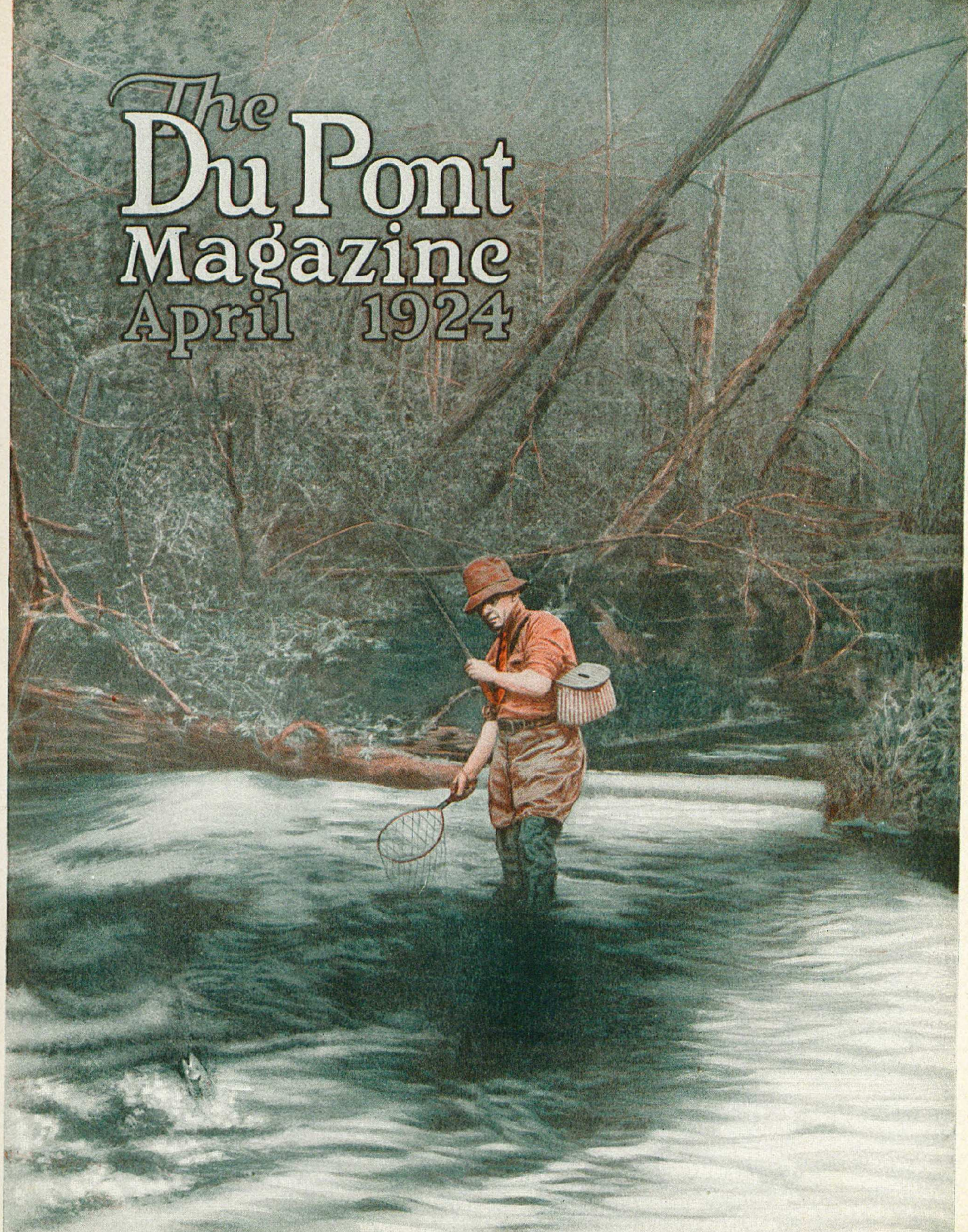


The
Du Pont
Magazine
April 1924



This advertisement appeared in THE SATURDAY EVENING POST, March 29th issue.

DU PONT ANNOUNCES AN ENTIRELY NEW TYPE OF FINISH



Duco is adaptable to almost any product requiring a lasting finish in color. It is already being successfully used in the following industries:

Automobile Bodies	Novelties
Truck Bodies	Toys
Automobile Accessories	Electrical Parts
Wood Furniture	Umbrella and Cane Handles
Metal Furniture	Radio Boxes and Radio Parts
Office Equipment	Gasoline and Oil Pumps
Pens, Pencils, etc.	Bath Fixtures and Accessories
Washing Machines	Medicine Cabinets, etc.
Lamps	Toilet Seats
Handles for Tools,	Typewriters
Brooms, Brushes, etc.	Vacuum Cleaners

VISCOLAC

The transparent finish, without color, for use on furniture and other wooden articles where a natural finish of superior durability is desired.

GREATEST ADVANCE IN FINISHING ART IN QUARTER-CENTURY

Duco Finish Gives to Wood or Metal a Rich, Satin-like Surface Whose Soft Lustre Actually Improves With Age

Chemists have long sought the secret of a finish which would combine two essentially different properties—*beauty* and *permanence*. After years of research, thousands of experiments, and exhaustive service tests, du Pont Chemical Engineers now announce the perfection of just such a finish—and its adaptation to quantity production and quantity application. This new finish is known as Duco.

Duco can best be described by likening it to the finishes which gave to ancient Chinese lacquerware and costly Oriental pottery the soft, rich tones which have come down unmarred through the ages. The effects which the ancient artisans required months to produce on a few rare objects are now being duplicated in a few days' time on thousands of articles in commercial use with Duco.

AMAZINGLY DURABLE!

Applied to almost every material, from wood to steel, Duco defies the usual deteriorating elements. Its soft lustre *actually improves with age*. It retains its original color tones and values, and even bumps and scratches, which would disfigure other finishes, do not seriously affect it.

Duco is, in brief, of such extraordinary denseness, hardness and adhesiveness, that it forms a surface on the material it covers, which sets an entirely new standard of durability.

The finish on an automobile, for example, is subjected to action of sun, rain, snow, ice, mud, alkali dust, grease, boiling and freezing temperatures and sudden changes. Yet test cars finished with Duco over a year ago are today actually in *better condition than when the finish was applied*. Duco is today giving equally successful results in 20 other industries.

RICH TONES THAT LAST!

Organically, Duco represents an entirely new type of material. It is compounded on a pyroxylin base, employing a distinctly new principle. It is supplied both in a basic black and a wide variety of beautiful fast colors, suitable for finishing practically all types of wood and metal surfaces. Neither the black nor the colored enamel finish requires baking. *Duco retains its original colors indefinitely.*

Duco is easily applied by dipping or spraying, **but cannot be applied by brushing**. It dries almost immediately after application, thus materially reducing finishing time and costs.

Manufacturers of all products which require a colored finish of enduring beauty are invited to investigate Duco. Our Technical Laboratories are at their disposal. Our representatives are available for a limited number of demonstrations.

E. I. du Pont de Nemours & Co., Inc.
Chemical Products Division
Parlin, N. J.



THE DU PONT MAGAZINE



Vol. XVIII

APRIL, 1924

No. 4

Business Conditions Show Little Change

This condensed report of the first month's activity tends to confirm the forecast made last month for good business in 1924

THE volume of trade in January was apparently not greatly different from that in December.

By F LESLIE HAYFORD
Economic Statistician
General Motors Corporation

While it was to be expected that retail business would decrease somewhat, January sales of the two leading mail order houses declined slightly less than 15 per cent, compared with a decline of slightly more than 15 per cent in January of last year.

Freight car loadings continued at a high level. Car loadings during the first half of January were somewhat below the corresponding period of last year, but those for the last half of the month exceeded any previous records for the season.

Commodity markets were in general firm, somewhat freer forward buying was in evidence in some lines, particularly iron and steel, and business sentiment seemed more optimistic.

Industrial Activity

Industrial employment increased a little more than 1 per cent in January, according to the Federal Employment Service.

Production of automobiles, iron and steel, and zinc was larger than in December. The building industry was also more active. Mill consumption of silk and cotton increased. On the other hand, the number of active cotton spindles declined, cement production fell off and stocks increased, and locomotive shipments and unfilled orders were smaller than in December.

In the iron and steel markets increased buying appeared in January and stimulated production and prices. It was the first month since last June in which the daily rate of pig iron production failed to decline. The January increase in steel ingot production was particularly marked; the month's output was the largest

since last August. Unfilled orders of the U. S. Steel Corporation increased for the second consecutive month,

and although the December increase was only slight, that in January was considerable. Somewhat greater freedom in placing orders for steel was said to have been in evidence in January. Railroad, railroad equipment, and automobile buying of steel was reported better, and the demand from farm implement manufacturers was greater than for many months.

Automobile production increased about 4 per cent, the January output being 316,000 passenger cars and trucks. Thus for eleven consecutive months more than 300,000 vehicles have been manufactured. Comparison with January of last year indicates at what a high level this industry is operating. Production in January, 1923, amounted to 243,500 cars and trucks, a record figure for the month at that time; yet that of January, 1924, was 30 per cent larger. The industry's output for the twelve months ended January 31, 1924, amounted to 4,085,000 cars and trucks, or 72,000 more than the best previous twelve-months' total.

The mild, open winter, thus far, has greatly facilitated building operations. Figures of new building contemplated, permits issued, and contracts awarded point quite conclusively to the continuance of a large volume of construction during at least the first half of this year.

Commodity Prices

The average of wholesale prices changed very little in January. Bradstreet's index declined 0.6 per cent; Dun's and Fisher's indexes each advanced 0.6 per cent, while the index of the U. S. Bureau of Labor Statistics remained unchanged.

So far as any general tendency was apparent in commodity markets it was rather in the direction of firmness than of weakness. Probably no marked change in the general price level will be seen in the next month or two, although there will likely be increasing firmness in commodity markets and at least a moderate advance in average prices during the next six months.

Banking and Credit

There was no change in the quoted rates for commercial paper during January, although usually a slight decline takes place in this month. This has no significance, however, because of the easing of rates in preceding months.

The banking figures showed, as is usual at this season, a decrease in Federal Reserve notes in circulation and in the bill holdings of the Federal Reserve Banks. The reserve ratio of these banks rose from 73.8 per cent on January 2 to 81.3 per cent on January 30. Bill holdings, —including paper rediscounted and paper bought in the open market—were reduced \$351,000,000.

Evidence that old loans continued to be paid off more rapidly than new loans were contracted is found in the decline during January of \$183,000,000 in the total loans and discounts of the member banks of the Reserve

System. Their rediscounts with the Federal Reserve Banks also declined during the month.

The Outlook

No significant change in business conditions occurred during January—nor has any occurred thus far in February—to alter the forecast published in the March number which, in brief, was as follows: Although it is expected that 1924 will be a year of good business, it is not believed that it will be a boom year. During the next month or two, at least, the volume of trade and of industrial output and the general level of commodity prices and of wages will probably continue about as they are. As the year progresses, however, and confidence becomes more fully restored, a moderate expansion of activity is likely to occur. Of course, conditions may arise which will materially change the outlook. It appears probable that such a change, if it should occur, would be in the direction of a more rapid expansion and an earlier culmination of the period of good business than are at present indicated, rather than in the opposite direction. Although there is at present no sign that we are approaching a period of inflation, the unusually large potential credit supply would make such a period possible.

(From the report of February 26, 1924)

For Better Putting Greens—Semesan

SMITHERS, golf bully of the Wardmore Country Club and putter extraordinary, believed that a good game was founded on putting ability. His driving was fast, his approaches average, but on the greens he was invincible. He said so himself.

Now all golfers have their good days and their off days. On the sultry July afternoon Smithers played "Red" Warner, the latter was going strong. But Smithers' drives were continually getting him into trouble. Only by superior putting did he manage to keep the match "all square" at the eighteenth tee. Both men matched strokes down the fairway and Smithers made a pretty approach, his ball lying only four feet from the pin. Warner's ball came to rest fifteen feet beyond it.

"Will you concede the hole?" asked Smithers, smiling.

"When you win it," Warner grimly replied.

"Red" was plainly nervous. Nevertheless his well-aimed putt sent the ball straight across into the cup.

Smithers was "stymied" by a rough patch of dead grass. Both men had noticed similar defects on other greens that day, but as neither had been troubled before, Smithers made his stroke with usual confidence. The ball rolled true until the rough, dead grass deflected its course. He had missed!

Then the fireworks started. Loudly, violently, profanely Smithers condemned the Greens Committee.

"Never before," he declared, "had he missed so easy a putt. That blankety-blank grass patch would not have appeared on any well-kept green," and so on.

The trouble complained of was the result of "Brown Patch," a parasitic fungus that attacks grass, and propagates from season to season by means of minute bodies called "sclerotia". It is usually first noticed in the early morning, during humid weather, when circular areas on the green show a slightly grayish color, turning brown under the noonday sun. This results in unsightly spots that become rough and bumpy through continued use of the greens. Golfers cannot putt over them with any degree of accuracy.



The du Pont Company has spent months studying this disease, together with other plant diseases that seriously affect crop and plant growth, and has now developed a new type of seed and plant disinfectant called Semesan. From all laboratory and field tests so far made this product seems effectually to control Brown Patch. Several prominent golf clubs have used it successfully. Other clubs are now being offered this product for trial on their courses. If the results attained are indicative of what can be expected in the future, then Brown Patch on golf greens will cease to be troublesome, and Smithers and golfers generally will feel grateful to the du Pont Company for developing Semesan.

Under the "Richest Hill on Earth"

How the Anaconda Copper Mining Company is conducting operations in the Butte district of Montana

MODERN industry is inseparably linked with copper, the oldest known metal of commerce. The ancients used it as early as 5500 B. C., which was long before the Bronze Age. And all through the centuries it has been a most useful metal. To our present civilization in the age of electricity it has become absolutely indispensable—a product of almost universal use.

As copper mining is a major industry it may be of interest to know the story of copper as it is produced in Butte, Montana, the greatest copper-producing center in the world and headquarters of the Anaconda Copper Mining Company, one of the largest operators in the world.

The discovery of metals in the Butte district dates back to 1864 when a few placer-mining prospectors discovered gold in the gravel of Silverbow Creek, a short distance from what is now known as the "richest hill on earth". From placer gold it was but

natural that these miners should turn their thoughts to the more permanent mining of lode deposits, especially as their gold was heavily alloyed with silver. The outcrops of mineral-bearing veins were traceable over the hills adjacent to Silverbow Creek, and it was but a short time until the location of quartz claims started, the first location in the Butte district being on July 12, 1864.

Originally, the quartz locations in the Butte district were made for the value of the silver in the veins. Little did the old-time prospectors dream that in their day these silver locations would produce a large part of the world's supply of copper.

From 1875 until the sudden drop in the price of silver in 1892, silver mining occupied the attention of the people of Butte. However, during that period it was discovered that with depth, the silver ore in the veins had been replaced by copper ores of great value. This resulted in spirited activity, which was handicapped by the fact that there were no copper-treating plants anywhere in the West. The original copper ore of the Butte district was hauled by wagon to Corinne, Utah—a distance of 400 miles—then shipped to eastern reduc-

By J. C. HORGAN
Sales Representative
E. I. du Pont de Nemours & Co., Inc.

tion works, some going to far-off Swansea, Wales.

In 1879 the first successful copper smelter was located in Butte, and from that year the development of copper mining in the district was rapid.

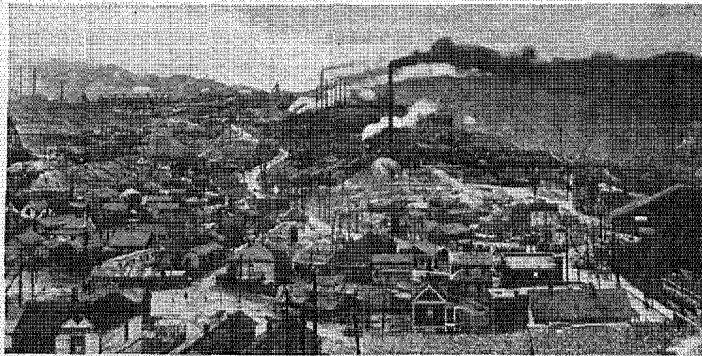
The development of large bodies of copper ore led to the formation of large operating companies such as the Parrot Mining Company, the France Mining Company, the Colorado Mining and Smelting Company, the Butte & Boston Mining Company, the Boston Montana Mining Company, the Montana Ore Purchasing and Mining Company, the Anaconda Mining Company, and many others.

As the combining of various interests under one management is an economy, it was entirely logical that these various mining interests should be brought together into one large operating unit; hence the final formation, on July 1, 1910, of the Anaconda Copper Mining Company. This company today has about thirty operating shafts in the Butte district, each

capable of a large production. These shafts are all vertical, and vary in size, the standard being rectangular in shape, 20 ft. long by 7 ft. wide (outside dimensions). They are divided into two hoisting compartments: one through which all supplies are handled, and the other in which are located the manway, water-column, electric cables, air lines, etc.

Mining operations as carried on by the Anaconda Company can roughly be divided into two parts—development and mining. The former consists of opening levels at one and two hundred foot intervals, depending upon ground conditions and width of the veins, then crosscutting to the veins or ore bodies. When these are struck they are drifted on both ways and crosscut at intervals to the walls. Five-by-seven-foot drift and crosscut headings are carried. These are generally drilled with the toe or down-cut round of from nine to fourteen holes, depending upon the ground.

The most important ore-mining methods are the square-set and the rill-stope systems. The square-set system needs no explanation; it is the conventional system in vogue in all the metal-mining centers of the country.



Looking toward the "richest hill on earth" at Butte, Montana, and the Mountain View, High Ore, Anaconda, and Never Sweat mines of the Anaconda Copper Mining Company

Rill-stope ore is blocked out by two raises twenty-five sets apart, and the ore chute, which is cut about half-way between the raises (Fig. 2). The sill floor is taken out and timbered as in any square-set stope.



Here you see a powder man on the job in one of the Butte mines of the A. C. M. Co.

The rill is started by drilling the first cut six sets towards the ore chute. The ore from this cut is shot down on the stop-boards on top of the sill sets (Fig. 1, Sec. A—A). From here it is drawn down so as to leave sufficient room for the drilling of the next cut. The second cut or slice is taken by again starting at the raise and drilling four sets towards the ore chute. The third cut or slice is the same except that it is drilled only two sets towards the chute.

This leaves a worked-out space triangular in shape with a base of six sets and a height of four sets.

The broken ore is loaded out through the stop-boards.

After bulkheading the raise and opening the side of the chute on the fourth floor of the raise, the stope is filled with waste from this opening. The filling continues to within five feet of the back, forming a slope of about thirty-seven degrees.

The method of taking the cut is now changed. The holes are drilled along the face and pointed so they will break towards the ore chute. Seven feet is the standard depth of rill-stope holes. To separate the ore and waste, and also to provide a slide so the ore will slip down smoothly to the mucker, a floor of two-inch lagging is laid on top of the waste. After shooting, the back and sides are barred down and where necessary, studded (Fig. 1, Sec. A—A). The ore is cleaned out, the floor laid, and the cut again filled with waste until within five feet of the back.

To complete the first development of the stope these operations are carried on until the lower end of the rill reaches the ore chute, after which all ore goes to the chute.

These operations are carried on from the other raise also, so that there are two rill stopes between the two raises.

Raises and ore chutes in rill stopes consist of two chutes and a manway, so that ore can be steadily produced by mining one of the rills while the other is being filled (Fig. 2). As it is no longer necessary to draw the ore through the stop-boards it is loaded from the chute mouth on the sill. Waste is then filled into the stope,

and two-inch lagging nailed to the posts to keep it from breaking the lining of the chute.

The miner then drills the stope from ore chute to raise, the waste is leveled, the two-inch floor laid on the waste, and then the stope is ready to blast. The holes are usually blasted in sections, and always from the bottom up.

Should the ore need sorting, it is run onto a grizzly with four-inch spacing between the bars. Should no sorting be needed, the openings are larger. To sort, the waste is picked out and thrown into the adjacent chute, and the ore put through the grizzly. After all the ore is drawn, the two-inch floor is taken up, the posts lagged on the stope side, and the stope is again ready for waste-filling.

To keep the ore chute the same height as the lower end of the rill, the ground over the chute is taken out, and the space timbered with square-sets.

Sometimes the walls of the stope will not permit keeping five feet open between waste and back. In this case the stope is filled to within two feet of the back. The two-inch floor is laid and the miner drills as in the five-foot spacing. The miner advances the face until the raise is reached, drawing off just enough ore to make working room. After the raise is reached, the remaining ore is drawn off, the floor removed, and the stope is again ready for waste-filling.

As the rill stope reaches the level above, the remaining ore is taken out by several methods. One way is to carry the stope in the usual manner, and as it reaches the upper level, brace and stull the timbers to prevent their falling into the stope; then waste-fill the stope as it advances under the sill.

Stope drilling is carried on either wholly with stoper drills or with stoper and Leyner drills. The stoper holes are drilled from the set below, vertically or at angles to the vertical face of the back. The Leyner holes are

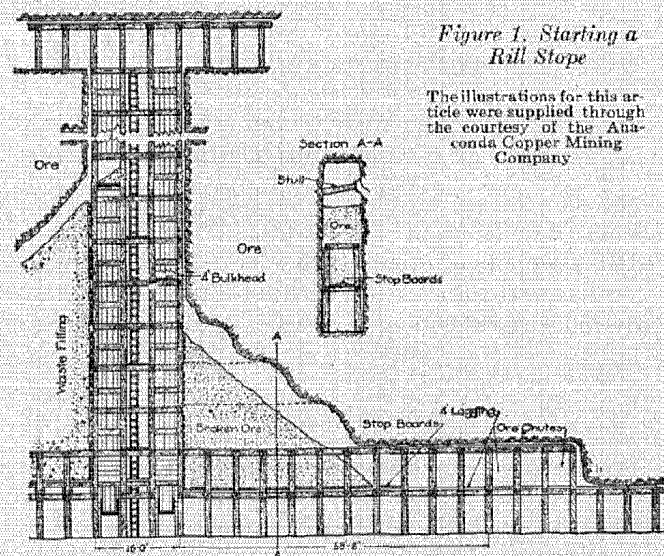


Figure 1. Starting a Rill Stope

The illustrations for this article were supplied through the courtesy of the Anaconda Copper Mining Company

drilled vertically and flat. The usual number of holes per set is from five to seven. Thirty-three per cent du Pont Red Cross Extra is used in the stopes; 40 per cent Repauno Special Gelatin in drifts, crosscuts and raises; and 40 or 60 per cent Repauno Special Gelatin in shaft-sinking.

The fuse and cap method is used for detonating the charges, except in shafts where du Pont Electric Igniters are very successfully used. Indeed, in some cases the electric method is used in drift and crosscut shooting, and always with very satisfactory results.

The day has come when the Anaconda Copper Company is really carrying on deep mining in the Butte district, for some of its shafts reach into the earth over 3600 feet. With this depth attained, the problem of getting fresh air into the bottom workings has been given serious consideration and study, and the company has left no stone unturned to supply every one of its underground workers with more fresh air than is considered necessary.

The system of ventilation can really be called artificial, as the air is picked up on the surface by large fans which push it into the mine through the down-cast shafts, or draw it out by suction through the up-cast shafts. Thus the shafts are used as the main air conduits.

One of the greatest difficulties to be dealt with was the resistance offered the down-cast and up-cast air by the open timbering of the shafts. After much study a clever method of overcoming this resistance was developed by Mr. A. S. Richardson, the efficient ventilation engineer of the company. This consisted of lining the open-timbering of the shafts with cement slabs. This shaft

lining has doubled the air-carrying capacity and has lessened the fire hazard, as the shaft timbers themselves are cement-covered.

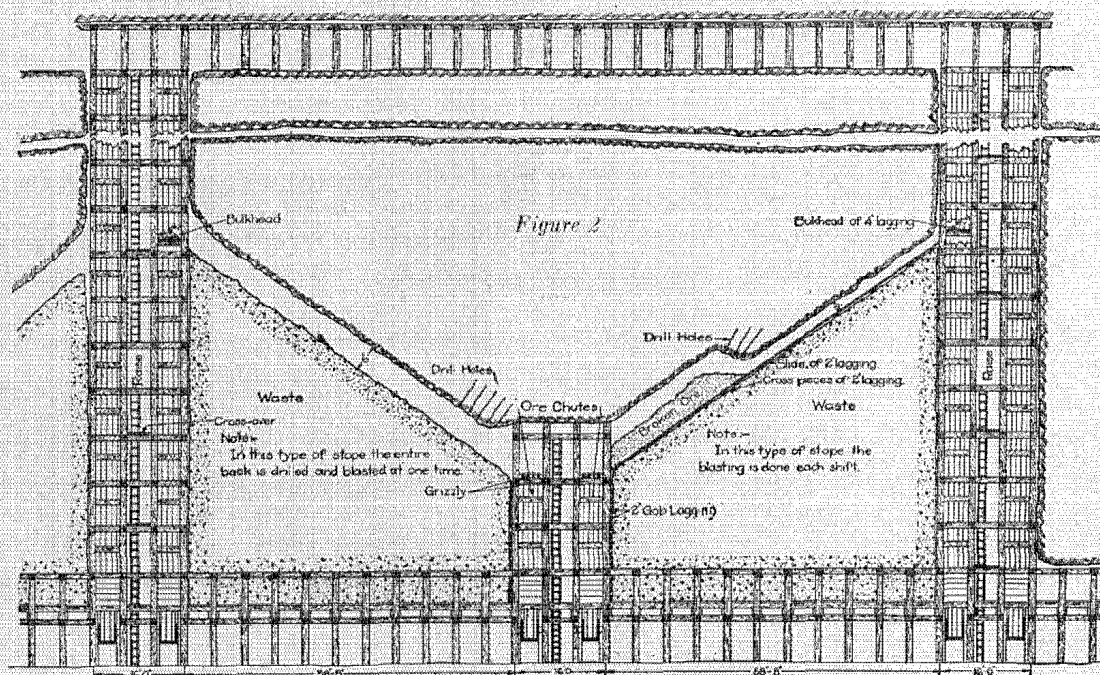
Air can be handled in a mine by utilizing its natural channels of flow through down-cast and up-cast workings and connected drifts and crosscuts. However, for ventilating dead-end drifts, crosscuts and raises, it becomes necessary to conduct the air to the headings by wholly artificial methods. These consist of a blower placed at the nearest source of fresh air, and piping to transmit the air to the dead-end headings. Du Pont Ventube, a flexible tubing recently developed, exactly fills a long-felt want in this field.

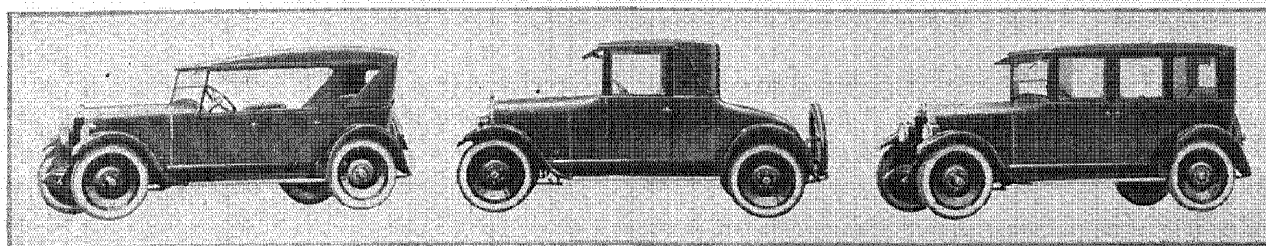
The magnitude of the Butte operations of the A. C. M. Co. can be seen when it is realized that the normal production is about 15,000 tons per day of 24 hours.

To meet the increasing costs, the company has found it necessary to save all the possible values. The old saying, "Save everything but the squeal," is literally true with this concern. Due to the efficiency of its research corps, it is now able to make commercially profitable the hitherto so-called by-products of Butte ores, such as antimony, arsenic, and lead.

Butte ores of the company go to the Washoe Smelter at Anaconda, Montana, the largest smelter in the world. Here the ore is concentrated by jigs, tables and flotation; the concentrates, smelted, and the copper, furnace-refined. This product contains not only gold and silver, but many other impurities which have to be practically removed before the copper is ready for the market. To accomplish all this, the product of the

(Continued on page 16)





Three of the seven popular models of the Oakland Line. Duco is the finishing material used on all models

1924 Oaklands Finished in Duco

Here's some more information about the finish that is adding to the well-deserved popularity of a truly fine car

AMONG the hundreds of automobiles displayed at the national automobile shows this year in New York and Chicago, one of the most interesting lines was the "True Blue Oakland," manufactured by the Oakland Motor Car Company, Pontiac, Michigan. These cars embody the latest and most approved engineering principles, including also many features not to be found on other cars, regardless of price. First among these improvements is the new du Pont automobile finish, Duco, which is now standard on the entire Oakland line.

The 1924 Oakland line includes seven models. The bodies, built by the Fisher Body Corporation, are sub-

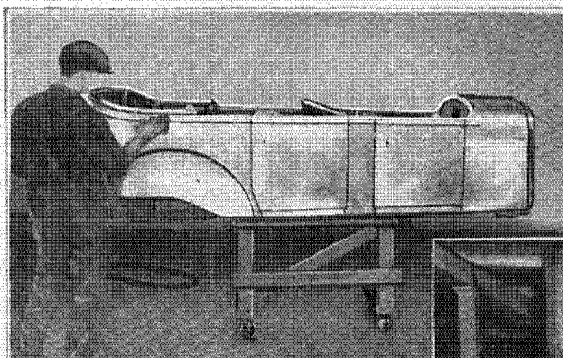
By F. H. KANE
Technical Engineer
Oakland Motor Car Co.

stantial and businesslike, yet altogether pleasing in appearance. Among the mechanical features are the six-cylinder

"L" head engine with a special combustion chamber in the cylinder head designed to produce a thorough mixture of gasoline and air, resulting in increased power.

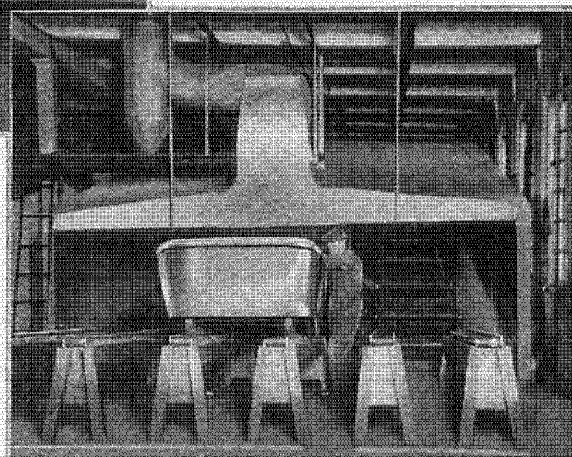
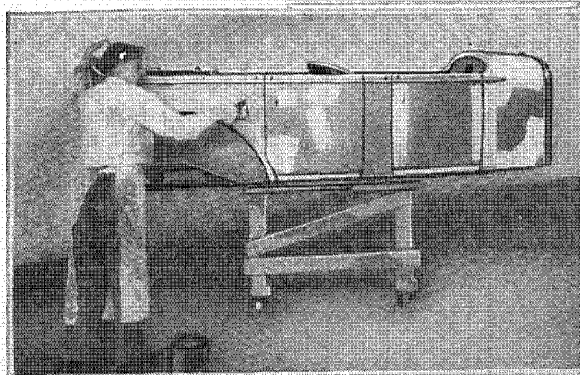
Four-wheel brakes are standard on all Oakland models. A unique centralized control and all the instruments under glass on the instrument board are important innovations. The centralized control includes choker, throttle and horn buttons, lighting and ignition switches. These are all mounted on an aluminum housing in the center of the steering wheel. Incorporated in the lighting switch is a device which permits the

Right—Before applying the priming coats or Duco the car body must be clean. This shows you the metal "clean-up"



Below—This shows one of the huge drying ovens used to bake on the priming coats. You will note that it is wide enough to accommodate three car bodies and high enough for a full-grown man to stand under the hood without stooping

Below—Glazing the car body after the priming coats have been applied



driver to dim the headlights without removing his hand from the wheel. Five disc wheels, demountable at the hub, are part of the standard equipment. A permanent top is a feature of the open car. A set of glass enclosures is available at a slight extra cost.

The closed bodies as well as standard touring car and roadster are finished in dark blue Duco with red striping, while sport models are painted in light blue Duco with orange stripe and trimmed in Spanish leather. These color combinations in the satiny Duco finish are more than attractive—they present the appearance of a custom-made job.

At the beginning of production last fall the Oakland Motor Car Company staged a nation-wide demonstration of the stamina, the dependability and the general performance of the brand new Oakland Six under all conceivable operating conditions.

On September 8, six "True Blue Travelers" left Pontiac for different destinations, each with a definite schedule. Car No. 1 was bound for San Francisco, Car No. 2 for Los Angeles, No. 3 for Dallas and El Paso, and so on. Not only the time for completing the trips was specified, but the time of arrival at each point on the route was designated, so that every car operated with the regularity of a fine passenger train.

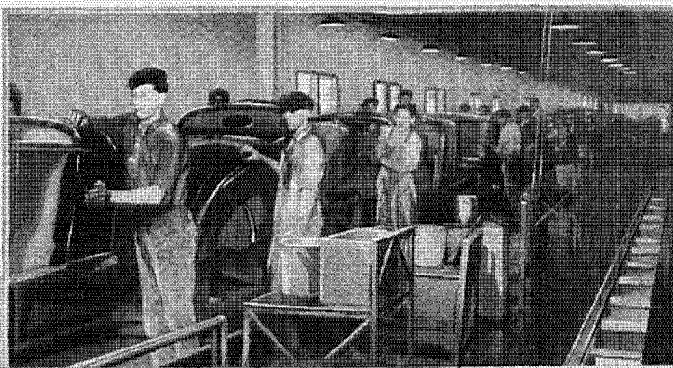
Stopping at all Oakland dealer establishments along the way, public demonstrations were given, usually under the auspices of the police and fire departments and other public officials. Fire departments by the score collaborated in demonstrating the Oakland four-

wheel brakes by flooding the pavements while the True Blue Traveler brakes were applied at high speed and on curves. Not a single criticism of these brakes was received in any instance and scores of letters were received from mayors, chiefs of police and fire department chiefs, congratulating the Oakland Motor Car Company on the simplicity and perfect operation of these brakes, as well as the increased safety afforded by the centralized driving controls. Newspaper men, too, showed great interest in the success of these rigorous tests, and the story of Oakland prowess was quickly spread with the progress of the Travelers.

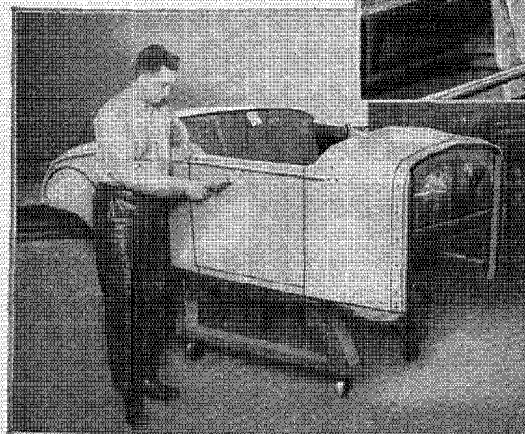
The extreme road and weather conditions encountered by these cars also demonstrated most conclusively the wonderful durability of the new Duco finish. Particularly on the western trips, it was found that gumbo mud clinging to the body for several days had no effect whatever on the finish, whereas it is well known that such treatment would quickly destroy the lustre of ordinary body finishes. These cars, after being covered with mud, were easily cleaned with a dry cloth, without marring or scratching the finish.

The new finish has been the center of attraction at the automobile shows, and it is freely prophesied that it is the only satisfactory body finish of the future. This is because it is an air-drying pyroxylin enamel which is impervious to the action of mud, water, alkalis or changes in temperature, and in addition presents a soft, satin-like appearance which evokes admiration wherever Oakland cars are displayed. The gumbo mud of Iowa,

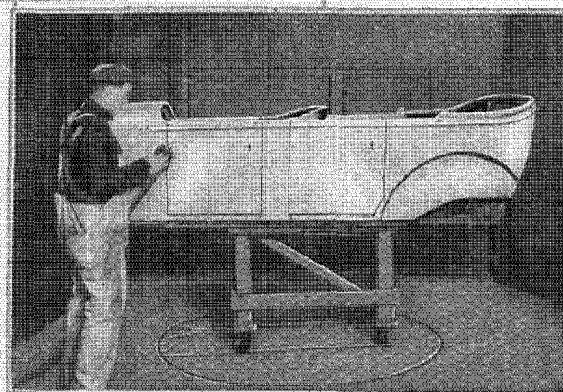
Right—The sanding operation. As the car bodies pass along on the conveyor the workmen perform their task. Each man works on an assigned portion of every car body that passes by him, and at the end of the line a smooth, even finish is obtained as the foundation for the Duco



Below—Applying a coat of Duco in one of the spray-booths of the Oakland factory. Note the hose line (left) and the air-gun in the operator's hand. Note also the wheel truck supporting the car body and the turn-table platform on which it is placed



Left—Any dents or slight defects in the surface of the car body are removed by "metal bumping," an operation which would be impossible with other than Duco finish



the salt air of the Atlantic seaboard, the sand of the desert or the alkali dust of Texas cannot harm Duco.

The Oakland Motor Car Company has been experimenting with this finish for more than two years and has found that body panels coated with Duco could be made to look like new by polishing with a soft cloth after being exposed to all kinds of weather for that period. This unusual durability under such conditions of exposure is of particular value to the man who must leave his car in the open for long periods. Duco can best be described as weatherproof—sun, snow, rain and hail do not affect it.

This gives some conception of the advantages of the Duco finish from the standpoint of the owner. This new finish, to put it briefly, stays "better looking longer." The manufacturer, on the other hand, finds many advantages in the saving of time and space formerly required to finish automobile bodies. This economy, and others, have been passed on to the automobile buyer—as can readily be seen in the remarkable Oakland prices.

An idea of what Duco means to the manufacturer is shown from the fact that Oakland now has a capacity

for finishing three hundred bodies in the same space formerly designed to handle one hundred and seventy-five cars. The time for finishing a body under the old method was approximately ten days, while only eight hours are needed to completely finish the body in Duco.

This new process, in addition to reducing the number of painting operations by one-third, makes an enormous saving of space possible. Where it was formerly necessary to provide storage space for 2,500 bodies for production of 300 cars per day, it is now necessary to have only approximately 600 bodies in process, maintaining the same rate of production.

Knowing that "the public be pleased" is the only sane attitude for the modern business man to adopt, the Oakland Company asked its principal distributors to report the attitude of their trade towards Duco. The result was a huge surprise. From sixty-nine key cities, ranging in location from Florida to California, from Maine to Texas, came the most enthusiastic answers. Circumstances were cited where Duco had withstood the most trying conditions. Praise for the beauty of this new finish was repeated. Every distributor looked upon Duco finish as a great boon to the automobile buyer.

Miltford Liners Used in Stetson Shoes

DAMP pavements, wet streets—the aftermath of April showers—make walking unpleasant unless overshoes are worn, and who likes to wear them? They are heavy, unsightly, and a general nuisance; yet heretofore they have afforded a necessary protection. But foresighted manufacturers have now come to our rescue with waterproof shoes, and we may discard our overshoes without a regret.

In the July, 1923, number of the *Du Pont Magazine* the Miltford Liner for shoe soles was described. It is a

Massachusetts, has incorporated the Miltford Liner in several styles of shoes now on the market, and through the courtesy of the company we are permitted to show you here just how the Miltford Liner is used in a Stetson shoe. The thin, white line magnified is Pyralin.

Many people believe that waterproof shoes are necessarily heavy and cumbersome, but that is not true of shoes made with Miltford Liners. Both men's and women's light-weight dress shoes are made with the in-built patented liner which does not detract in any way from the appearance of the shoes, but serves very effectively to keep any water underfoot from penetrating through the sole.

Wearers of Stetson shoes do not have to bother with rubbers



See the white line under the glass? That's where the Miltford Liner is built into the shoe sole

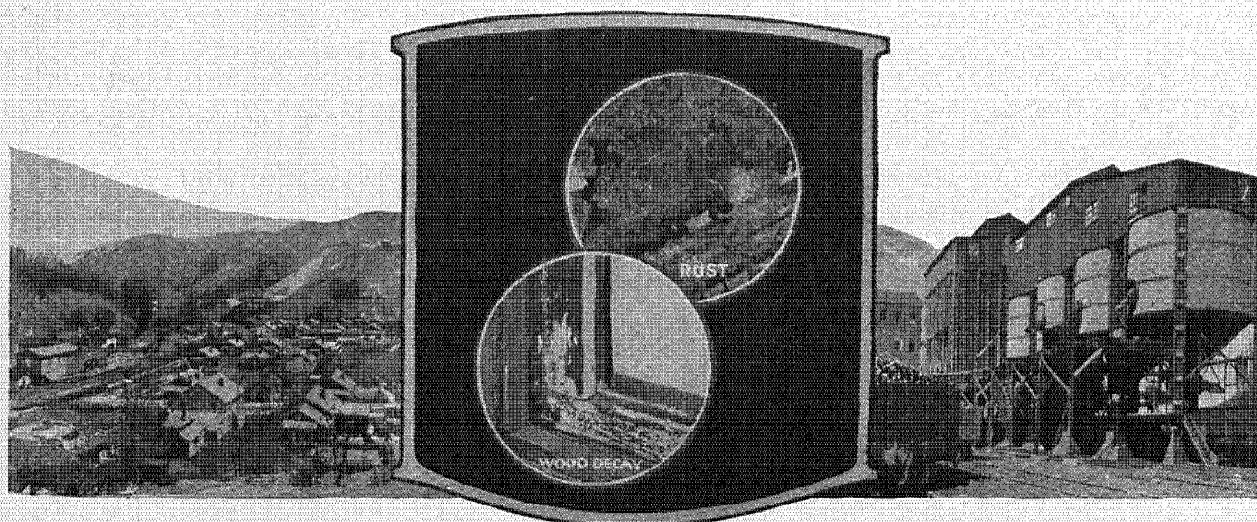
product made by the H. N. Cook Belting Company of San Francisco, California. This liner consists of a sheet of du Pont Pyralin annealed between two very thin pieces of leather. Because Pyralin is waterproof, flexible and durable, it is especially adapted as a lining material.

The Stetson Shoe Company of South Weymouth,

Cement vs. Silk

A WRITER using the pen-name "Backlash" in the February number of *Outer's Recreation* strongly recommends Du Pont Household Cement as follows:

"Always have a tube of Du Pont's Household Cement around. Use it whenever something needs repairing—rods, windings, lures of all kinds. You can build a fly or feather minnow without one bit of silk winding. Just cement it together with Du Pont's and old man bass can chew on it to his heart's content, yet it will come up smiling. I have feather minnows that were the producers of lots of bass all last season that were made this way, and one coat of Du Pont's, applied quickly with a small brush, has put them in commission for this year. It will keep a ferrule just better than anything I know of."



How Long Since You Gave Your Plant the "Once-Over"?

"Keep yourself in health. Let a physician examine you at least once a year." That's an excellent idea, and here's another one: keep your plant property in good condition. Examine it thoroughly at least once a year

DURING the past few years life insurance companies have been trying to "sell" the American public on the value of an annual examination by the family physician. This plan insures the detection of any unrecognized physical defect that might exist and permits steps to be taken to prevent its growth and its menace to life.

By R. C. SHEELER

If such a plan is good for the human body, why should not an annual inspection of your plant and its equipment be an equally good thing? Rust and decay are insidious enemies to the welfare of all physical property. Day and night, the endless attacks of storms, moisture, gases, heat and cold are making themselves felt on all surfaces with which they come in contact. Since "constant dripping wears away the hardest stone," so the unremitting play of these forces will eventually destroy those surfaces, unless—

And here is where Paint and Varnish enter the picture.

Before one buys paint and varnish, he should know the surfaces that should be painted, the kind of finishes required, the proper color to use, etc. The best method to determine these facts is to take a pad and pencil and go over the plant and equipment from top to bottom, inside and outside, noting the condition of all surfaces. Begin with the interior, including—

Walls, ceilings, floors, doors, girders, beams, pillars, elevator gates and shafts, racks and bins, machinery, electric conduits and switch boxes, sprinkler and piping systems, fire doors, fire buckets, sand pails, fire extin-

guishers, waste cans, tanks of all kinds, hand and motor trucks, boiler fronts

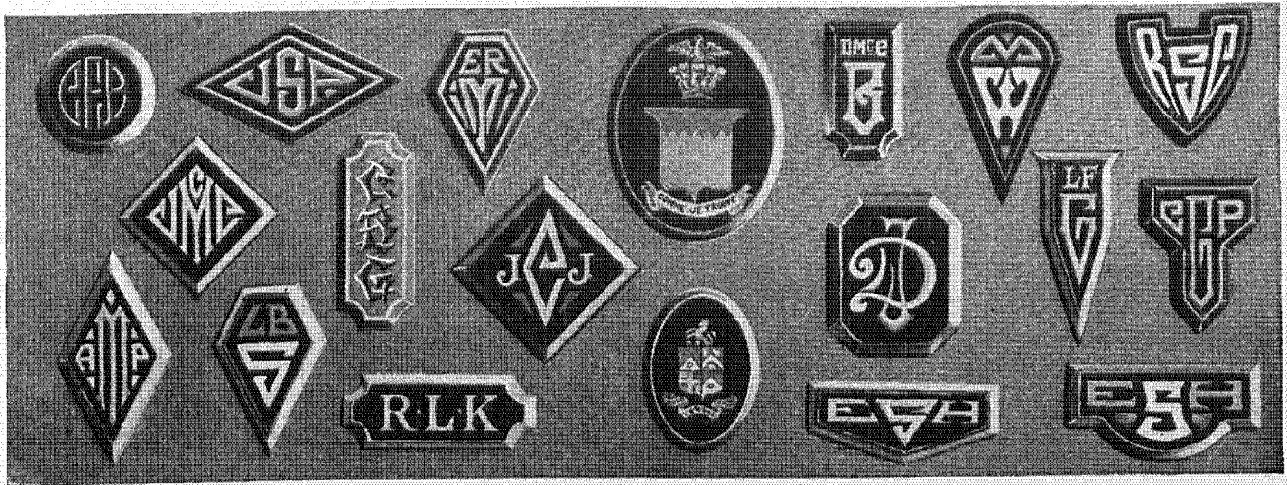
and connections, engines, turbines, pumps, etc.

Then carefully look over the exterior of the plant, noting particularly the roofs, siding, gutters and leaders, window frames and sash, tanks and their supports, fences and gates, doors, bridges and passageways, fire-plugs, fire-houses, hose-carriages, alarm-boxes, etc.; fire escapes and ladders, hand rails and steps, pipe lines, covered and bare, stacks and chimney connections, steam or electric cranes, ventilators, trucks, concrete surfaces, exterior woodwork of all kinds.

As these surfaces are investigated, make note first of the present condition of the paint, if any. Where the paint has "worn out," peeled, or shown other evidences of deterioration, see that it is replaced with a new coat. Note any unusual conditions, such as extremes of moisture, acid or gaseous fumes, heat, under which the paint is expected to serve.

The selection of the right paint for the purpose is of supreme importance. Where any doubt exists as to what to use on any given surface, take the question up with the Maintenance and Up-Keep Sales Division, 3500 Gray's Ferry Road, Philadelphia. We shall be glad to analyze your problems and prescribe the proper treatment for each surface. This service is yours without obligation.

"Saving the surface" of *your* plant and equipment is a sound investment. Don't put it off! Put it on!



Beautifully colored monograms are these, but our illustration can only give you a suggestion of their charm

The Vogue of the Ages

Monograms, of course. The latest development is the Pyralin monogram plate. You buy a pair to match your car—and put them on yourself

SOME thousands of years ago there was a hairy cave man who was a better hunter than any of his fellows. And like all egotists he sought for some means of self-expression. Near the entrance to his cave stood a huge block of stone. Looking at it one day, a great idea flashed through his mind, and soon after he was found chipping a curious mark on its smooth surface. Later he called his neighbors about him and, pointing to the finished work, said: "Lo—this is the sign of Ig, the great hunter!"

This may have been the origin of the monogram. But this we know—the vogue for monograms, insignia and heraldry has persisted all through history. Witness the coins and shields of ancient Greece and Rome, the monogrammed war chariots of Roman noblemen, the heraldic emblems of kings and knights during the Middle Ages, the monogrammed state coaches of the mid-Victorian period, and the automobiles of today.

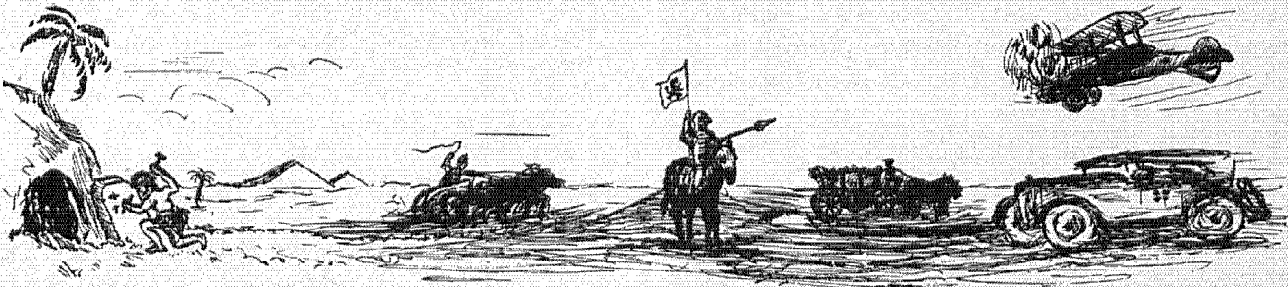
Emblematic signs were much in evidence during the World War. Each military division was known by its insignia. Designs of bison heads, rainbows, Indian heads and the like were sewed in colors on soldiers'

uniforms. Aviators painted emblems on the fuselage of their planes. Even General Pershing's military car was adorned with four stars, emblematic of his rank.

It has long been a popular conceit among motorists to have monograms painted on their cars, but nowadays the class A automobile needs a truly superfine monogram to give it the proper note of distinction. That is why Pyralin comes to the fore in a new use—for monogram plates. These are beveled medallions in various color combinations upon which the skillful artist etches the design in permanent, non-fading enamel colors. Sometimes the predominating initial is "radiumized" to make it visible at night.

Pyralin is an ideal material for monograms, because it does not chip, crack, rust or tarnish. Plates made of it can easily be shaped to conform to any rounded surface by a simple heat treatment; and they are attached to cars, hand luggage and brief cases with a special waterproof cement made for the purpose.

The designs shown here are products of the Lloyd Industrial Studio, 143 West 105th Street, New York City, to whom inquiries should be sent for particulars.



How Qualities of du Pont Coated Fabrics are Determined*

Part II

Personal element must be eliminated to secure reliable results in anchorage test. Exposing samples to elements simulates accelerated service. Tensile and tearing strength measured by use of standard machine. Weight of coating learned by use of solvents.

By ERNEST B. BENDER and N. M. NICKOWITZ

Respectively, Chemical Superintendent, Fabrikoid Division, and Chief Chemist, Fairfield Plant, E. I. du Pont de Nemours & Co., Inc.

ADHESION of a pyroxylin or rubber film to the fabric base is commonly spoken of as the anchorage of the material. This property is important and a satisfactory test for it is highly desirable. In the past the anchorage of a film to the fabric was judged by determining by hand how easily the film could be loosened and stripped from the fabric.

Strength of the film has an important influence on the anchorage of the film when tested by hand. Thus, with two pieces with equal anchorage, the one having the stronger film will appear to have the lower anchorage because the high tensile strength of the coating permits it to be torn free from the base more easily than in the other case, where the film breaks when pulled.

Results of hand tests for anchorage depend entirely on the judgment of the individual making the test and, therefore, introduce the undesirable personal equation just as in the case of the hand-scrub test. It is very evident, consequently, that a test is desirable which will yield results which are consistent and can be expressed numerically.

After some preliminary experiments, suggested by the Bureau of Standards test of "frictioning" in rubber belting, etc., a procedure was developed and has now been adopted as standard for determining the anchorage of the film.

Application of the test to pyroxylin-coated fabrics is as follows: By means of a spreader knife or spatula, a piece of cotton sheeting measuring approximately 10 x 13 inches is given two thin coats of a pyroxylin "jelly" (100 gm. 12 per cent pyroxylin solution in ethyl acetate, to which 12 gm. castor oil have been added). The sheeting is dried at room temperature after each coat and if it is rough after the second coat of jelly has dried, it is run through calender rolls until smooth. A third coat of jelly is applied and an 8 x 11-inch piece of the material, whose anchorage is to be determined, is immediately placed coated side down on the wet surface. The two pieces are then pressed together firmly by means of a wooden roller, in order to insure uniform adhesion.

After making sure of good union between the two materials, the combined material is allowed to dry at room temperature for about two hours. Following this

preliminary drying, the sample is dried further at 65° (150° Fahr.) for sixteen hours, at the end of which time three pieces, 2 x 8 inches, are cut out in such a manner that the 8-inch dimension is parallel to the warp threads of the fabric base of the original material.

The two fabrics are separated at one end of the strip and pulled apart for a distance of about 2 inches, being careful to have the film of the original material adhere to the coated sheeting. This can be done successfully if care is taken to start the separation in the proper manner. The 2-inch portions which have been pulled apart are narrowed down to a width of 1 inch so that they will fit the clamps of the Scott or other make of tensile strength testing machine.

They are then pulled apart in the Scott machine at a speed of 2 inches per minute. It is necessary that the fabrics separate cleanly when being pulled apart. If there is a tendency for the fabric to unravel at the side of the test piece, this must be corrected by cutting the threads, as the raveling causes an appreciable error in the final result. The results of the tests are reported as pounds necessary to strip a test piece 2 inches wide. This procedure has yielded very satisfactory and consistent results.

The anchorage of a rubber film is determined in essentially the same manner and the same precautions are necessary. The samples are, however, prepared in a slightly different manner.

A piece of drill is given two thin coats of rubber cement (40 per cent smoked sheet, 4 per cent rosin, 6 per cent shellac and 50 per cent benzol) and permitted to dry at room temperature for approximately five minutes. A third coat of the rubber cement is applied to the material whose anchorage is to be determined after the varnish has been partially removed by buffing. After this sample is allowed to dry a short while, the two pieces are pressed together evenly and firmly by means of a calender. The material is allowed to "rest" for three hours and the anchorage determined as in the case of the pyroxylin material.

Strength of Combining Test: In order to obtain accurate and reliable data on the strength of combining of double texture material, both before and after heat and

(Continued on page 14)

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

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Vol. XVIII

APRIL, 1924

No. 4

E. I. What?

E. I. du Pont de Nemours & Company, Inc.!

IT is doubtful if the name of any corporation in this country is so difficult for its customers to learn to write correctly as this one. It is a long name that many people abbreviate to "the du Pont Company" because they find it so difficult to write correctly in full.

You may be interested to know how this organization came to have such a long name.

Pierre Samuel du Pont (1739-1817) was a noted French publicist and statesman. He was a member of the States General of France, representing the town of Nemours. The roster of this legislative body included the name of another du Pont from the town of Bigorre. In order to distinguish between these men, they were referred to as du Pont (de Nemours) and du Pont (de Bigorre) respectively, just as United States senators of the same name are distinguished as Johnson of California and Johnson of Minnesota.

We know that Pierre Samuel du Pont was accustomed to sign his writings—mostly pamphlets—as follows: du Pont (*de Nemours*), and this addition to the family name in time became a part of it. Thus, his son, Eleuthère Irénée du Pont, was called E. I. du Pont de Nemours, and the name of the present organization, E. I. du Pont de Nemours & Company, Inc., perpetuates his memory. The "Inc." is added to comply with the law governing corporate names.

A New Director

Leonard A. Yerkes has been elected a member of the Board of Directors of E. I. du Pont de Nemours & Company, Inc., to fill the vacancy caused by the death of J. A. Haskell.

Mr. Yerkes is the president of the Du Pont Fibersilk Company and president of the Du Pont Cellophane Company, both subsidiaries of the du Pont Company.

What Equipment Do You Need?

WHILE the purpose of this publication is primarily to help you become better acquainted with du Pont products, new uses for them, and the many interesting ways in which they are used by our customers, the whole idea is one of service and co-operation.

Recently some one suggested that we might serve in another way—and here's how: Our plants frequently have available various pieces of machinery and chemical equipment which have been supplanted by other types of machinery as the result of research work by du Pont chemical engineers. This equipment has been discarded not because it has outlived its usability, but rather because changed processes have necessitated using other types of apparatus for the work.

Doubtless many readers of the *Du Pont Magazine* will be interested in procuring equipment of this kind, inasmuch as it represents items in good working condition and at a considerable saving over first-cost prices. The classifications follow: Autoclaves, ice crushers, dryers, kettles, mills, mixers, pumps, presses, tanks and wringers. We shall be glad to refer your inquiries to the proper departments for attention.

What equipment do you need?



Simple way to cross the street in safety
Reproduced from *Judge*, by permission

Boll Weevil Control

To take the evil out of weevil, drain the land, plant early and rush the cotton to maturity before the pest gets on the job

THE time to consider boll weevil extermination is not next summer, but now, before the cotton is planted. Ever since the boll weevil first appeared in Texas, cotton growers and all the agencies fostering agriculture in the cotton belt have been studying and trying out every possible method of combating this pest. Through these years we have learned that there is no one sure method of exterminating the boll weevil, which is still the scourge of the South. To raise cotton economically in boll-weevil-infested districts we must combine all the practicable methods of control.

One of the most successful methods is to rush the cotton to maturity so that it will fruit early and yield a good crop before the insects become plentiful. It is upon this first fruiting that farmers in weevil-infested sections must depend. Early maturity requires early planting, fertilizing and cultivating.

When I was a boy, before the boll weevil had invaded the cotton states, we could take our time about planting—wait for the soil to dry out in the spring and then prepare the land. If we did not get our cotton in until the first of June, we could still count on making a fairly good crop. But now we cannot wait, for unless the cotton is planted by April first, or April fifteenth at latest, we cannot hope to make a full crop.

The ridge lands may dry out as early as this but before early planting is possible on the lower lands, it is necessary to provide good drainage. Without draining wet soil, it is impossible to prepare the seed bed properly or to make the seed sprout quickly after planting. Our heaviest rainfall comes during January and February, June and July. The heavy winter rains saturate the soil and where drainage is poor the ground stays wet and cold until late spring. Early planting in such soil will not hasten the maturity of the crop, for the seed will either lie dormant until the land warms up, or rot and never germinate at all. To get good results from early planting in wet land, it is necessary to lower the water level and thus make it possible for the soil to warm up sufficiently to allow early germination of the seed.

When the June and July rains come, drainage is once more very important, for during these months the cotton should be making its heaviest growth and beginning its fruiting. If the ground stays wet at this time,

By W. B. ALFORD
Agricultural Demonstrator
E. I. du Pont de Nemours & Co., Inc.

the growth of the plants is slowed down and they are likely to become weak and lousy—good food for the boll weevil.

In former years, drainage was not so necessary, for then only the higher lands were cropped. Now that land is not so abundant and many of the higher lands have been permitted to lose their fertility, farmers are planting cotton in the low-lying fields.

To fight the boll weevil in the lower lands, therefore, first lower the water level by making outlet ditches larger and deeper to carry off a greater volume of water, and then deepen the small hand-dug or plowed ditches

in the cotton fields. There is still time to do this if dynamite is used, for a considerable length of ditch can be loaded and blasted in a few hours at relatively small cost.

When sufficient drainage has been provided, prepare the land for planting by working the soil thoroughly—adding fertilizer, if necessary — so that the sunlight and air can penetrate it, thus making a warm, porous seed bed. As soon as the earth is warm enough, plant the seed, but do

not fool yourself and think you can plant in cold land and get early cotton. Plant only the best early-maturing and tested seed. After the plants are up and well rooted, cultivate the fields regularly and continue the fight against the boll weevil by using calcium arsenate according to the instructions given out by the United States Government.

The fight against the boll weevil is of widespread interest, not only to cotton growers in the South but to every consumer of cotton in this country. Numerous bulletins referring to methods of exterminating the pest have been issued, and a vast amount of information can be procured from the following sources:

United States Department of Agriculture,
(Bureau of Plant Industry)
Washington, D. C.
Georgia State College of Agriculture,
Athens, Georgia
Alabama Polytechnic Institute,
Auburn, Alabama
Agricultural and Mechanical College,
A. & M. College, Mississippi,

and agricultural colleges and experiment stations in other cotton-growing states.

MR. ALFORD is especially well qualified to discuss this subject. He was a cotton grower before the boll weevil became a pest in the South. For several years he was connected with the agricultural department of a southern railroad and was actively engaged in the fight against the boll weevil. During the past six years he has become very familiar with the cotton-growing conditions in the hills of Georgia and the coastal plain section; also in the Yazoo, Arkansas and Mississippi deltas.

—Editor

How Qualities of du Pont Coated Fabrics are Determined

(Continued from page 11)

weather aging, it has been found necessary to develop a method of testing under uniform conditions. The anchorage test referred to required but little modification to give satisfactory results for strength of combining. The method of operation can be inferred readily from the description of the anchorage test.

Blooming Test: When rubber is vulcanized by means of sulphur, only a portion of the sulphur added combines with the rubber. The other portion is held in the rubber while it is vulcanizing, and after a time it may crystallize out and the rubber is then said to have "bloomed" or "sulphured up." The manufacturer usually is familiar with the amount of free sulphur the compound will hold without blooming and tests the coating for free sulphur periodically. The purchaser's most practical way of checking this is merely to store a sample in a cool, dark place and observe it periodically for this defect.

Weather Exposure Test: Exposure tests, in general, can be considered as accelerated service tests, since the results obtained give, in a comparatively short time, an indication of the general wearing qualities of the coated material. The test has been found to be of greatest value in testing automobile top materials.

The time of the exposure is usually one year, because it is desirable to have the material subjected to the weather conditions of the four seasons. A one-year exposure is considered equal to about three years of actual service.

How Exposure Tests are Made

A frame $4\frac{1}{2}$ by 5 feet, having three equidistant cross-members, is made from 3-by-1-inch stock and supported by suitable uprights at an angle of 45° , facing south. The sample of material to be tested must be of sufficient size to cover the top of this frame and leave at least three yards for a "retained sample". The following observations and tests are made on the original material:

Appearance	Smoothness
Lustre	Pliability
Color	Scrub
Cold crack	Strength of combining cement
Tensile strength	Hydrostatic

Fold test giving the material 300 folds and after noting appearance, making hydrostatic test on the folded portion.

The material to be tested is placed on the frame and tightly drawn over the edges before fastening, so that a pocket will not be formed to collect and hold water

during a rain. At the end of each three months' exposure a strip is cut from the material on the frame and the above-mentioned tests and observation are made on both the exposed sample and a portion of the "retained sample". At the end of a year of exposure, all the results are tabulated and conclusions drawn from the data obtained.

It is important that the location of the frames should be such that rigorous conditions are encountered by the material being tested. It has been observed that exposure in a manufacturing city causes much more deterioration than is produced in clean country air.

Owing to the varying conditions met at different periods of the season, exposure tests on rubber or pyroxylin goods always are conducted so as to obtain comparable results. When a manufacturer desires to determine the aging quality of a competitive material, he usually exposes it along with a sample of his nearest comparable quality. Similarly, when he makes a change in compound, his standard is exposed along with the new sample, so that comparable data are always available.

Edge-Cracking Test:

Edge-cracking tests are applied only to rubber-coated fabrics. This test simulates the effect of turned edges, one of the first places where a top shows wear. This test is carried out by cutting a sample of the material 13 by $2\frac{3}{4}$ inches, with length parallel to the warp. The material is then suspended with coated side out over a sharp edge in the form of a loop in which is placed a $2\frac{1}{2}$ -pound weight. This sharp edge should be made of metal, preferably brass, and the goods should form an angle of 60° .

This test is comparative only and its duration is dependent on weather conditions as well as on the quality of material tested. The test is carried on until definite results are obtained.

This is a very important test on automobile top fabrics, because it combines the deterioration, due to weather exposure, creasing, and tension.

Tensile Strength Test: The tensile strength of coated or uncoated fabrics is determined by machines which are specially designed for this purpose and are readily available. The method for carrying out the tensile strength test has been well standardized, and has been published in so many places that it is unnecessary to repeat the directions here.

The information given by this test is of great importance in all cases where the material is to be subjected to much strain, as in upholstery, automobile tops, etc.

Tearing Strength Test: Tearing strength is determined by the same machine which is used for tensile strength tests. In this case a tear is started in the fabric in the direction in which it is desired to measure the strength.

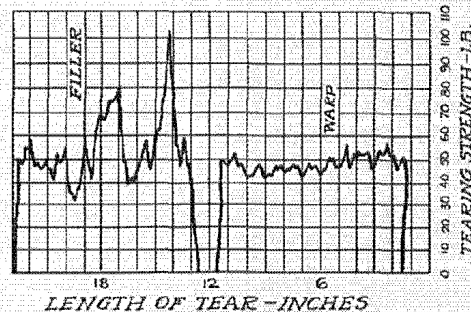


Fig. 1—Chart from tearing test of fabric. The area inclosed by the graph is divided by the length to obtain the tearing strength

The goods at one side of the tear are connected with the upper jaw of the machine and the goods on the opposite side with the lower jaw. In this case a graph of the stress put on the goods is taken. Since the result is very irregular, as illustrated in Fig. 1, it is common practice to repeat the test several times. In order to further average the results it is best to use a planimeter to measure the area between the axis and the irregular line, thus obtaining a measure of the work done in tearing the fabric. The area is then divided by the length of the tear, giving the result in terms of average force required to tear. The tearing strength is, of course, taken in both directions, with the warp and with the filler.

Analysis of Coating and Fabric: The procedure followed in routine analysis of pyroxylin-coated material consists in first stamping out a sample with a die 4 by 3.81 inches. The area of this test piece is such that its weight in grams when multiplied by three is equivalent to the weight of the material in ounces, per square yard. The film is dissolved off with ethyl acetate, the fabric dried and weighed, the difference being the weight of coating. Weight of the coating is expressed in ounces per running yard and the fabric in yards per pound. If the fabric is sized, sizing is removed with diastase. Count and construction of fabric are determined in the usual manner.

Rubber-coated fabrics are analyzed in essentially the same manner, except that the coating is removed with benzol or gasoline.

In the case of double-texture fabrics, the weighed sample, after the coating is removed, is treated with "Paraffin White Spirit" (130-220° C. distillate from motor gasoline), and the fabrics are separated. The cement is freed from the fabrics by scraping them with a spatula and extracting with more solvent.

Reasonable variations in weight are to be expected and limits of plus or minus 5 per cent generally are considered permissible.

Fabric Analysis tests are of great importance, because two pieces of goods may be quite similar as to total weight and general appearance, but one may have been manufactured by putting a light coating on a heavy drill and the other by application of a moderate coating on a sateen. The ratio of weight of coating to weight of a given type of fabric must be within fairly definite limits to give a well-balanced and satisfactory piece of leather substitute.

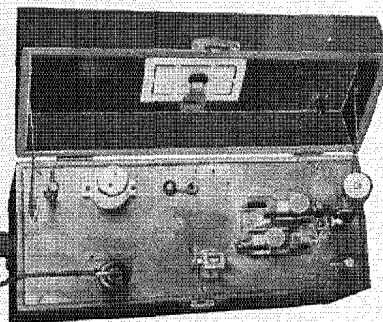
Coated Fabric Specifications

While the tests which have been described clearly indicate the value of any leather substitute, it is not necessary to employ all of the tests in the case of any fabric for a particular purpose. The purchaser need specify and apply only those tests which indicate the qualities necessary for leather substitutes for his particular uses. Some of the tests are such that they can be written into specifications; others are of greater use

to the purchaser in deciding what makes or types of leather substitute are best for this purpose; that is, they are broader tests than are required for specifications.

There is reason to believe that more careful examination of materials of the type under discussion will assure the purchaser of securing material closely adapted to his needs and will enable the manufacturer to interpret the requirements of his customer more accurately. It seems likely that there will be greater satisfaction on the part of all parties concerned when the characteristics of leather substitutes become better known. The series of tests described will contribute a great deal toward this understanding.

The scrub-testing machine was referred to in Part 1 of this article, but it was not illustrated for lack of space. The machine was fully described in the October, 1923, number of this magazine



The Fabrikoid Division of the du Pont Company realizes that many users of coated fabrics are not in position to install the testing equipment described in these articles. It will be glad to render technical assistance to those consumers who desire to use its testing facilities and to collaborate with them in drawing up suitable specifications as a basis for their purchases, whether or not they are using or contemplate using coated fabrics of its manufacture.

"Good Air Anywhere"

WHAT more appealing title for a booklet intended for the use of men who are continually confronted with problems of underground ventilation than the title "Good Air Anywhere"! To deliver air where it is wanted, when it is wanted, with the necessary economy, is a perpetual problem in any type of mining, and particularly in coal mining where the matter of cost is always vital.

The Fabrikoid Division of this company has just brought out a new booklet with this title. It describes the Ventube System of secondary ventilation for coal mines, with all its varied uses and advantages. The booklet is full of interesting, on-the-job illustrations and valuable charts that are needed by mine superintendents and managers.

This booklet is available without cost to you. If you are interested in the problems which it discusses, drop a card to E. I. du Pont de Nemours & Co., Inc., Fabrikoid Division, Newburgh, New York, and your copy will be mailed immediately.

Under the "Richest Hill on Earth"

(Continued from page 5)

Washoe Smelter is sent to Great Falls, Montana, where the electrolytic plant of the company is situated. This product is now known as an anode, which contains on the average—

Copper	99.30%
Arsenic	.04
Antimony	.03
Silver per ton	80.0 oz.
Gold per ton	0.4 oz.

The product of the electrolytic plant is known as a cathode and an average analysis is—

Copper	99.97%
Arsenic	.0016
Antimony	.0015
Silver per ton	0.5 oz.

This shows that a very small percentage of impurities gets by the electrolytic process. As the impurities are in a great part insoluble in the electrolyte, they settle to the bottom of the tanks and are known as anode mud. This mud is dried and sent to the silver refinery, the Raritan Copper Works at Perth Amboy, N. J. This plant separates the gold and silver from such impurities of the anode mud as tellurium, antimony, selenium, arsenic, lead and fine metallic copper.

The copper is first removed by converting the metallic copper to a copper oxide and leaching this out with sulphuric acid as a copper sulphate. The slimes are

then furnace-treated. Immediately after melting in the furnace the lead present forms into a dross which is skimmed off and shipped to the lead refinery at East Chicago. The antimony and arsenic are driven off in the fumes as oxides which are caught in the flues. The flues are cleaned out from time to time, and the oxides reduced to a crude antimony metal which is also sent to the lead refinery, for refining and the manufacture of antimonial lead. The selenium and tellurium are removed by fluxing the furnace charge with soda ash and nitre. The slags thus formed contain all of these metals as selenites and tellurites of soda which give up the metals when leached with water. The gold and silver are then separated from each other by the electrolytic process which gives a cathode product of silver assaying 999.2 fine. The slimes resulting from this electrolytic process contain all the gold, platinum, and palladium present originally in the copper. These slimes are again treated by the electrolytic process which gives a cathode product averaging 999.75 gold fineness. The platinum and palladium are totally soluble in the electrolyte. Ordinary quantitative analytical methods are followed in separating these metals.

The activities referred to are so vast and so varied that it would be quite impossible to describe them in detail here. Acknowledgement is due to Mr. John L. Boardman, chairman of the Bureau of Safety of the A. C. M. Co., for assistance in collecting the data furnished and for many courtesies extended to the writer.

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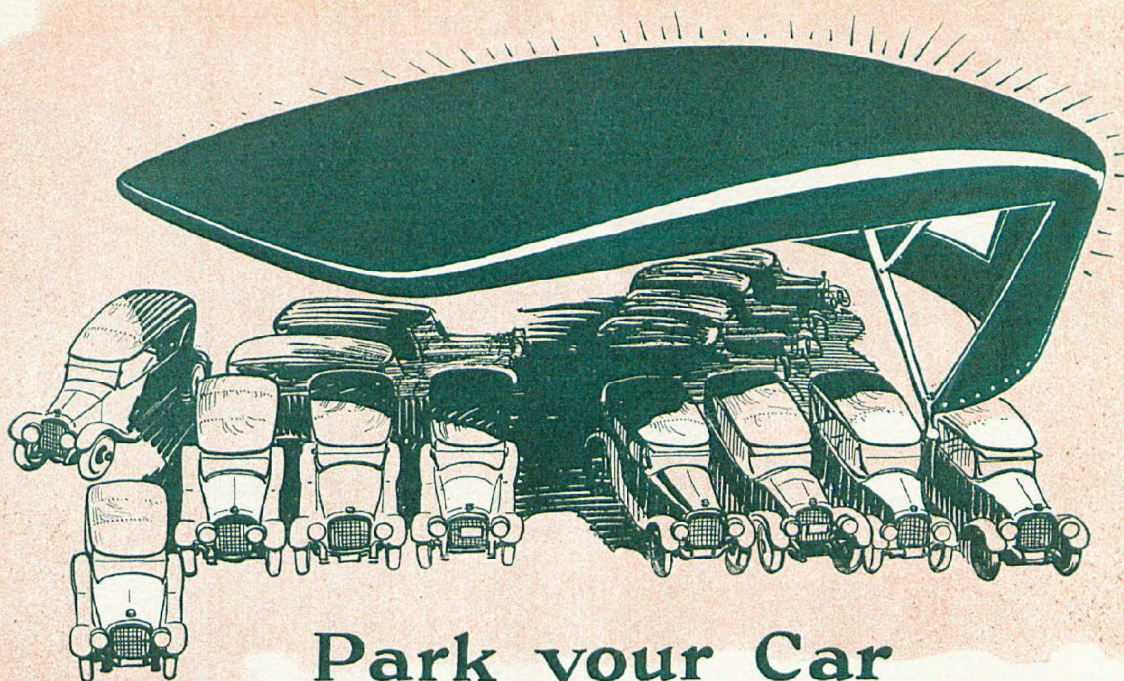
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