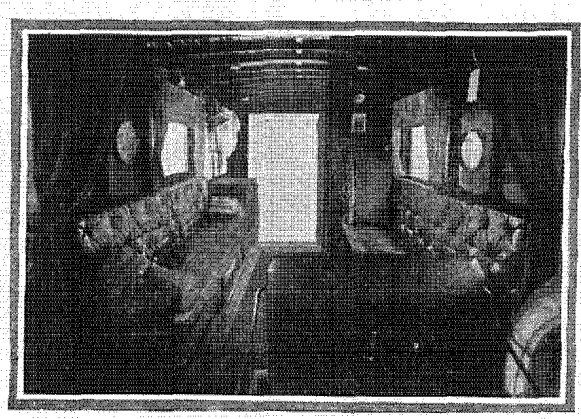
Dean D. Gross, a hardware dealer of Yankton, states, "I have one of the one-pound cans of powder mentioned as having been hidden in the old barn and can verify the statement that it is in an excellent state of preservation. In fact, I would take it for new powder. It is FFF rifle powder of which considerable quantities were used in this section of the West at that time."

Touring With Fabrikoid

Wherever the material is used in Motordom, it gives good service

GIPSY motoring has become popular and withal a practicable way to spend one's vacation. The lure of the road, the joys of camp life, the ever-changing scenery make it so. But deep down in the heart of every motorist is the hope that some day he may take a trip to the Pacific Coast in his car; many have gratified that ambition.

Mr. W. J. O'Hara, formerly a factory representative of the Chevrolet Motor Company at St. Louis, can look back upon such a trip. Accompanied by his wife and a friend, he toured from St. Louis to Oakland, California, by way of Portland, Oregon, in a car largely constructed by himself. It was a 3000-mile trip accomplished in 25 days in a house-on-wheels that was well planned to give the trio a maximum of comfort en route. The accompanying illustration gives you some idea of the attractive interior, which is roomy and so thoroughly appointed as to suggest an apartment rather than an auto. The occupants had every convenience possible, from a bath tub beneath the floor to a china closet, a gas stove and refrigerator, while the folding beds concealed locker space for bedspreads and other needfuls on the trip.



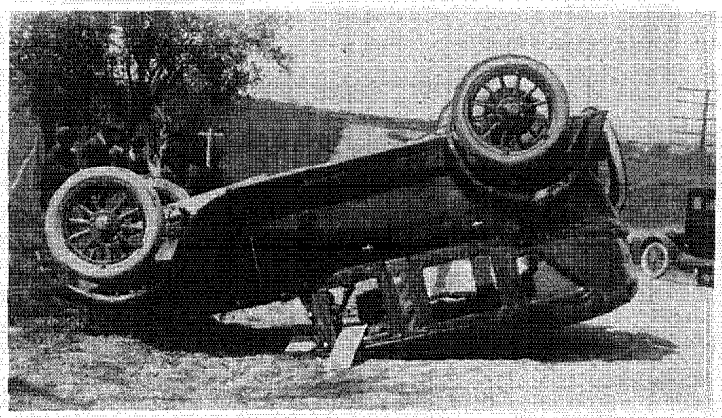
The folding berths were upholstered in Fabrikoid

Altogether the body of the car cost Mr. O'Hara only about $500, it is claimed, and in its construction he used only high-grade materials. The rich-looking upholsteries on the folding berths are du Pont Fabrikoid. We suspected it when we first saw the illustration in the *Chevrolet Sales Speeder*. That fact has since been confirmed and we call attention to it here, believing that other gipsy motorists will be glad to know about it.

A "Tip-Over" Didn't Hurt This Top

IF some one told you that a touring car could turn turtle on the road with practically the whole force of impact coming on the front of the top—without injuring it, would you believe it? Well, just such an accident did occur a few months ago in Iowa.

It was a Buick five-passenger car equipped with a Craftsman Fabrikoid (California-type) top, made by the Rex Manufacturing Company, of Connersville, Indiana. When the machine upset practically all of its weight was imposed on the front of the strongly constructed top.



The position of the car a few moments after the accident

Not even enough weight rested upon the radiator to mar its coat of paint. The top stood up so well under the burden that the occupants of the car were protected from serious injury. Aside from the fact that some broken glass had to be replaced, the top came through the ordeal without a single evidence of injury. The driver of the car, speaking of the accident, says: "Every time I think of this trip I feel that I ought to take off my hat to the Rex California Top."

This top is well known for its in-built strength and durability. The Craftsman Fabrikoid covering also has a well-earned reputation for withstanding all kinds of rough wear and abuse. This combination of good construction and high quality material produces a top of remarkable rigidity and strength, which in this instance was subjected to the severest kind of a test—and came through unharmed.

After the accident, the dirt ground into the Fabrikoid was easily washed off, and the material looked as good as ever. A "tip-over" didn't hurt this top.

The Crow—An Outlaw of Wild Life

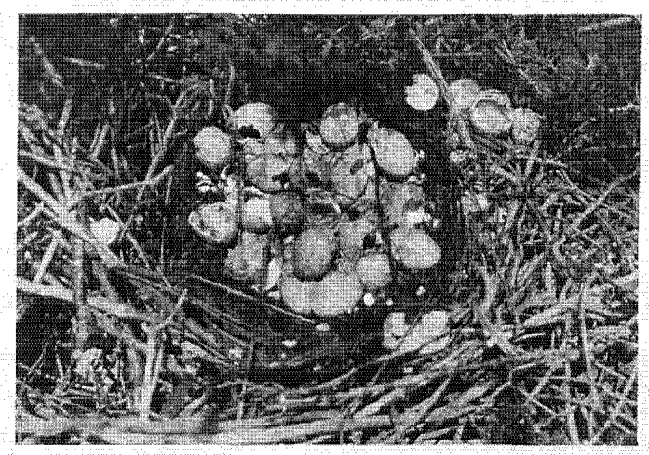
His reputation is like his coat—as black as black can be

By FRANK J. BYRNE

CROWS are doing an incalculable amount of damage in the rich game territories of the Eastern Shore of Virginia. They are destroying thousands of the young and eggs of game birds, including the black (wild) duck, clapper rails, or marsh hens, king and Virginia rails, willets, a larger species of shore birds, quail, and many kinds of useful, insect-eating birds. They are also a constant menace to poultry. These crows, which frequent the islands along the coast, are the species known as fish crow. They look like the common crow found on the mainland and have his same pernicious habits.

What damage they are doing is shown in a recent expedition undertaken by Dr. B. H. Warren, of West Chester, Pennsylvania, who spent three weeks on the islands of the Eastern Shore of Virginia. Dr. Warren, formerly state ornithologist of Pennsylvania, is an authority on birds and other natural history topics and is an indefatigable student of wild life.

He visited Assateague, Chincoteague, Revell's, Cedar, Mockhorn, Palmer's Beach, Owls' Bluff, Wallop's and Hog Islands, and numerous marshes about these islands. He also visited Pammer's Point, a narrow strip connected with the mainland near Wachapreague. These are tidal islands located from a mile and a half to eight miles from the mainland. They abound in game. The marshes are favorite nesting places for clapper rails or mud hens, and black ducks. Sea-gulls, terns, willets—a larger species of shore birds—and others of this group, as well as herons, have their nesting places there. The whole district is one of the favorite hunting places of the East and has been so known for many generations.



The damning evidence—53 egg shells in this crow's nest, 127 more on the ground and fragments enough to make 400

Only two of these islands have any considerable human population. Chincoteague Island, six miles from the mainland, is the largest town in Accomac County. Its population is given as about 4,000. On Hog Island there are two or three hundred permanent residents.

Dr. Warren found thousands of eggs of game and useful birds destroyed by crows. He also found large numbers of young birds slain. On islands where the people raise poultry many eggs of chickens and tame ducks were found, as well as the remains of adult chickens, their young, and the young of tame ducks. On Chincoteague Island, Hog Island, Assateague and Palmer's Beach, Dr. Warren found that in order to protect their chickens and ducks the islanders in the spring and early summer had been shooting out crows' nests and destroying their eggs or young.

"I found, however," said Dr. Warren, "numerous eggs of birds and poultry scattered about the ground under trees and shrubbery on these islands. These egg remains, as well as fragmentary evidence of other animal food, were especially noticeable under trees and bushes near edges of the woodland bordering the great salt water marshes.

"On a remote section of Wallop's Island, which is probably two and a half miles from the mainland and five miles south of Chincoteague, I found five crows' nests. Three of them contained young; the other two, eggs. Under one nest, containing four young nearly ready to fly, I picked up 352 egg shells, most of which were those of clapper rails. The remains of at least three black (wild) ducks, king or big red rails, and Virginia rails were also found. Among the egg shells of non-game birds were those of meadow lark, killdeer, red-winged blackbirds, a warbler, two kinds of marsh-inhabiting sparrow, mourning dove, great bittern, green herons and boat-tailed grackle.

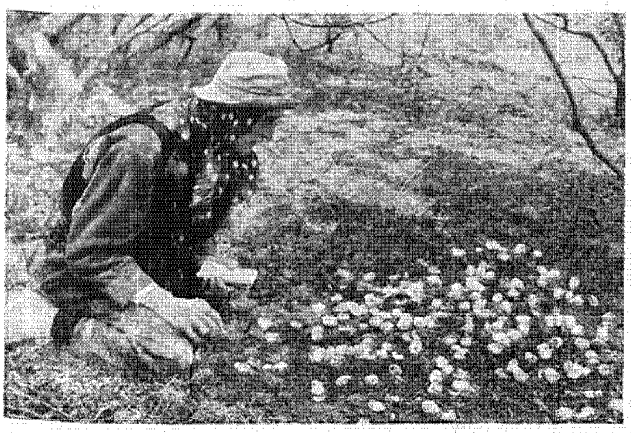
"At Wallop's Island I found no evidence of quail or cottontails having been destroyed by crows. Several years ago when I investigated their game-destroying habits on this island, I found on the ground, under a nest containing young, a dozen or more quail's eggs which had been eaten by crows.

"On Cedar Island, about eighteen miles south of Chincoteague, I found five crows' nests. There was a colony of about 40 crows on this island, showing that a number resorted there as a feeding station, aside from the nesting birds.

"In an hour and twenty minutes under these five nests and within a radius of a hundred and fifty yards, I found fully 2500 egg shells of game and non-game birds which had been eaten by crows. Three nests contained young. At the base of a low cedar tree where there were two crows' nests, one of which contained four

young almost ready to fly, I picked up 197 eggs in a space not more than four feet square. These egg shells, with the exception of about twenty heron eggs, were practically all those of mud hens.

"This trip was made on June 2. On June 19 I went back to this island, searched it carefully, and found seven additional crows' nests, from all of which the young had departed. But under the same tree containing the two nests discovered on our first visit, and at the bottom of which were 197 eggs, we found 125 more eggs, with at least 150 more in a radius of twenty-five yards from that tree. We had cleaned up those previously found, so that the number of new shells showed how voracious the crows were.



Dr. Warren notes the evidence of a crow-feast on Revell's Island: 150 egg shells—count 'em

"At Palmer's Beach abundant evidence of the egg-destroying proclivities of crows was found. Under one tall pine tree there were probably 75 to 100 egg shells, mostly those of clapper rails and laughing gulls.

"At Owls' Bluff we saw fully 75 crows, old and young, the latter as large as their parents. These youngsters were traveling with the old birds to and from the meadow, the adult birds evidently teaching their young how to forage for themselves. We found broken egg shells scattered all over this island on the meadows and under trees and shrubbery.

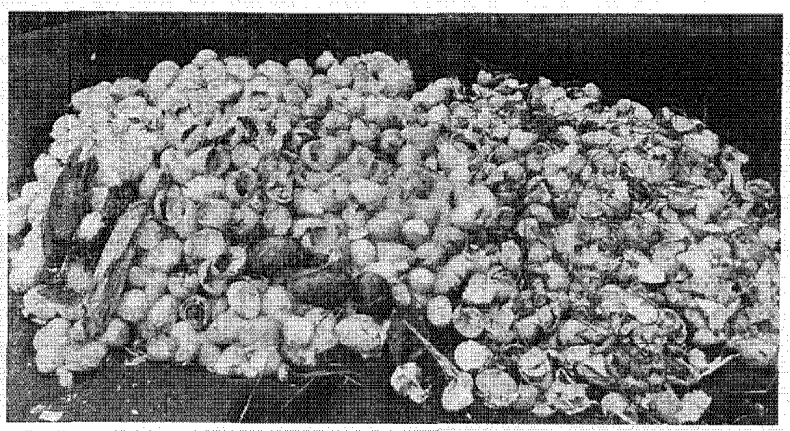
"We visited a part of Revell's Island, which evidently is not frequented by human beings in the spring and summer season. Everywhere we detected egg shells broken by crows. In one place 150 broken shells were found under bushes close to woods near salt water marsh. No crow's nest was nearby. At another place, a fish crow's nest was located in a large pine tree fully forty feet above the ground. The young had recently left it. Twenty-five egg shells and many fragments, chiefly those of clapper rails and gulls, were found in a crotch of the tree two or three feet below the nest. On the ground were shells of eggs of clapper rails, gulls, herons, some willets, a few terns, and several small non-game birds. There were fully 300 eggs under and about this tree, making at least 325 eggs, including those found in the crotch of the tree.

"We spent the greater part of a day at Hog Island. With a native guide we traveled four or five miles and found in various places a few eggs eaten by crows and the remains of birds which crows had killed and devoured.

"When I returned to the village on Hog Island and interviewed residents, I was informed that the crows had committed such serious depredations to their poultry that the owners and their friends had been shooting out the crows' nests when they contained eggs. Although possibly a dozen crows were seen on the island, they simply came there on foraging expeditions and departed for other points where they could rear their broods free from man's interference. We found and collected 100 or more eggs, a number of which were those of domestic fowls, clapper rails, green herons, mud hens, and song birds.

"At both Mockhorn Island and Pammer's Point conditions were found to be as serious as on the other islands.

"It is evident to any thoughtful person that to preserve game for future generations we should establish sanctuaries where game will propagate and be protected from natural enemies. The islands visited are largely owned or controlled by sportsmen's clubs, and their keepers have learned from experience to destroy depredating birds and other animals which prey upon game. On islands where natives raise domestic fowls they have learned that they must destroy vermin, and they regularly go out and shoot the crows and their nests. Experience has taught them that it is best to shoot into the crows' nests before they have young, since at this period these Argus-eyed robbers are most destructive of the eggs and young of poultry and wild birds."



Collected at Cedar Island, Va., under five nests of fish crows. There are about 1,000 shells and other remains of birds in this pile

Mining White Oak Coal

Some interesting details about coal production in the West Virginia fields

"I'm a lump and an egg, and a bit of slack"—With apologies to Kipling.

By W. E. TISSUE
Assistant Manager of Sales
White Oak Coal Company

LET us follow a ton of White Oak coal from the "face" or scene of actual mining until it is prepared and loaded in the railroad car for shipment. This is a shaft operation 465 feet in depth and we must travel underground nearly two miles from the shaft bottom to the face of the coal. Before shooting it down, the first operation is undercutting. This is done by a powerful electrically driven machine operated by a machine runner and his helper. It moves from place to place on a self-propelled truck under its own power. On arriving at the working place the machine is unloaded and secured on the bottom.

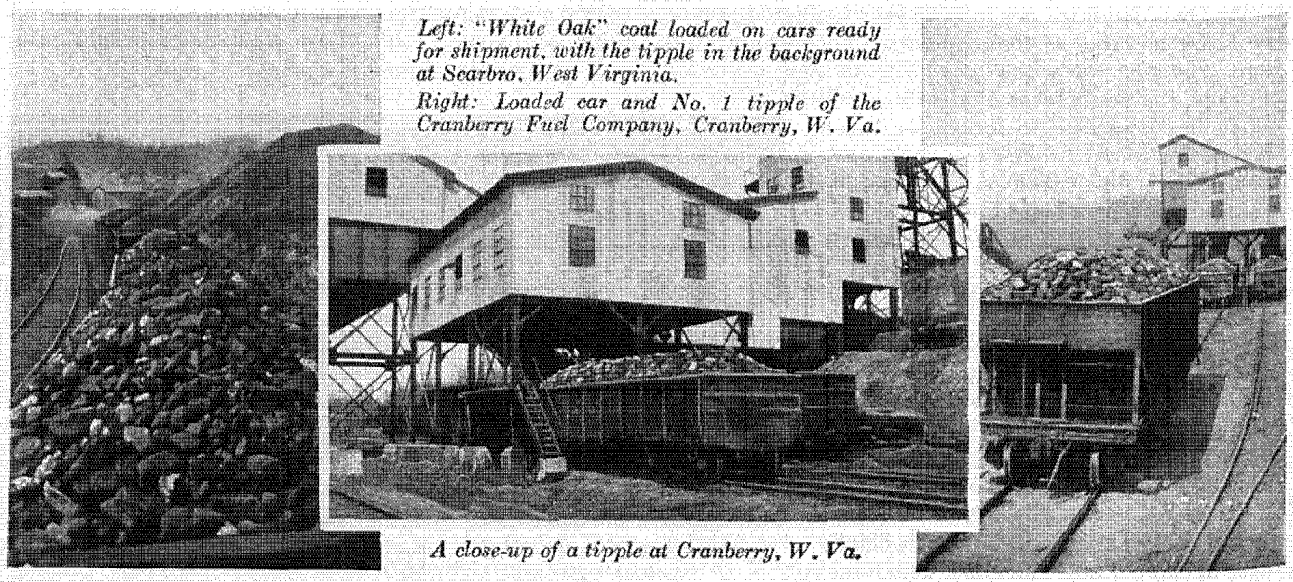
The principle of this cutting machine is an endless chain with bits or teeth inserted which cut a "kerf" or opening four inches high and seven and a half feet deep into the coal.

The miner's working place is twelve to eighteen feet wide, and the machine is moved across and along the coal by a steel rope during this operation. These machines are capable of cutting 200 tons per day in a four-foot seam of coal. When the dust or fine coal from the undercut has been carefully removed from the kerf or opening, the machine is reloaded and moved to the next working place. This operation has taken about 45 minutes.

THE mine described in this article is one of fifteen mines operated by the New River Coal Company in the New River smokeless coal fields of West Virginia. These mines have a daily production of 10,000 tons of "White Oak" coal, a product highly regarded both for steam and domestic purposes because it is very low in ash and very high in heat value. The New River Company aims to produce the cleanest coal with the highest percentage of lump possible. Du Pont explosives and technical service have helped to achieve that result.

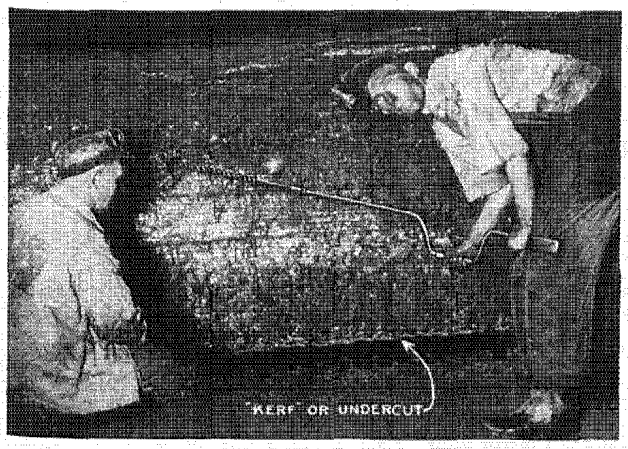
The next job is to load the undercuttings before blasting the undercut coal. Here is where "White Oak" preparation begins. Careful shooting greatly increases the percentage of lump or coarse sizes of coal. Many tests have been conducted by our Inspection Department to determine the most suitable explosive to use in each mine. Permissible explosives approved by the United States Bureau of Mines are used exclusively. There are many types of this explosive. Careful tests must be made before selecting an explosive that will produce the greatest percentage of lump after shooting. Demonstrators conduct these tests and carefully watch and record the effect of the powders on the different types of coal.

At different locations across the face of the coal the miner now drills boreholes for the purpose of inserting the explosive. These holes are drilled by hand and are of a size to exactly accommodate the explosive cartridges. The location of these holes, their depth and diameter, and the amount of explosive used all have a direct bearing on the percentage of lump coal produced. These matters have all been taken care of by the "White Oak" Inspection Department and a blue print furnished



Left: "White Oak" coal loaded on cars ready for shipment, with the tipple in the background at Searbro, West Virginia.
Right: Loaded car and No. 1 tipple of the Cranberry Fuel Company, Cranberry, W. Va.

A close-up of a tipple at Cranberry, W. Va.



The undercutting operation finished, the next job is to bore the holes for the explosive charges

each section foreman in the mine who exercises supervision over the shooting, in addition to his duties of looking after the safety of the men. After drilling the holes, inserting the explosive and detonator, he attaches a shooting cable, retires to a place of safety and fires the shot. The drilling of the holes and the shooting have taken about an hour. The coal shot down is what is known commercially as "mine run" and is ready to be loaded into mine cars of 1½-ton capacity for delivery to the tipple. These cars are substantially built of wood with steel trucks. There are 350 of them in the mine.

The miner attaches his check to the car for identification at the tipple and for proper credit when it is dumped. He is paid for the actual scale weight of the coal. Additional cars are rapidly supplied him until all the coal in his working place is loaded out and the chamber cleaned up for re-cutting.

A 6-ton electric gathering locomotive—there are seven of them at this mine—hauls the mine car approximately 2,000 feet to a side-track where it is later picked up by a main haul electric locomotive. This mine is equipped with two of them.

Our car is now one of thirty, all in one trip and headed for the shaft bottom, approximately 7,000 feet away. Upon its arrival the trip is attached to a feeder chain, which delivers the mine cars to an automatic caging device. This places the cars, one at a time, on the cage preparatory to being hoisted to the tipple over the shaft. The cars are hoisted to the surface by a huge hoisting engine which can raise, dump, and return the mine cars at the rate of two each minute.

When a car is placed on the cage, a man at the bottom of the shaft signals the hoisting engineer that all is ready. The car is rapidly pulled up the 465-foot shaft to the head frame in the tipple where it dumps automatically and is lowered into the mine for reloading.

The coal discharges into a steel hopper where it is carefully weighed and credited to the miner. After weighing, the coal passes into a reciprocating feeder, which controls the flow of coal to the shaker screens, so that it is fed in uniform quantities to insure proper screening; thence over a rapidly oscillating screening plate sixty inches wide and twelve feet long, containing slots one and one-eighth inch wide at the top, tapering to two inches wide at the bottom and twelve inches long. This screening plate removes the nut and slack coal, which drops through this plate and runs through a convey chute to the slack car. The lump and egg coal are now mixed, and it is necessary to separate them. The coal next passes over an oscillating screen of the same width and depth but having openings of three inches wide at the top, tapering to four and three-quarter inches at the base. These screens are stepped, or rather have three-inch offsets, which turn over every piece to prevent the slack from "riding" the larger lumps over into the prepared coal.

The egg-size coal drops through this screen plate and is conveyed to a re-screen which extracts all the fine coal and slack made by the shaker screen during its operation; the slack from this re-screen is picked up by a conveyer and taken to the slack car.

After passing over the re-screen the egg coal is deposited on an adjustable loading boom 30 feet long and 36 inches wide, where it is spread out for careful inspection. The lump coal passing over this screen is conveyed to a loading boom and placed in the lump car. A competent inspector is stationed on each boom where he is in easy reach of a push-button control that enables him to stop the machinery instantly and remove any impurities. These booms are all adjustable. As the car is placed under the tipple for loading, the boom is lowered to the floor of the car; as the car fills up, the boom is gradually raised, thus preventing any breakage. The railroad cars are controlled by car retarders. A car may be moved a foot at a time if necessary. As the coal reaches the top of the car, men who are expert trimmers place the coal so as to load it to its full bulk capacity, give the coal a good appearance and prevent loss in transit. The car is then recorded on the inspector's

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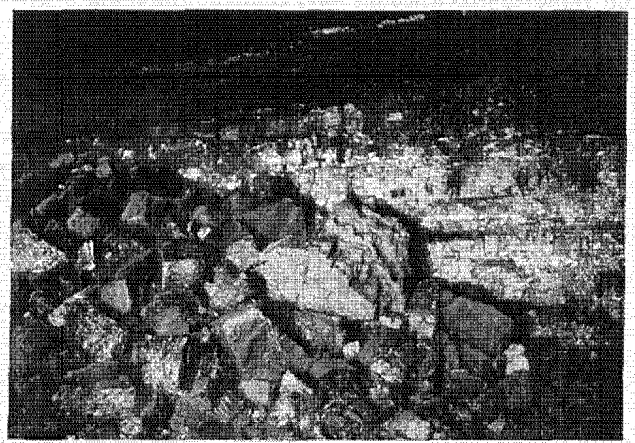


This view shows the result of a shot. Note that the coal is broken in large lumps by the blast

"Missis-Seepage"

Levees minimize flood losses along the Mississippi, but some of the water seeps through and makes ditch-cleaning work for du Pont dynamite

By O. B. MONOHAN
Sales Representative
Explosives Department

THE Government has spent millions in building levees along the Mississippi to keep the turbulent flood waters within due bounds. Usually, they accomplish that major purpose, but occasionally the river breaks through the high mounds of earth, causing enormous damage to property and sometimes loss of lives, as was the case last year. But what we have chosen to call "Missis-seepage," the constant seepage of water through levee walls, is something that land owners in the Mississippi valley have to contend with all the time, for the levees are not seep-proof.

Taking care of seepage water is a bigger problem than many people imagine.

Statistics published in the Reclamation Record indicate that the U. S. Government has been spending millions of dollars in constructing drainage works for irrigated lands. The work completed is estimated to have reclaimed and protected from seepage about 370,000 acres of irrigable land, and there are about 125,000 acres which are damaged by seepage. These drainage works are located on seventeen projects in thirteen states.

This article will tell you something about seepage water that comes through the levees along the Mississippi River and necessitates pumping stations continually operated.

In many instances property owners, jointly with the Government, have been called on to expend more money to get rid of seepage water than the original levee cost. It has meant digging ditch lines leading to reservoirs where pumps could be installed to force the water back into the river. And when seepage water comes through all the time, keeping these ditches open and pumping the water out becomes a constant undertaking and, as one may well imagine, an expensive one.

The problem of keeping the drainage channels open is unusually troublesome. The flat land does not permit of digging ditches with sufficient fall to carry the water off rapidly, which would tend to make the ditches self-cleaning. Instead, the watercourse is a sluggish, turbid stream so that there is a continuous deposit of sediment being formed, making it necessary to clean out the ditches more frequently than is the case in other parts of the country.

One specific instance of a drainage ditch that filled up and ceased to function occurred in the Drury Drainage District of Illinois, just across the river from the city of Muscatine, Iowa. It became imperative to reopen the ditch channel because the water would not flow in sufficient volume to permit of pumping for more than one or two hours a day. The district commissioner asked a du Pont representative to look over the work and determine if dynamite could be used to advantage, and the result was a recommendation to clean out the ditch with 60 per cent straight dynamite.

The work was started in the spring of the year, and the first shots were witnessed by members of the drainage district, visitors from other districts, engineers, contractors and others interested in drainage work. The shooting was done in a single line of holes twenty-eight inches deep and spaced twenty-four inches apart. This spacing was maintained as standard practice in loading as long as the work continued in the spring. Late in the fall the work was resumed and finally completed when the water in the ditch was covered with ice. Under these conditions the spacing was cut down to eighteen inches between holes.

All shots were made by the propagation method, with a blasting cap placed in the center charge of 200 holes. The explosive charge in each hole was limited to one pound, except in every tenth hole where an additional half-pound was added as a booster charge.

The old ditch averaged twenty feet in width. The new channel averaged nine feet at the top, three feet at the bottom and three and one-half feet deeper than the original ditch. Altogether, dynamite cleaned out three and one-half miles of ditch. The labor item covered the services of four men for sixteen days, three men for nine days, and two men for five days, or the equivalent of one man's time for 101 days. The amount of explosives required for this job was 8,000 pounds of straight dynamite.

To have moved a dredge in to do the work would have involved many times the total expense required to shoot this channel, and it would also have meant tearing down and rebuilding all the bridges along the watercourse. Blasting was therefore the most economical way to do the work as the results clearly indicated.

Generally, it may be said that if drainage ditches are promptly cleaned out as soon as there is a noticeable obstruction in the waterflow, they can be maintained in serviceable condition a long time. But if the stoppage is not removed until considerable sediment has accumulated, the cleaning operation, instead of requiring a few sticks of dynamite, is likely to require many of them, making an expensive job. A little twist of the old axiom states the situation aptly: "A stick in time saves nine."

Helpful Hints to Ditch Blasters

CREDITABLE work calls for careful preparation. Particularly is this true of ditch-blasting by the propagation method. If you would blast a straight, trim, clean-cut ditch, make sure the ditch line is straight at the outset, space the holes uniformly, punch them to an approximately uniform depth, grade considered, and load accordingly. Unless there is a variation in the character or moisture content of the soil, unless rocks, stumps or other obstructions are encountered which necessitate special preparation, uniform loading can usually be relied upon to give uniform results.

A stout cord—stretched taut between wooden stakes along the ditch line and parallel to grade—is a dependable guide for keeping the holes in alignment. And one of the best ways to have the holes spaced regularly is to crimp double-pointed copper rivets to the cord at required intervals, so that when the cord is in position each rivet will show where a hole is to be punched.

Of course, if the ditch line is comparatively short, the practice of fastening the rivets on the cord is hardly warranted; but if it is proposed to blast a ditch several hundred yards long, the time required to prepare the cord in this manner is usually well invested. For ditches of short length, many professional blasters merely use a stick of wood cut to the desired length for regulating the space between holes.

Wooden punch-bars, gradually tapering to a point, and of a diameter large enough to admit a 1¼-inch cartridge, have been found most satisfactory for making holes in soft ground. In hard ground steel bars are necessary.

After the holes are punched it is important that the dynamite charges be forced down into the ground an even distance from the cord. This is easily done by the simple expedient of cutting a notch on the tamping stick as a guide in pushing the charge in place.

The stout cord stretched taut between wooden stakes

It is good practice to pour a little water in the holes, if no water is encountered, in order to punch them more easily. After loading, it is a good plan to fill the holes with water to act as tamping and also to assist propagation.

Rest Your Back

IN a recent number of the *Chevrolet Sales Speeder* appeared an article about an automobile back cushion, which we quote in part:

"Are you short? A little below the medium height, or long-bodied and short-legged? Then you will appreciate how men or women drivers feel when they are a little too short to reach the pedals. They have to slide forward on the seat, and after they have driven a short distance they are fatigued. And no wonder—there's no support for the back.

The cushion for your back that rests you when you are tired

"Numerous automobile back cushions have been devised, but here is one that takes the palm. It's quite the neatest thing of its kind we've ever seen. The wedge-shape just 'hits the spot' and rests you where you're tired.

"This cushion is constructed of 4,000 Quality Fabrikoid, which—as nearly everyone knows—will resist water, weather and wear. It is rugged, waterproof and washable and can be cleaned with a damp cloth. It does not scuff or grow shabby, is grease-proof and stain-proof.

"It comes with the Chevrolet trademark embossed on it in a rich, two-tone effect, and the cushions can be obtained in a variety of pleasing colors, such as blue, brown and red Moorish.

"The filling for the cushion is the result of careful development. It is stuffed with a very finely picked cotton floss which will retain its resiliency for a long time, and has practically no tendency to mat or lump. It combines elasticity with light weight and has a separate cushion within, which has the effect of an air cushion. After use, it returns to its original shape."

This cushion is manufactured by the Texart Corporation, 75 Carson Avenue, Newburgh, New York. We understand that they will supply them either with or without the Chevrolet trademark embossed thereon at $1.75 each, delivered.

Blasting Caps Dangerous Playthings

By HELEN E. DAVIS

BLASTING caps and electric blasting caps are useful agents for detonating a charge of explosives in a bore hole but as playthings for children they are not desirable. Last month two boys of seven and nine walking along a country road in Michigan spied a small, glittering copper tube in the dust. The older boy picked it up, squinted his eye at the open end, and then extracting a nail from his pocket began to dig out the tube's contents. The little fellow crowded close to watch proceedings. The cap exploded, hurling small bits of copper violently upward into the boys' faces. Their cheeks were scratched and cut and each boy lost the sight of one eye.

A few weeks ago a boy in Jasper, New York, whose father works in a quarry, found a blasting cap on the floor in their house near the hook where his father hangs his working clothes. He took the cap out into the yard and began pounding it with a stone. The cap exploded and a piece of the copper shell buried itself in the boy's eyeball.

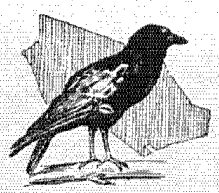
Recently some children in Cleveland found a number of electric blasting caps and, with a vision of lollipops for all on the horizon, tried to sell them to a junk dealer for old metal. He pointed out the cotton covering on the wires and refused to buy them. So the children set to work scraping off the insulation. This proved slow and hard. Some one suggested burning it off. A small fire was built and the wires were thrust into the flames. The caps exploded and seven children and a man working nearby were injured, two of them being seriously burned.

Not long ago in New England some boys were discovered throwing sticks of blasting gelatin which they had pilfered from a quarry in the vicinity, under the wheels of an approaching trolley car after the approved American fashion with Fourth of July torpedoes. Fortunately the cartridges rolled away from the tracks and landed safely in the middle of the road bed.

Obviously neither dynamite cartridges nor blasting caps are made to be handled by children. Their function is to explode. If given a chance—or sometimes even half a chance—they will do so. Sticking a match in a blasting cap, stepping on it, hammering it, denting it with a knife, digging out its contents with a nail, jerking out the wires of an electric blasting cap, or swinging it hard against a fence or sidewalk—"treating 'em rough" in any manner whatsoever is dangerous. When caps explode, even one at a time, they can do a good deal of damage. When set off, a blasting cap will tear its copper shell into bits with such violence that they will bury themselves in iron a foot away or shoot straight through a steel plate one-sixteenth of an inch thick. A single cap exploding in a boy's hand can easily blow the hand to pieces and hurl a fragment or two of copper into his eyeball in the bargain. Every year more than one hundred children in this country are injured by playing with blasting caps—all of them painfully hurt and some of them maimed for the rest of their lives.

An inquiring disposition, ignorance and high explosives are not a safe combination and had much better be kept apart. But quarries and mines and blasting operations for construction work naturally have a fascination for children. They like to get as close to them as they are allowed to while work is in progress and to explore them on Sundays. If explosives are kept in unlocked houses or are left lying around unguarded, or even if a stray blasting cap is dropped on the ground and forgotten, some boy is pretty likely to find this treasure—with the risk of blowing up himself and any one else who happens to be on the spot. Or if men handling explosives leave blasting caps in their pockets to drop out by the roadside or in their own houses, or take partly used boxes of caps home with them, the chances are that a child will get hold of a cap or two with disastrous results.

Of course, children who live near operations where explosives are being used should be warned against playing with caps or dynamite. But so long as children are children curiosity and a faculty for forgetting warnings will exist, so the responsibility for preventing accidents must rest upon their elders. Users of explosives who wish to sleep at night unhaunted by the thoughts of their own child's or their neighbor's child's mangled fingers and sightless eyes should take careful count of every stick of dynamite and of every cap they handle, making sure that it either explodes as intended or that it is put away under lock and key.

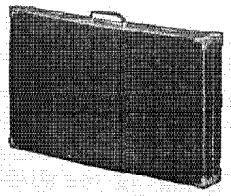


Wild Goose Nests Robbed by Raven

The following quotation from the *Times* of Priest River, Idaho, tells its own story and shows the necessity of anti-vermin activities on the part of all sportsmen:

"A few days ago Ed Trainer, who has been working on the Priest River drive, discovered two wild goose nests on an island about sixteen miles north of Priest River. One nest contained eggs while the other contained five goslings. The nearness of the men on the drive drove the mother geese away from the nest, but nearness of men meant nothing to a big raven that was nearby. It flew down to the nests and carried off contents, and all while the men watched them."

A Portable Dining Room Suite

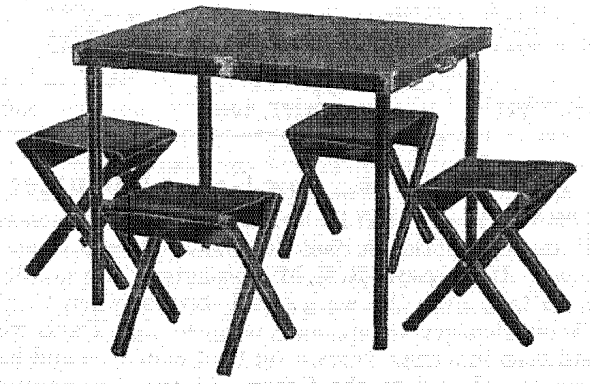


IF you have ever been on a picnic or camping trip without a table to eat from or chairs to sit on; if you have ever forgotten the "Thou-shalt-not-swear" commandment trying to get regular folding chairs and tables into an automobile so they wouldn't crowd out the wife and children; if you have suffered the many mishaps which beset the camper with his dining equipment, you will appreciate what John S. Anderson, of Jamestown, New York, has done for suffering humanity.

Mrs. Anderson had frequently asked her husband if he couldn't solve the problem of table and seats for outings, because the Andersons are very fond of picnics. The result is shown in the accompanying illustrations.

The case is covered with du Pont Rubber Cloth, with nickel-plated metal corners. It opens up to form a table 24 by 32 inches. Inside this neat, handy, durable case are four folding chairs, steel-reinforced with rubber cloth seats. It also contains a metal box 7½ by 11½ by 3 inches for cutlery, tableware, napkins and other accessories. The table has folding metal legs, the whole outfit weighing only 25 pounds.

Where the table and chairs are not covered with the rubber cloth, the wood or metal is finished with Viscolac enamels. This combination makes an attractive, waterproof job. Incidentally, for the information of any readers who may want to procure this equipment

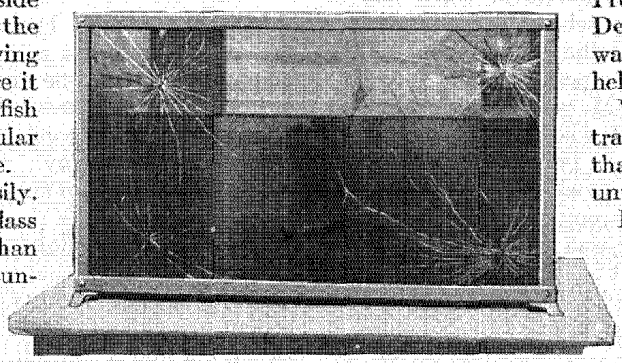


quickly, we add this line: Dealers, or those interested in single cases, should write to the Tablecase Company, Jamestown, New York. This product is now being shown at the Du Pont Products Exhibit, 1121 Boardwalk, Atlantic City, New Jersey.

An Interesting Exhibit

GOLD fish in a glass aquarium are undoubtedly attractive. To watch them swim about within glass walls is a fascinating pastime; to feed them is a still greater pleasure. But always there is the haunting fear that some one may break the fragile bowl and that the water will flood over the floor. When that happens there is a muss to clean up, aside from rendering first aid to the fish, and the expense of buying a new home for them. Were it not for this hazard, gold fish would be much more popular household pets than they are.

Common glass breaks easily. Gallons of water in a fragile glass container cannot be other than a potential source of trouble, unless the aquarium is made with glass walls like the one illustrated here. It looks as though some malicious person had tried to break this one with a hammer. You'll observe the evidence in four different places, with the fractures running clear across the case. It *was* done purposely—to demonstrate that not all glass is as fragile as it seems.



This illustrates what Pyralin sheeting does to make glass non-shatterable

The walls of this aquarium are made of Safetee Glass, a product made so strong that it resists the impact of heavy blows without shattering. A sheet of Transparent Pyralin solidly pressed between two sheets of glass gives it this unusual property. For more than two years this aquarium was exhibited at the Du Pont Products Store at Atlantic City. Despite the fact that the glass was cracked, the Pyralin within held water perfectly.

We call attention to this illustration merely to remind you that Pyralin is a material of very unusual properties.

Its use within the glass walls of this aquarium is only one of hundreds of uses in which transparent sheeting stock finds a place in the manufacture of thousands of commercial products. It may be just what you need for some manufacturing need of your own. Tell us about it. Write to the Application and Research Department of the du Pont Company at Arlington, N. J.

THE
DU PONT
MAGAZINE

Published and copyrighted by
E. I. DU PONT DE NEMOURS & COMPANY, Inc.
Subscription, 50 cents the year
E. R. MANCHESTER.....*Editor*

Vol. XVII AUGUST, 1923 No. 8

F. B. Davis, Jr., Now General Manager

FRANCIS B. DAVIS, Jr., has been made general manager of the du Pont Company's Pyralin Department. He succeeds R. R. M. Carpenter who was called in to take over the work last February when C. W. Phellis, then general manager, resigned. Mr. Davis, who had been in former years a du Pont employee and had been transferred to the General Motors Corporation, was called back to become Mr. Carpenter's assistant.

R. W. Brokaw has been advanced to the position of assistant general manager, made vacant by Mr. Davis' promotion.

Rodgers Wilson

WITH much regret we note the passing of Rodgers Wilson, the popular superintendent of the Nemours, West Virginia, plant, who died July 21. His death removes from the du Pont organization one who had served it faithfully for nearly twenty years.

Mr. Wilson, a native of New Castle, Delaware, received his early education in the public schools of his home town, and subsequently pursued courses at Friends' School in Wilmington and at the University of Pennsylvania. After leaving school he was first employed at the Harlan and Hollingsworth shipbuilding plant of which his father was superintendent. Later, he accepted a position with the Maryland Steel Company at Sparrows Point, Maryland, where he remained until he entered the employ of the du Pont Company in 1904 as mill office clerk at the Brandywine plant. His ability was soon rewarded by advancement to the position of chief clerk. Subsequently he was made superintendent of the former du Pont plant at Schaghticoke, New York.

In later years, besides holding a responsible staff position in the black powder division of the company at Wilmington during the war years, he was at various times superintendent of the Brandywine and Nemours works.

Mr. Wilson was of a genial disposition and had a wide circle of friends in Wilmington and elsewhere. He was highly esteemed by his associates and was popular with the workers at the various plants where he had held executive positions. His death is sincerely deplored by all who knew him, and the company has lost one of its most loyal employees.

Ditching Demonstration in Florida

THE Fort Myers (Florida) *Tropical News* reports an interesting ditch-blasting operation which was conducted near an orange grove at Tice, Lee County, Florida, last Spring. The major details of the story about this 900-foot ditch can be told in two's: The work was done in less than *two* days, with *two* shots at a total expense of less than $200 by Otho O'B. Strayer, one of our agricultural demonstrators, and his *two* helpers.

This ditch was made through a heavy growth of tangled brush, stumps, and some large standing timber in low hammock land. Any one who is familiar with land types in Florida can readily visualize the picture without an illustration. The purpose of the ditch was to drain an orange grove. Holes three feet deep were punched along the ditch line at intervals of thirty inches, and half-pound charges of du Pont 60 per cent straight dynamite were loaded. Only one electric blasting cap was used to detonate the charges. The first shot resulted in a ditch 500 feet long, and the second extended it 400 feet farther. The completed ditch is four to five feet deep, three to four feet wide at the bottom, and twelve feet wide at the top.

Many orange growers of that section witnessed the demonstration and were much impressed with the propagated ditch-blasting method and its low cost as compared with the usual laborious way with axe, pick and shovel. Du Pont dynamite once loaded in the holes can finish the job in the twinkling of an eye; the old-fashioned way consumes a seemingly endless length of time and involves a disproportionate amount of work.

Malaria Control—An Appreciation

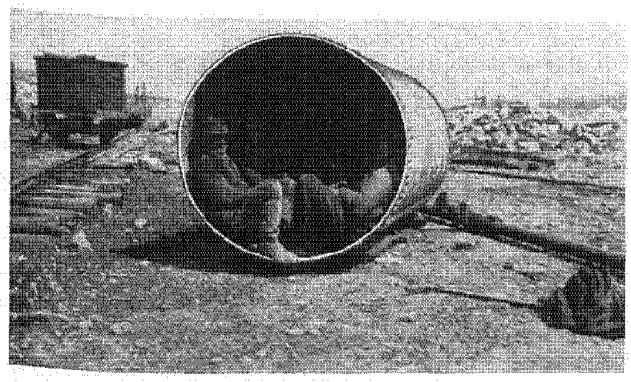
"DITCHING with Dynamite Pays'? Yes. If people only knew what an enormous tribute they pay to malaria they would be under many obligations to your company," writes Dr. C. A. R. Campbell of the Health Division of San Antonio, Texas, to a representative of the du Pont Company.

Dr. Campbell is an authority on malaria control. He discovered that bats prey upon mosquitoes, and prevailed upon the municipal authorities of San Antonio to build the first bat roost ever constructed. The daytime housing of these creatures proved to be an excellent investment, for each night they sallied forth to catch, kill and eat mosquitoes, a favorite part of their diet, and malaria was soon brought under control.

His letter concludes: "We ought not to depend on any one thing in the fight on malaria. Employ them all—infantry, cavalry, artillery, poison gases, bombs, bats, drainage, in fact, *anything* that sounds as if it would destroy mosquitoes."

Protection During Blasts

HOW the Louisville Cement Company, of Speed, Indiana, provides safety for its quarrymen during a blast is illustrated here through the courtesy of *Rock Products*. Incidentally, these devices save money



With the blast only 100 feet away the quarrymen are safe here

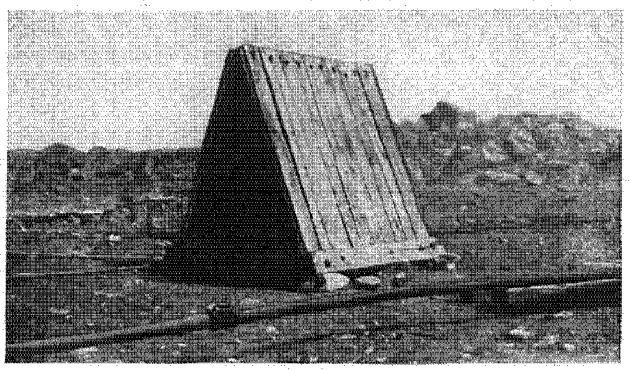
which in many quarries is paid out for time not utilized in production—time spent by the workmen in going to and from some distant place of safety before and after blasts.

"At many large open quarries it is necessary for the men to go one-eighth and sometimes as far as a quarter of a mile from a blast. For instance, a quarry of modest size employs, let us say, twenty men who are paid an average hourly rate of thirty cents. If it is necessary that these men go one-eighth of a mile from a blast, it means that each man spends at least a total of twenty minutes, including going, waiting for the blast, and returning to his work. This entails an expenditure of exactly $2 for every series of blasts.

"The Louisville company is no doubt cutting this cost at least in half by the installation of steel cylindrical tanks, such as shown in the illustration. This tank was located not more than 100 feet from the blast.

"For this company, this type of safety 'house' is inexpensive. Once it served as cooler in the cement mill proper. By merely closing up one end of a cylinder with heavy timbers and bolting 2 x 4-inch timbers extending the full length on either side for the men to brace themselves against, the tank needed no other alteration in being converted from a cooler into a place of safety.

"Prior to using these steel cylinders for this service the company used safety houses of V-shape timber construction, as illustrated. While this type of protector is perhaps more practical, due to the fact that it can be constructed very easily at any operation, it is not as efficient as the steel-tank type, because it is more cumbersome to handle; also, it cannot be placed as near to a blast. The steel-tank type is especially desirable because it can be rolled easily from one place to another."



Safety houses like this in the quarry are money-savers

Mining White Oak Coal

Continued from page 7

report. The car number, type of car, and grade of coal are reported to the shipping department at Macdonald, and shipping instructions are furnished immediately.

In conducting the coal-mining industry, a great many operations are incidental to the actual producing of a ton of coal. For instance, the mine must be ventilated in accordance with the strict West Virginia State Mining Laws. The mine must be kept free from water. Large and expensive transmission lines must be erected to convey electric power from the nearest power company. Expensive substations, metering frames, and other equipment must be provided to measure and transform this power for mine use. At shaft operations electrical storage battery lamps must be purchased, racks erected to recharge the lamps, and a service station provided with a man to repair, maintain, and issue these lamps to the miners; shops, with all necessary tools, must be provided to repair mine cars, motor pits, and so on, to enable speedy inspection and repair of the mine locomotives; sand dryers to dry sand for the mine locomotives and special cars to transport the dry sand must be constructed. Large water tanks to take care of the mine requirements, as well as the domestic supply, must be erected, and water lines laid. Storage and other handling facilities for taking care of the slate, rock and dirt removed from the mine must be taken care of. Where mules are used in the mine a large stable and necessary feed buildings must be erected.

An auxiliary gasoline engine must be provided to operate the mine fan in case the electric power goes off while the miners are at work.

All of these, and many more, are absolutely necessary for the safe and economical operation of a coal mine.

Adequate Ventilation of Metal Mines

An authoritative discussion of this most important subject

By D. HARRINGTON
Supervising Mining Engineer
U. S. Bureau of Mines

WHILE ventilation has practically always been deemed an integral part of coal mining, metal mines have rarely paid much, if any, attention to air circulation until forced to do so by occurrence of some untoward condition or accident. Yet metal mines actually have as great need of efficient circulation of air as have coal mines. The coal mine must remove the dangerous explosive gas methane, also fumes from explosives, and in occasional places other gases such as CO_2 or nitrogen; metal mines have greater necessity to remove fumes from explosives, frequently have occasion to remove CO_2, nitrogen and other gases from strata, and even the coal miners' explosive gas — methane — is occasionally encountered. In addition, circulating air currents are urgently needed in metal mines to reduce excessively high humidity and temperature so frequently found in our metal mines, but very rarely in coal mines; also the immense quantities of minutely fine particles of rock dust floating in the stagnant air of metal mines and very largely responsible for miners' consumption and other diseases so prevalent among our metal miners in many regions, could be almost wholly removed by adequate ventilation. The generally accepted conclusion that coal miners have a healthful occupation and live to a ripe old age, and that many metal miners contract diseases such as lead poisoning, miners' consumption, etc., and either die early in life or are incapacitated in middle age, is due almost wholly to the superior working conditions in the coal mine brought about chiefly by ventilation.

MR. D. Harrington, who contributes this article, is undoubtedly the greatest living authority on the important subject of mine ventilation. His conclusions as to the humanitarian and economic advantages of adequate ventilation in metal mines are so well based and authentic that the mining industry is everywhere putting his recommendations into effect.

When the attention of mine operators and engineers became focused upon the problems of better ventilation, the Du Pont Fabrikoid Division was asked to develop a flexible ventilation tubing so treated as to give increased and more economical service by resisting the effects of heat, moisture, mildew, acid waters, fumes, etc. Du Pont VENTUBE was the result, and this easily installed, long-lived and thoroughly efficient tubing has successfully met the most severe conditions imposed upon it.

In a detailed study of a large metal mine in which much better than average ventilation practice was in vogue and workings extended almost from the surface to below the 3000-foot level, data were obtained at 158 working places, of which 87½ per cent were below the 2000-foot level, and 35 per cent below the 2500-foot level, and about 75 per cent of the observations were at actual working faces. It was found that average wet bulb temperature of the 158 places was 76.8 degrees F., and average relative humidity 91.3 per cent. There was sufficient air movement to be detected by ordinary observation in 42 out of the 158 places, and an additional 29 places had enough movement to be detected through very slight inclination of a candle flame, leaving 87 out of 158 places (or over 55 per cent) with not the slightest detectable movement of air.

In general, the places with the high wet bulb and high relative humidity and little or no air movement were those where men were doing the hardest and most important work, that is, at the working face, drilling, mucking, or shoveling, timbering, etc.

The matter of movement, or velocity, of air is by all means the most important consideration in effecting adequate ventilation of mines and in the protection of the health and the forwarding and maintaining of the working efficiency of the underground workers.

Temperature of underground air is affected by outside air temperature in varying degree, dependent on depth and extent of workings, air velocities and other considerations; temperature of mine air is very definitely affected by underground rock and water temperatures, by quantity of air flowing, by oxidation (or decay) of timbers and ores, and by mine fires. It is also affected to a greater or less extent by friction due to velocity of flow, and by moving of ground; and firing of shots, heat from lights used and from breathing of animals, heated air obtained from other mines, and from electric motors and other machinery may seriously affect local temperature of air of underground workings.

Relative humidity of underground air is affected to some extent by humidity of surface air, but much more vitally by moisture content of walls of underground workings, and especially by water dripping through the air. Quantity, temperature and velocity of air flowing also ultimately affect humidity of underground air; and handling of air by small fan and pipe units also locally affects mine air humidity, and may be utilized to govern humidity of underground air to a certain extent.

Gases found in mine air may come from surface air, from breathing of men and other animals, from lights used, from firing of explosives, from compressed air used with machines or as blowers, from operation of various kinds of machinery and from various rock or other strata encountered, as well as from mine fires that are active or incipient.

Miners' consumption, the scourge of metal miners, is caused primarily by breathing of very fine particles of certain mineral dusts and especially of siliceous dust; over 50 per cent of our metal producing mines are working in more or less siliceous material and, through lack of ventilation, giving this dangerous dust maximum opportunity to exercise its harmfulness. Lead poisoning afflicts workers by skin absorption of soluble dust of lead ores as well as by breathing of such dusts.

Dusts found in metal mine air are largely derived from dry drilling, from blasting, from shoveling or mucking, from tramming or dumping ore, timbering, etc. Probably well over 50 per cent of all metal mining has siliceous material in ore or containing walls, hence has siliceous dust which, as far as present-day knowledge goes, is the most dangerous of all dusts, especially when taken into the lungs in extremely finely divided form such as dry drilling, blasting and mucking throw into the air.

Metal mine dust acting through miners' consumption, lead poisoning, bronchitis, etc., is the chief instrumentality in perhaps

more deaths annually among our 175,000 metal miners than coal dust causes to our 700,000 coal miners through explosions. The best remedy for the dust menace in mines, other than preventing its formation, is the universal coursing of currents of air to remove the dust, as it has been proved that the very fine, most dangerous dust in metal mines remains suspended in still air several hours.

Efficient ventilation of metal mines consists in supplying at all times such volume of circulating air at places where men work as will enable the worker to exert himself in comfort at maximum physical capacity without endangering his health. In mining, it appears that ventilation, fire protection and prevention, health, safety and efficiency are very closely interlocked.

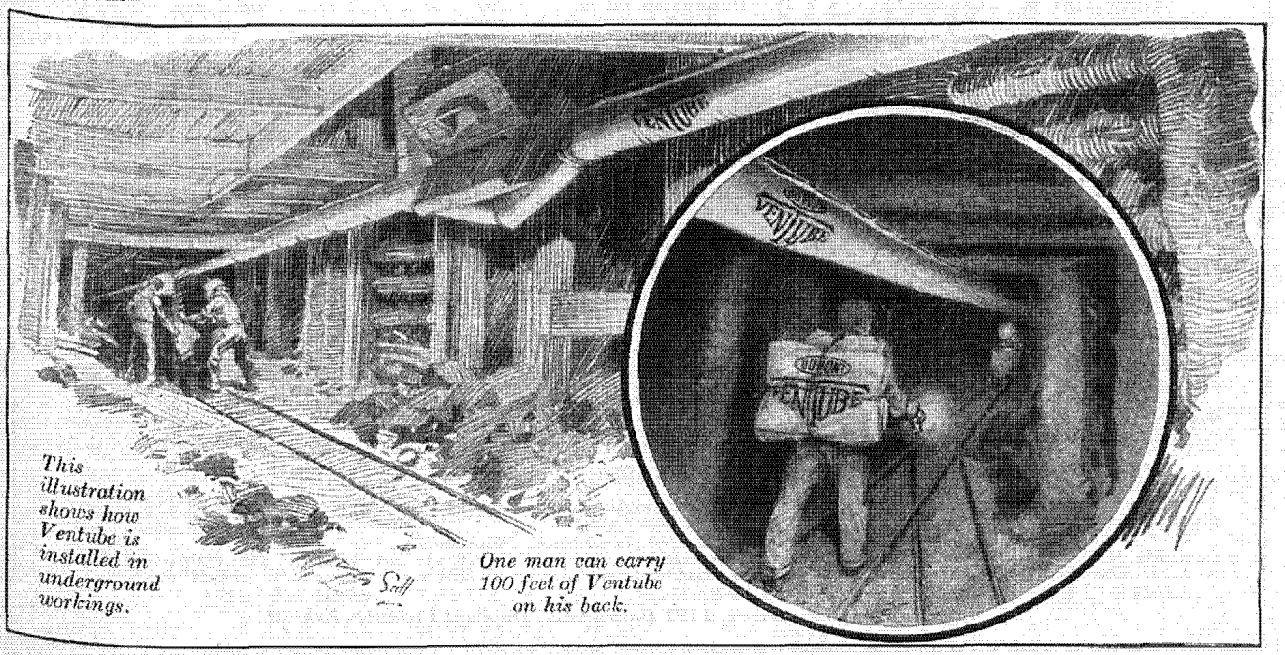
Every mine (coal or metal) should have mechanically driven fans preferably placed on the surface, fireproof housed and capable of reversing air currents with minimum delay. There should be a definite system of air splits such that fire in one place may not necessarily fill the entire mine with poisonous fumes. There should be a system of doors near shafts in levels leading from shafts such that the shaft or any part of mine may be readily isolated in case of fire. Metal mines should provide fan ventilation from start of opening in order to avoid dangers from explosives fumes, etc., and provide fresh air to workers. Each mine should be ventilated wholly within itself; inter-ventilation of mines is likely to be dangerous, inefficient and unsatisfactory. Workers in metal mines, including shift and other bosses, must be educated to respect ventilating devices such as doors, regulators, overcasts, brattices, fans, etc., as coal miners do, and to become as familiar with these devices as coal miners are.

There are records of naturally or otherwise inadequately ventilated mines filling with CO_2 or other gas, overcoming some of the workers and compelling suspension of work for considerable periods of time. Upon establishment of efficient mechanical ventilation this situation was readily controlled. At seasons of the year when the temperature of surface air and of underground rock and water are about equal, mines relying on natural ventilation have periods when air circulation is sluggish, or ceases utterly or reverses in direction. At time of mine fire, naturally ventilated mines are likely to be at a decided disadvantage through inability to control direction of air currents.

The use of poorly placed compressed-air hose blowers at working faces frequently intensifies air dustiness by allowing a high-velocity compressed air stream to pass through dry, loose, finely divided ore or other material being drilled, shoveled, etc., and forcing workers to breathe this air highly impregnated with dangerous fine dust. Some metal mines with high dust production under certain conditions at working faces, have comparatively low dust content of the air of these places at other times, and low average dust content of all places due to efficiency of ventilating currents especially at working places. Significantly these mines appear to be singularly free of miners' consumption or other diseases, yet the employees work at top-speed and the material handled is highly siliceous.

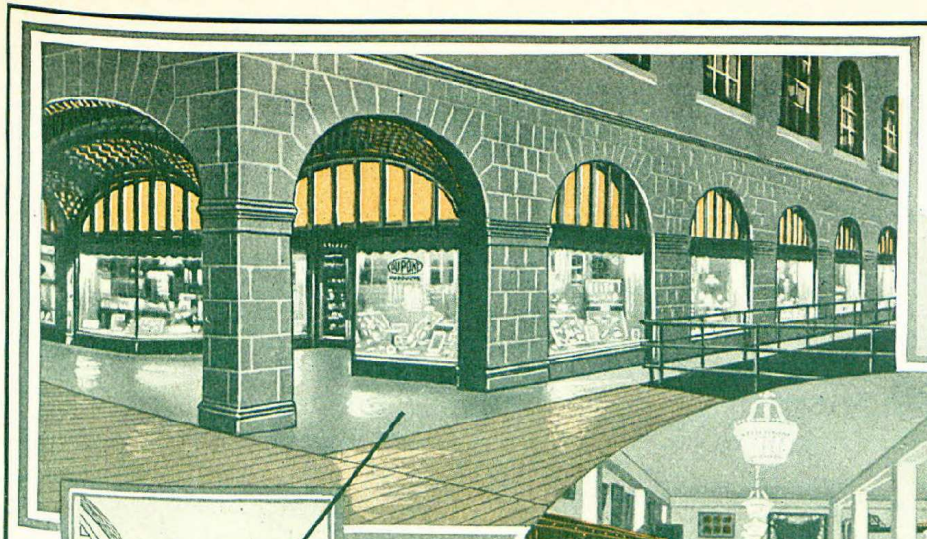
With dry bulb air temperatures above 75 degrees F., comfort and maximum working efficiency can be attained only when the air is moving, this being especially true if the air has high relative humidity. The exact velocity necessary is a variable dependent upon the temperature and humidity. Saturated atmospheres, up to nearly blood temperature, may be made endurable and even to a considerable extent comfortable by providing sufficient velocity. Some experimental work has been done on this by Dr. Sayers, Chief Surgeon of the U. S. Bureau of Mines, and the writer, and detailed report is to be issued. Relative humidity, even up to the saturation point, does not appear to be harmful to health, comfort or efficiency until temperatures run above 75 degrees F.; and if sufficient movement is supplied, high relative humidity is not particularly harmful until temperatures are well over 90°.

Frequently blind-end working faces in metal mines have air so depleted of oxygen that a candle will not burn and carbide lamps must be used, hence oxygen is below 18 per cent and CO_2 runs several per cent; occasionally entire mines are found with this condition which many metal mine managers hold to be perfectly all right. There is absolutely no question that men working in atmospheres which will not support combustion of a candle cannot deliver maximum efficiency and their health must suffer ultimately. Mines with cool working places which allow men to work at top speed, especially when contracting, are likely to be extremely dangerous to health of workers unless provision is made to remove explosive fumes and fine dusts from working places by ventilating currents.



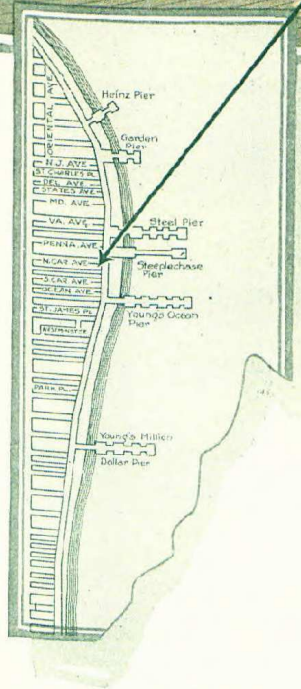
This illustration shows how Ventube is installed in underground workings.

One man can carry 100 feet of Ventube on his back.



Left—Exterior View of store building: 1121 Boardwalk, Atlantic City, where the Du Pont Products Exhibit is housed.

Below—An interior view which gives you only a hint of the many articles on display.



Visit the DU PONT Exhibit *at Atlantic City*

ON THE BOARDWALK, opposite the Steeplechase Pier, is located one of the most unique educational exhibits in America. It is maintained by the du Pont Company to show the public the useful character of its products and the wide range of their application in industry.

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There is no charge for admission. Excepting Sundays and the usual holidays, our representatives are on hand every day in the year to explain to visitors the merits of the products displayed, and to tell them where they can be procured. Sales of exhibit articles are never made except upon the voluntary request of visitors.

We extend a cordial invitation for you to visit this exhibit.

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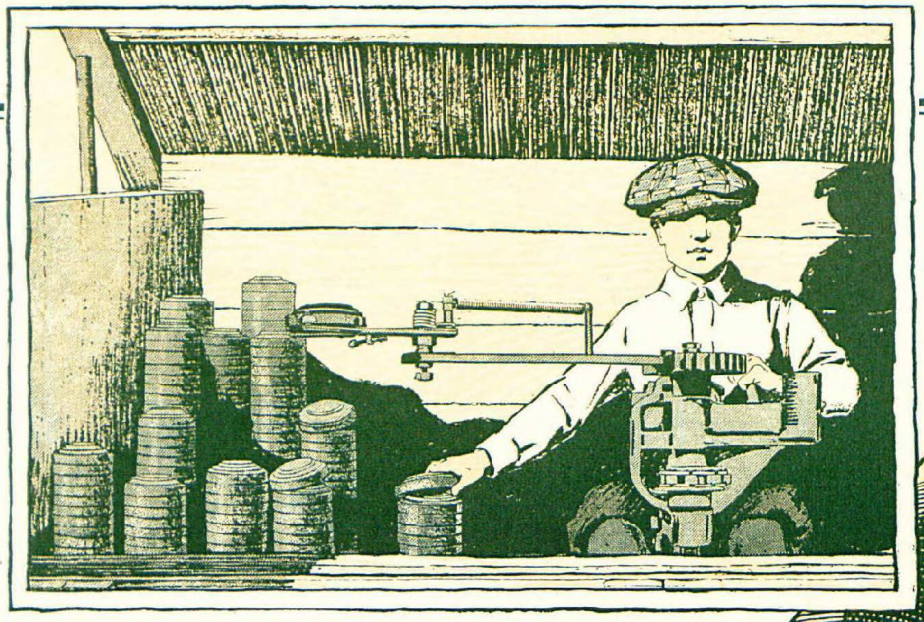

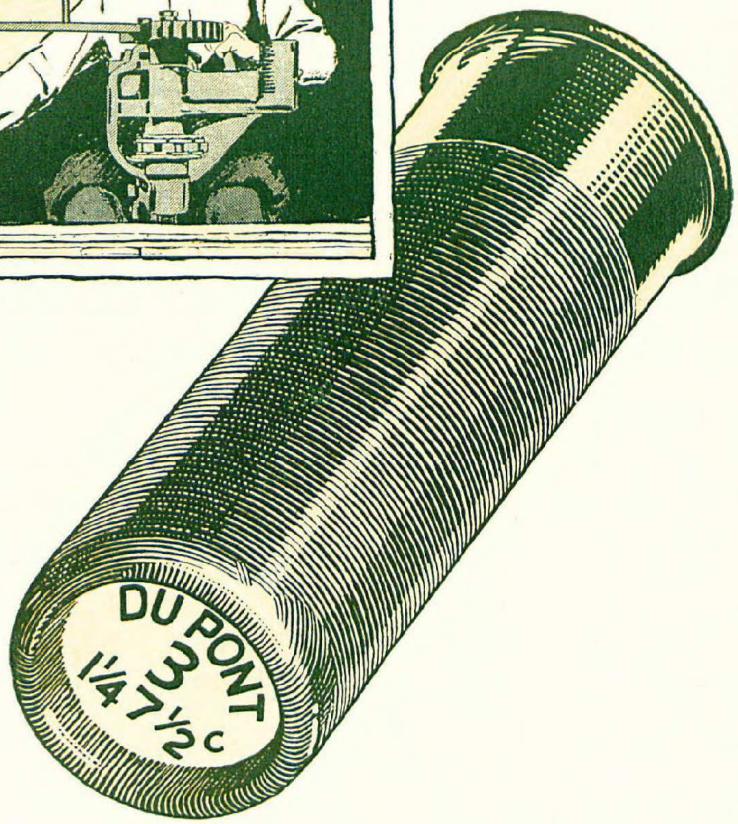

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