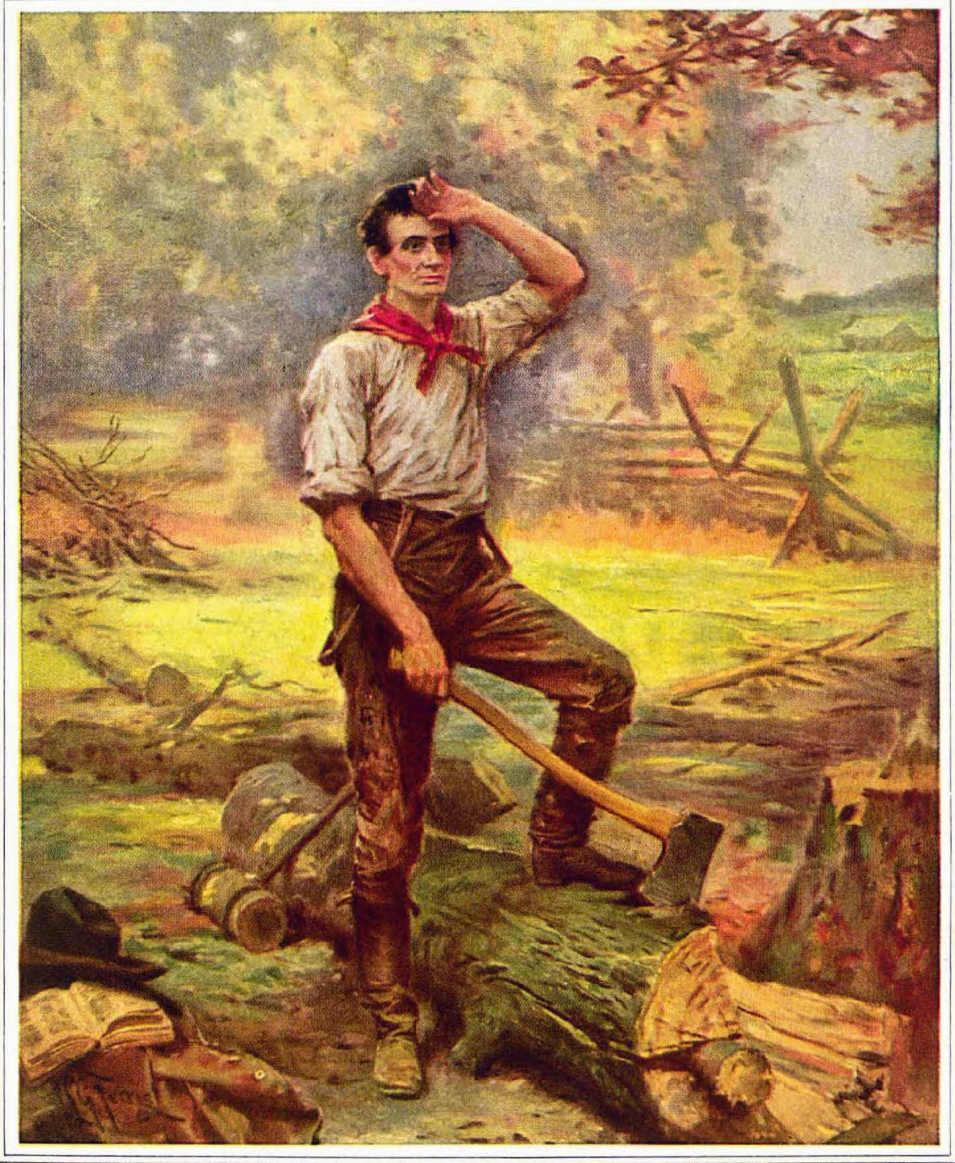
The Du Pont Magazine



© *Painting by J. L. G. Ferris*

THE RAIL SPLITTER

February, 1927



DU PONT PELLET POWDER

New—more lump and less slack!

BY loading Pellet Powder you reduce the quantity of shattered coal, obtain more uniform sizes, and reduce "pop" shooting,—more lump and less slack is the result.

Used extensively, for many years, in Great Britain and France and now, for the first time, introduced into this country by the du Pont Company after extensive and satisfactory tests in the mines of West Virginia, Pennsylvania, Iowa and other coal mining territory.

Pellet Powder is one of the greatest forward steps in coal mining methods,—a development no mining man can afford to neglect. Important enough to warrant *immediate* attention. Your inquiry will bring a du Pont service man to explain the use of Pellet Powder and its advantages as they apply to *your own mine*. Write or wire IMMEDIATELY to nearest office.

E. I. DU PONT DE NEMOURS & CO., Inc.
Explosives Division
WILMINGTON DELAWARE
Branch Offices: Huntington, W. Va., Pittsburgh, Chicago, St. Louis.

Other Advantages:

1. No metal kegs: Instead of the metal keg which is sometimes accidentally exploded by contact with electric currents or opening with a pick, PELLET POWDER comes in uniform size pellets, wrapped in cartridges of thin paraffined paper, packed in wooden boxes.

2. No dust: PELLET POWDER eliminates the possibility of dust from the powder being ignited by an open light. Not granular, but in the form of compact, dust-proof cartridges.

3. No loose powder: PELLET POWDER cannot run, laying a hazardous train for fire to run back to the charge, as sometimes occurs when using black blasting powder. Not exposed to stray sparks or electric currents.

4. Less smoke: Repeated experiments prove that PELLET POWDER develops less smoke than the granular blasting powder.

5. More efficient: PELLET POWDER now makes it easy to accurately gauge the amount of explosive needed to bring down the coal in the manner required. Eliminates waste of explosives and is safer to use.

DU PONT

The
DU PONT
MAGAZINE

VOL. XXI FEBRUARY, 1927 No. 2

PARIS GOWNS FOR MOTOR CARS

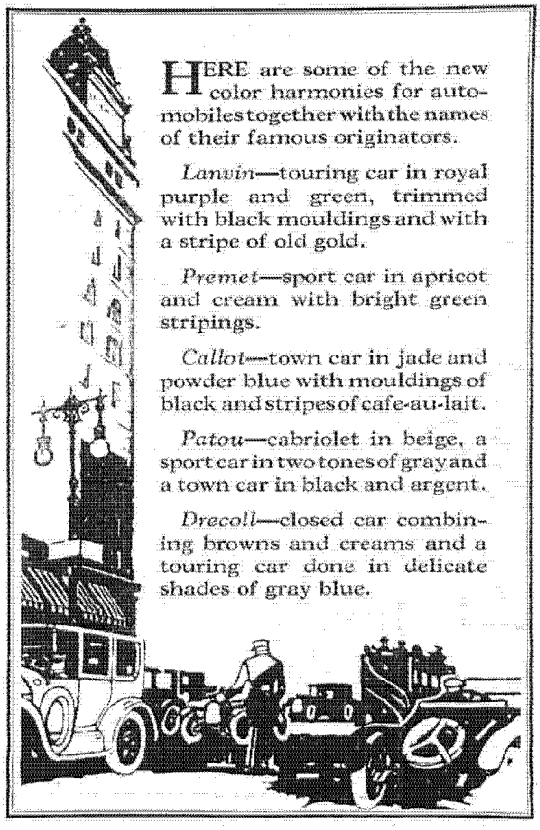
The popular demand for color, hitherto buried by conventions, leads to a new chapter in automotive achievement

MANY will recall that not so very long ago Sunday afternoon was the fashionable time for a carriage ride. Then were the cushions of the surrey vigorously brushed, the two sorrels carefully groomed, and with a great tipping of hats and a flurry of lace-trimmed parasols the family stepped aboard. The traditional Sabbath "airing" had begun. Into the midst of such gentle scenes often swept "that dreadful contraption"—the automobile. It was most annoying. Horses bolted and dignified ladies and gentlemen choked on the dust that arose in its wake. Any solid townsman of the late nineties regarded the machine as a downright nuisance.

But the nuisance must have possessed at birth the silver spoon of destiny, for dirt streets that once echoed to the sputtering of two-cylindered pioneers have now become paved avenues upon which glide our finest examples of automotive development. The motor cars of today fairly take your breath away. Mechanical accuracy, ease of operation, appointments unheard of in other days, and lately, the joyous colors — all these have combined to make them almost indispensable units in our lives.

Quick to sense the recent reaction to bright finishes, several famous Paris designers have turned to the automobile for the expression of new color harmonies and for the first time in history have given Fashion's approval to the gorgeous combinations seen on stock and custom coachwork at motor shows abroad.

Furthermore, the designs of Lanvin, Callot and others have already reached America and their signed sketches may soon be the creative forces behind a host of new combinations. Those for both open and closed cars that are noted here were given to the Duco Color Advisory Service whose director, H. Ledyard Towle, recently visited Paris and London, attending motor shows and interviewing the designers.



HERE are some of the new color harmonies for automobiles together with the names of their famous originators.

Lanvin—touring car in royal purple and green, trimmed with black mouldings and with a stripe of old gold.

Premet—sport car in apricot and cream with bright green stripings.

Callot—town car in jade and powder blue with mouldings of black and stripes of cafe-au-lait.

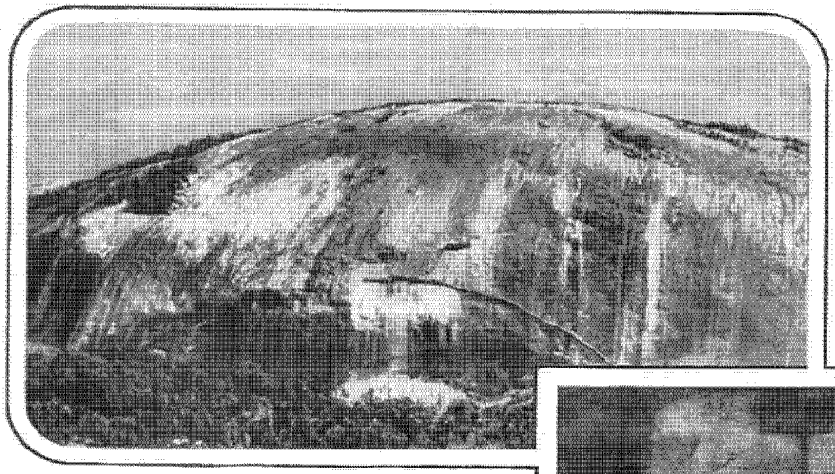
Patou—cabriolet in beige, a sport car in two tones of gray and a town car in black and argent.

Drecoll—closed car combining browns and creams and a touring car done in delicate shades of gray blue.

No longer must we bow to dreadful dullness. With Duco an ever-willing and resourceful agent, new beauties have been given to modern cars. They are as flashes of color against a quiet background. They have already served to release an individuality of design which never before has been permitted to bloom unhampered in this country.

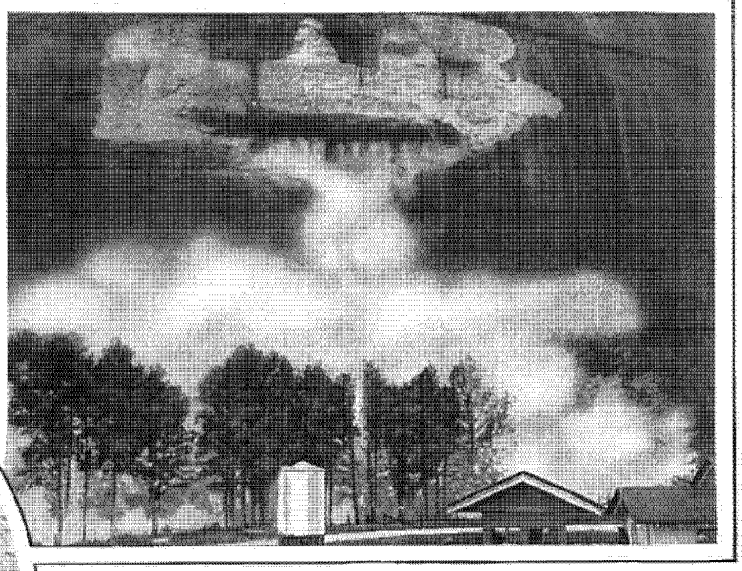
And now when Paris yields to the once-despised automobile, a new chapter in the automotive book of progress has been reached—a chapter destined to unfold *all* the beauties of color harmony that were so long denied us. Paris knows full well that color has come to possess an almost universal appeal.

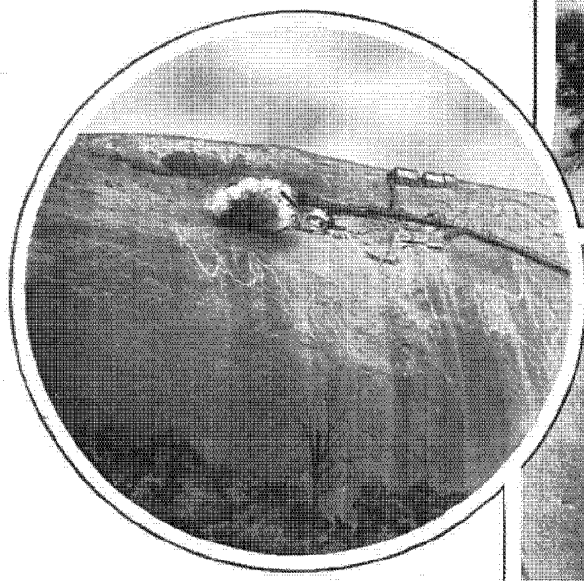
STONE MOUNTAIN VIEWS



Above—Where the huge Confederate Memorial is being carved from a granite mountain in Georgia

Right—Du Pont dynamite recently tore out enough rock in this blast to fill 96 railroad cars. Explosives greatly speeded up the preliminary sculpturing of the heroic figures





Above—At the instant a blast was fired high up on the mountain side. Note the painted outlines of uncompleted figures and the walkway leading down the mountain



Left—Augustus Lukeman (holding drawings) pays his first visit to Stone Mountain, where he has undertaken the completion of the South's tribute to officers and men of the Confederate army

A BELTING CONTROL SYSTEM

Reports of power losses, deterioration and poor service from belts in your plant can be permanently silenced, says this expert, through standardization. And results have proved his point

By WILLIAM STANIAR

AN attempt was made in the September, 1926, issue of this magazine to focus the attention of industrial executives on the importance of power belting and its direct relation to production and profits, because in the demand for manufacturing economy and efficiency the unnoticed essentials must be brought to the surface. In the average industrial plant belting is an "unnoticed essential," and generally upon investigation it is found to be a "waster of power" at approximately $60.00 per horse power per year; a "waster of time," owing to production machinery shutdowns; a "waster of wages" occasioned by idle men waiting for resumption of machine operation, and a "waster of capital investment" brought about by the shortened life of plant equipment.

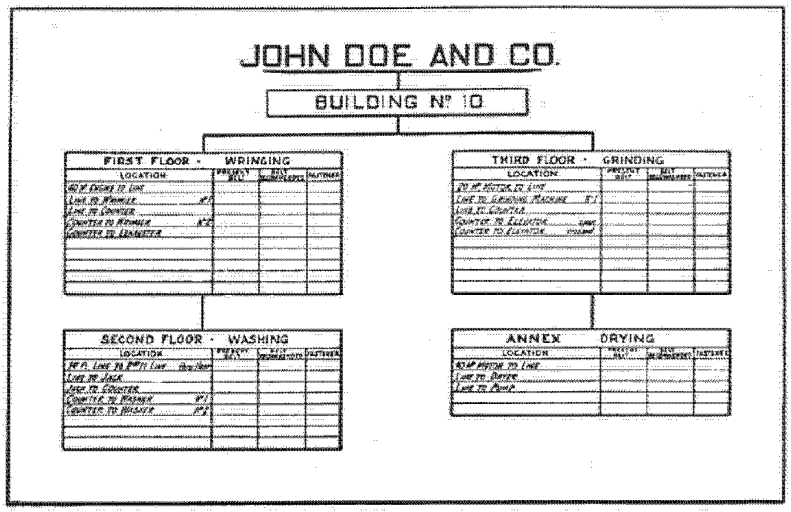


Fig. 1—Belting requirements in this building have been charted for the control system, with subdivisions for each floor and operation. In this manner, complete data are made instantly available

It is, therefore, the purpose of the writer to place before executives a belting standardization and control system that is eliminating mechanical transmission losses and increasing production in all large plants of the du Pont Company and in four of the largest plants of the General Motors Corporation.

If mechanical power conditions in most manufacturing plants were analyzed, it would not be difficult to comprehend why the selection, installation and care of belting is generally left to the inexperienced. Managers and superintendents have been interviewed on this subject and, as a rule, these gentlemen realize the importance of their belting equipment and its relation to production efficiency. But their question is—"What can we do about it? We have no one in our organization who really knows enough about belting to make a correct and economical selection." The job is and always has been left to workmen and millwrights. These men know their own line of work but do not and are not expected to know the particular characteristics and uses of the various brands of belting so necessary for its correct and efficient application.

Some plant superintendents know their mechanical transmission equipment is not what it should be and would welcome a system of belting control and standardization. Being aware of their lack of information, they turn to technical books or trade papers in the hope of finding some practicable method. Instead of being helped, they find themselves face to face with mathematical problems and discussions, possibly dealing in calculus, which tend to smother the real commercial engineering of the subject.

If a system of belting standardization, such as is about to be described, can lower belting costs and give increased production to two of the largest corporations in the world, there is no reason why it cannot be applied to the great majority of manufacturing plants of the country, if they are ready to invest the time and money necessary for its establishment. This system is a practicable method of employing the right belt in the right place as to type, width and thickness. It is based on the following facts about each installation:

1. Conditions surrounding the drive, such as acid fumes, heat, steam, moisture, dust, grit, etc.
2. Horse power to be transmitted.
3. Ratio of drive.
4. Diameter and speed of pulleys involved.
5. Center distance between driver and driven.
6. Method of control.
7. Angle of drive.
8. Top or bottom pull.
9. Kind and method of loading.
10. Method of joining.

But it will require time and money to establish this control in the individual plant, if all the work necessary is done within its own organization, because it is based on testing over a period of months and an intimate investigation of belting substance by an experienced engineer.

The belting standardization system is a method whereby each individual belt drive is scheduled on a chart

shown by Fig. 1. If the plant is divided into buildings, each building has its schedule with subdivisions for the various floors and operations, and if divided into areas, each area has its schedule with subdivisions for the various buildings.

Each subdivision of the schedule is again subdivided into four columns: Location—such as 50-hp. motor to head shaft; Present Belt—the type and size of the belt in use at the time of the analysis; Belt Recommended—the type and size recommended for the installation based upon knowledge and the results of testing; Fastener—the correct method of joining the belt recommended.

With these schedules, every individual belt drive is definitely specified. The question as to what type to install for a certain atmospheric or mechanical condition is therefore not a matter of guesswork, but is based on the result of applied testing and the process of elimination. It removes belting problems from the mind of the plant engineer; it eliminates multiplicity of types and sizes, and it lowers belting inventory.

If, previous to the installation of this system, plant belt records have been kept in a systematic manner, the building up of the foregoing schedules will be greatly facilitated. However, if no records are available and it is desired to gain the required knowledge by testing under the conditions existing in a particular plant, it will be necessary to inaugurate a testing program. This should be done sectionally; that is, one test of the various belting types for each acid, heat, steam, moisture or grit condition existing. It should be borne in mind, however, that reliable belting performance tests under actual operating conditions are, as a rule, difficult to obtain because they are to a great extent hampered by the personal opinions and preconceptions of maintenance men and operators. Particular pains should therefore be taken to eliminate the personal equation in this work.

Tests of this character need not necessarily be continued until the belt has actually gone to shreds, because it is possible to obtain comparative results of one type over another in two or three months and, in some cases, within a much shorter period. The test record card, as shown in Fig. 2, will be found convenient for this purpose.

At the conclusion of this testing, which is for type only, the plant should have in its possession positive information as to the belt capable of affording the longest life, least maintenance cost and best power transmission for every condition existing. It is now possible to make an intelligent belting analysis of each individual belting installation in the plant because it will be based on known quantities. The belt survey card shown in Fig. 3 should be used for this purpose, one card for each belt drive.

All the facts called for, such as plant conditions, motor horse power and speeds, pulley sizes and speeds, method of control, open or crossed, vertical or horizontal and center distance, should be supplied from the actual operation. The horse power and speed in feet per minute can be calculated. Such tabulated data must be studied by an engineer familiar with the situation, and the type and size for renewal belting then selected, based on the knowledge gained from testing and the actual operating data placed on the belt survey cards. The area or building schedules can now be built up for actual plant use. If the plant belting renewals are in charge of one man, this man should have a complete set of the schedules for all areas and departments. However, if there is a belt supervisor for each individual area or department, he should have the schedules for that particular division only, as he is not interested in any other.

The schedules are for renewal belting only and should be consulted when a replacement is necessary. Their function is to eliminate a repeated installation of the same and usually the wrong type and size of belt. Because a certain belt has been operating on a particular drive for years does not prove it to be the economical one unless its selection has been based on comparative tests. When a belt is installed according to departmental schedules there is no question as to its fitness for the work. It has been

E. I. DU PONT DE NEMOURS AND COMPANY

BELT RECORD

PLANT	AREA	HOUSE	DRIVE FOR
Conditions		Single—Double—Triple	Date on
		Kind of Fastener	Date off
Horse Power		Shifter—Clutch or Free	Life of Belt
Center to Center of Shafts		Open or Crossed	Cost of Maintenance
Dia. and R. P. M. of Driver		Vertical or Horizontal	TO BE FILLED IN BY ENGINEERING DEPT.
Diameter and R. P. M. of Driven		Inclined—Approx. Angle	Tention per Inch
Name of Belt		Is Tight Side on Bottom	Speed F. P. M.
Maker		How Often is Belt Shifted	Arc. of Contact
Width and Ply		How Often is Clutch Operated	Cost of New Belt
Length			

Dates Inspected	Condition of Belt	Condition of Fastener	Inches Take Up	REMARKS

Fig. 2—A complete record of tests given each type of belt may be kept on these cards. At the conclusion of testing, positive information as to the kind of belt giving longest life and greatest power transmission is thus gained

POWER DIVISION

E. I. DU PONT DE NEMOURS & CO.

BELT SURVEY RECORD

PLANT AREA BUILDING

OPERATING CONDITIONS

Acid ... Dust ...

Dust ... Steam ... Heat ...

Damp ... Water ... Good ...

MOTOR

Horse Power ... R. P. M. ...

Pulley ... Type ...

TRANSMISSION

Center Distance ...

Driving Pulley ... R. P. M. ...

Driven Pulley ... R. P. M. ...

Clutch Control ...

Chain Control ...

Tension Control ...

Stepped Cones ...

PRESENT BELTING

Leather ... Rubber ... Fabric ...

Width ... Ply ... Single ... Double ...

Open ... Crossed ... Q. T. ...

Vertical ...

Horizontal ...

45° ... 60° ... 30° ... 20° ...

Endless ... Cotton Pull ...

Clipper ... Alligator ... Metal ...

Crescent ... Wire ... Raw-hide ...

PRESENT POWER CAPACITY

Velocity f. p. m. ...

Tension per inch ...

Horsepower ...

DRIVE

Motor to ...

Head to ...

Line to ...

Counter to ...

Jack to ...

RECOMMENDATIONS

Type ...

Width ... Thickness ...

Fasteners ...

REMARKS

Fig. 3—A survey card, properly filled out, offers an intelligent analysis of each belting unit in the plant, building by building. With such information, there is no guesswork in renewals or changes

proved. Belting costs generally follow production labor costs where there is no system of belting standardization. Investigations in a number of plants have proved this fact and have also proved that when there is a control system, reduction of these costs in relation to productive labor is effective almost immediately.

Fig. 4 illustrates the actual effect of the schedule system of standardization on belting costs in relation to production labor costs in a large plant recently surveyed. It will be noted that from January to August productive labor increased from $34,000 to about $120,000 and the belting cost increased in proportion from $1,500 to $5,000. During the latter part of August, belting schedules were placed throughout the plant and by October the tendency of belting costs was downward while labor costs continued upward. By the following March belting costs had dropped to $3,200 with production labor at $103,000. This illustration shows the value of belting control and the almost immediate effect it has on plant costs.

There are approximately eight hundred types and brands of power belting on the market. Is it any wonder that confusion and loss exist when there is no standardization of this power commodity? For example, there are about 450 brands and grades of leather belting alone, but to the average user of belting, a leather belt is simply a leather belt. Weights and trade names are responsible for these numerous brands, but as a rule there are four distinct and separate classifications of leather used in the manufacture of belting, and they may be listed as follows:

1. Regular oak-tanned leather spliced with glue.

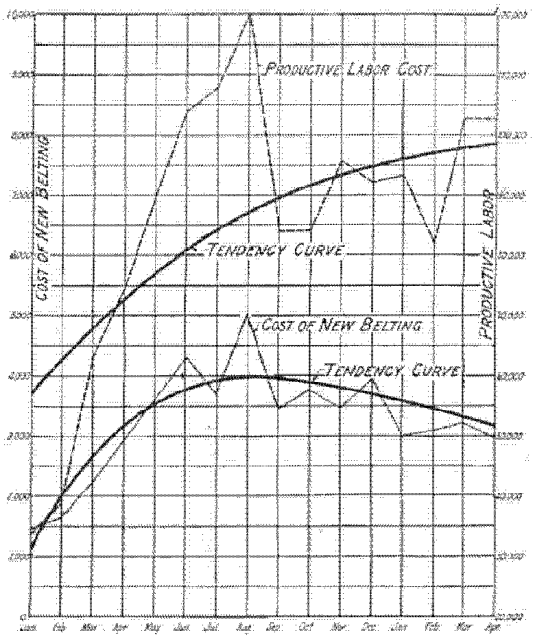


Fig. 4—How a control system keeps down belting costs while allowing productive labor to increase. Taken from actual figures

2. Waterproofed oak-tanned leather spliced with waterproof cement.

3. Special tanned leather spliced with waterproof cement.

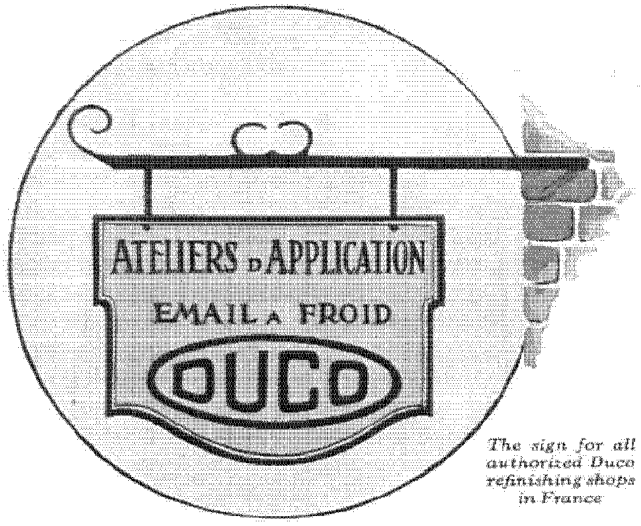
4. The combination belt made from waterproofed oak-tanned leather on the outside and special tanned leather on the pulley side spliced with waterproof cement.

Each one of these leathers is manufactured for a specific field of transmission and when properly applied therein will lower belting costs and increase production.

The use of regular oak-tanned leather, spliced with glue, is gradually giving way to the waterproof variety. It is economy to pay 10 to 15 per cent more for waterproof belt, because it is insured from the beginning against destruction by dampness and actual water contact. The waterproofed belt is also a better power transmitter than regular oak. Leather of the special tannage type is the result of a distinct industrial demand. Leading belting manufacturers have met this demand by producing a leather with far more resiliency and greater adhesiveness than straight oak-tan. It functions best on high-speed, small pulley work, or on operations where the speed is slow and where the arc of contact is small on the driver, but it should not be used on shifting or stepped cone pulleys, because of its extreme pliability. This special tannage creates a leather impervious to water and steam and to a certain extent resistant to the deteriorating effects of heat and corrosive acid fumes. This type of leather has less stretch than ordinary oak and, therefore, is more applicable to endless motor belt installations and to heavy-duty driving. By this tannage process leather can be made either stiff or pliable, and its tensile strength and frictional value can be regulated at will.

A combination leather belt is necessary where the frictional advantages of special tanned leather must be employed. This condition generally occurs on heavy-duty, stepped cone installations and on slow-speed, heavy-duty shifting belts. Owing to the pliability of the special tannage type, a crumpling action

(Continued on page 16)



The sign for all authorized Duco refinishing shops in France

AROUND THE WORLD WITH DUCO

Less than two years ago, this American voyager set out to make friends in distant lands. What has happened in the meantime makes interesting reading

By J. L. Masterson

On the desk where this is being written lies a cablegram that has just been deciphered. It is addressed "Ducofinish, Parlin, N. J." and reads: "You may use in your American advertisements trade-marks of eighteen French cars finished in Duco."

That cablegram is startling. Eighteen makes of French cars finished in Duco! Can it be possible that in so short a time Duco has made such a capture in a foreign market? If it is true of France, perhaps other markets of the world will bear some investigation to see how far Duco has gone during the march from its suburban home in northern New Jersey.

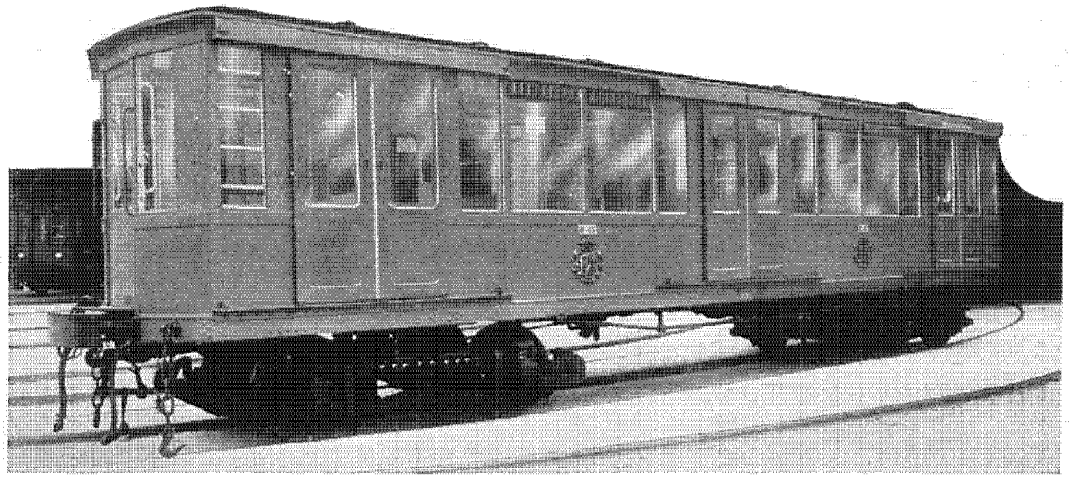
There was a time when the "markets of the world" were confined to the shores of the Mediterranean. Then it was a comparatively simple matter to introduce merchandise into "foreign" markets. When the Phœnician traders came into port, "domestic" merchandise went out, providing the traders on land could come to terms with these famous merchants of the sea.

But commerce has become infinitely more complex since then and foreign commerce is no exception.

There are foreign sales organizations, exporters who sell and importers who buy. There are advertising agencies that specialize in the promotion of foreign markets. There are carriers whose business it is to transport your product. There are forwarding companies that supervise the transportation of your merchandise. There are insurance writers and underwriters that guarantee the delivery of your products. There are banks and mercantile companies that supervise the collection of your money. There are bills of lading, consular invoices, and numerous other documents to be prepared to cover each shipment. There are trade-mark laws to be complied with—different in almost every country and bewildering in their requirements.



With Duco in Brazil: A demonstration and display in progress at a refinishing shop in São Paulo



A roomy, all steel railway car in Madrid, Spain, finished in sumach red Duco. Note the royal coat of arms

Gone are the Phœnician trading vessels that plied the shores of the Mediterranean and gone, too, is the sublime simplicity that surrounded their transactions. The frontiers of commerce have been pushed back from the Mediterranean century by century until now they embrace the five far-flung continents of the earth. Growth and complexity generally go hand in hand. Today, the conquest of foreign markets is a problem to be undertaken only by a corps of experts. The first thought an adviser on foreign trade will impress upon you is that "it takes time"—which is reasonable to believe.

About twenty-one months have elapsed since Duco was first offered for foreign utilization. In the light of this fact, the cablegram mentioning eighteen makes of French cars being finished with Duco is significant. In the light of this fact, also, a glance at other extra territorial markets may be interesting. Let us look first to our own hemisphere. Regular shipments of Duco go to Mexico, Porto Rico, Cuba, Haiti, Nicaragua, San Salvador, and the Dominican Republic.

Duco has gone far in South America. In the metropolis of the southern continent there is a great store. Every exporter of department store merchandise, whether he be American, European or Oriental, knows the firm of Gath and Chaves in Buenos Aires, and tries to get his merchandise displayed on their counters. Señora and Señorita in this rich and progressive capital of the Argentine Republic are as fastidious as their sisters on Fifth Avenue. So the store appointments must be the finest.

A shopping mother and a beseeching daughter step into an elevator, the interior of which is finished in a restful shade of green. Unconsciously, Señorita runs her fingers over the beautiful film of color and finds it as smooth as a china dish. She wonders! No need to wonder. It is genuine Duco. Gath and Chaves must give Milady the finest in appointments as well as in merchandise.



How a familiar slogan looks in other languages. From top to bottom they are: English, Italian, Norwegian, French, Spanish and German

There is hardly a dock or a quay along the east or west coast of South America where great cans of Duco are not frequent visitors. Duco finish is applied to automobiles in factories in Argentina and Brazil. Refinishing stations are springing up all over the continent, wherever there is a sufficient number of cars in operation to warrant them.

Other uses for Duco finish in South America are for furniture, telephones, interiors, signs, refrigerators, sewing machines, metal bedsteads, bath-room fixtures and seats.

Let us jump from there to Europe for a quick survey.

Besides the eighteen factories in France previously referred to, Belgium, Denmark, Spain, England, Austria, and Czecho-Slovakia all have automobile factories using Duco. In Sweden you will find scales, refrigerators, and motor boats being finished with Duco;

(*Continued on page 24*)

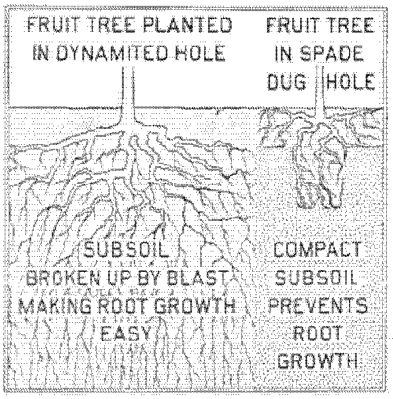
TREE PLANTING WITH DYNAMITE

When an economical method is needed for planting trees that will be thrifty, dynamite may be called on for help. This article tells how it is used

By W. B. Alford

Inasmuch as dynamite is being commonly used as a means of making holes in which trees are planted, it is well to consider some of the general principles involved in tree planting as well as some suggested methods of using explosives in order to obtain the best possible results.

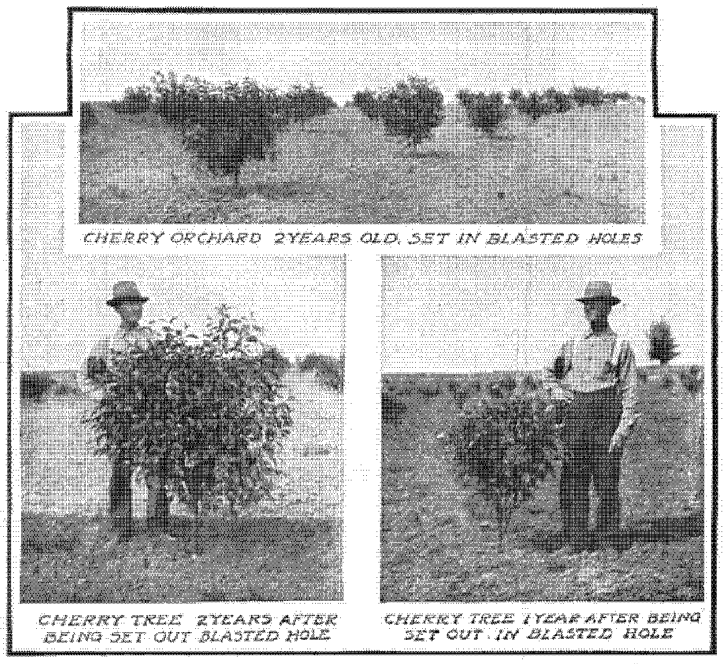
The first and most important principle—and one often overlooked—is that any tree, in order to make a thrifty growth, must have a home for its root system from which the food for its life and development can be readily obtained. Tree roots are often crowded into small holes dug into hard subsoil which the tender roots cannot penetrate. Of course, trees so planted cannot thrive; indeed, in many cases it is impossible for them even to live. Consequently, many orchards just barely exist, and bear little, if any, fruit. They are not able to withstand unfavorable climatic conditions. Trees are often considered not adapted to certain climates or soils when the only trouble is they were not planted properly at the beginning.



Improper planting, too, often results in a tree being absolutely ruined by insects or diseases just because the root system has not sufficient contact with plant food to give the tree the necessary vitality to withstand disease. Without contact with plant food the roots cannot feed the tree—and it starves. Not only must tree roots have a feeding area, but they must be reasonably extensive; for there is a cumulative demand for food as the tree develops, and Nature's way is to send out small tender roots to find it in solution between the soil particles. These roots can take up only liquid nourishment. Therefore, it is necessary to provide a large area of loose soil through which the roots may penetrate, and also to make sure that the surrounding soil is in condition to promote capillary action of soil water so that food will be made available for the roots in dry weather. Many people seem to think that tree roots are for anchorage only, whereas their most important function is that of food gathering.

Now there is no better, no more economical method of creating this loose soil condition, which is so essential for growing trees, than blasting the holes with dynamite. When this is properly done, it insures a good home for the root system with a large feeding area available. More than that, it breaks up the soil and subsoil, thereby promoting an improved soil condition that stimulates a rapid, vigorous growth of the tree and its early maturity.

In tree planting with explosives there are certain principles which should be followed to obtain the best results. For example, a sufficient quantity of explosives must be used to loosen the subsoil thoroughly. This, of course, depends upon the type of soil and the kind of trees to be planted. For small trees, such as peach, orange or cherry, one-half cartridge, or one-quarter pound of 20 or 40 per cent ammonia dynamite, is sufficient. For pecan or other trees with deep-rooting systems, one cartridge, or one-half pound of the explosives, should be used. This amount, too, will vary with different soils; but use enough dynamite to meet the requirements. An excess is better than not enough.


CHERRY ORCHARD 2YEARS OLD, SET IN BLASTED HOLES

CHERRY TREE 2YEARS AFTER BEING SET OUT BLASTED HOLE

CHERRY TREE 1YEAR AFTER BEING SET OUT IN BLASTED HOLE

Depth of loading will also vary with the soil and the kind of trees being planted. This has a direct influence on the effectiveness of the blast. Generally, the load should be placed

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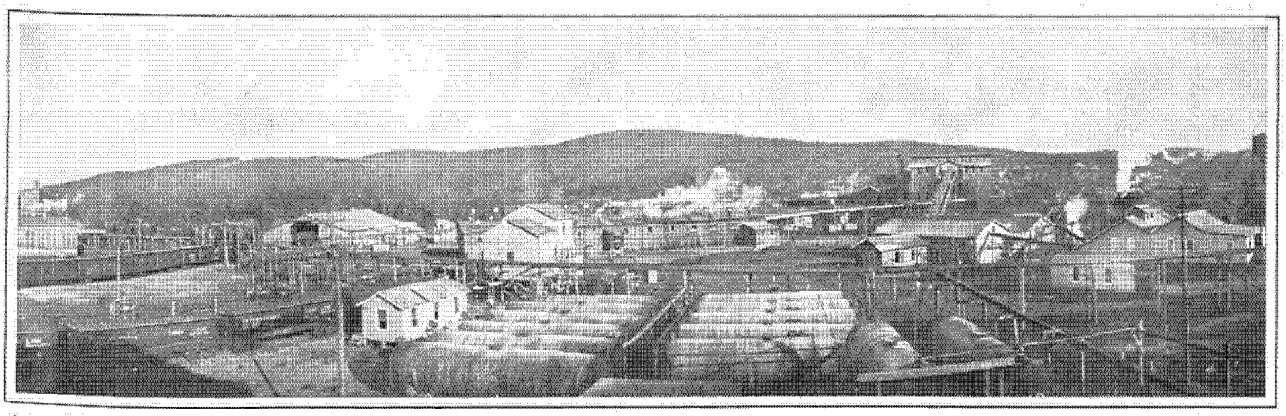


A partial view of one area of the du Pont plant at Haskell, New Jersey, where for many years nitroglycerin powders were made. The company has discontinued the manufacture of powders of this type and has dismantled the plant, representing an investment of many thousands of dollars

BALLISTITE HAS BEEN DROPPED

Now there are only two brands to remember—Du Pont Bulk and Du Pont Oval—the outstanding products in the field of sporting powders

By LLOYD R. LEWIS

BALLISTITE is no longer included in the line of du Pont sporting powders. It has passed out of the picture. Moreover, the old plant at Haskell, New Jersey, where Ballistite was produced for so many years, has been dismantled and the buildings burned to the ground. The plant personnel has been absorbed in other parts of the organization. All of which means that Ballistite belongs to the past so far as the du Pont Company is concerned.

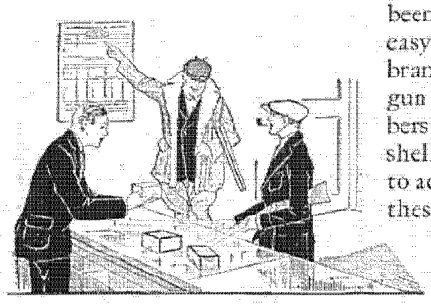
But why should Ballistite be dropped? Beyond question it was the best shotgun powder of the nitroglycerin class ever produced. Among competitive dense powders it held its place at the top both for quality and performance. Always it was a big favorite with game shooters. Considering its merit and widespread popularity it is not surprising that many should ask us the whys and wherefores for such a drastic action.

No manufacturer removes a successful product from the market without carefully considering the relative advantages to be gained or lost thereby. In the case of Ballistite a careful study of powder needs and the ballistic performance of all du Pont smokeless powders preceded the company's decision to stop making and selling this powder. Long before that decision was reached full consideration was given to its effect upon manufacturers of ammunition, jobbers, dealers and consumers.

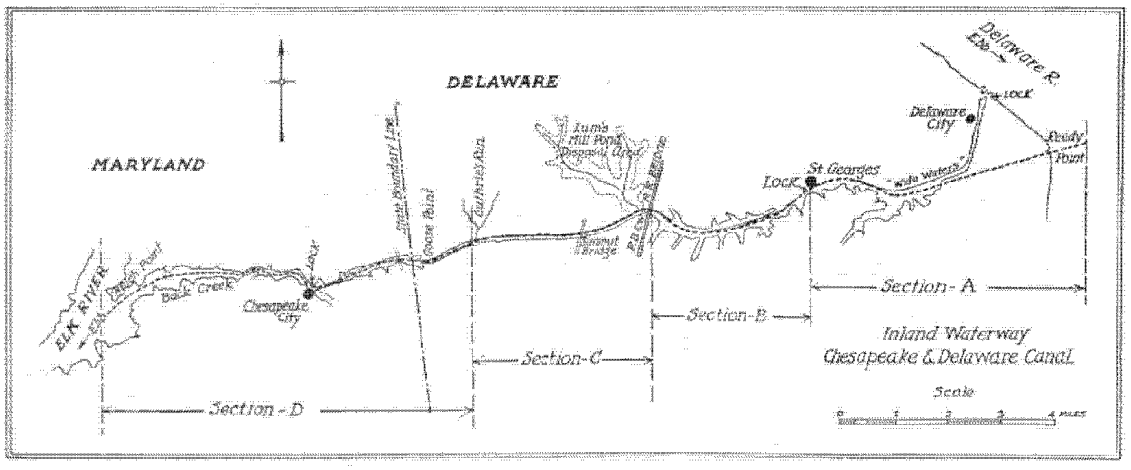
Why was Ballistite discarded? For two reasons: First, it was a nitroglycerin powder, the only nitroglycerin powder of any kind—shotgun, pistol or rifle—manufactured by the du Pont Company. Although it was the best powder of its type, it did not measure up to the 100 per cent standard attained by Du Pont Bulk and Du Pont Oval, both nitrocellulose powders.

The latter have been found to excel nitroglycerin powders in every way. They burn at a lower temperature. They are practically unaffected by temperature changes or atmospheric conditions. Nitrocellulose powders made by the du Pont Company will not injure in any way the finest steel used in shotgun barrels; in fact, the life of rifle barrels has been increased many times by their use. For these reasons the company decided to produce nitrocellulose powders only.

Second, the perfection of Du Pont Oval and improvements made in Du Pont Bulk powders so increased their efficiency that Ballistite and certain other brands were no longer necessary. In eliminating them the advantage of a further simplification of stocks was gained for the benefit of manufacturers of ammunition, jobbers, dealers and consumers. With Du Pont Oval for heavy loads, Du Pont Bulk for light and medium loads—a selection of twenty-six loads in all—it is believed that all normal shot-shell demands will be met with satisfaction to all concerned.



The du Pont Standard Loads Chart has been revised accordingly. It is now very easy to follow, for there are only two brands to remember and only one shotgun powder for a particular load. Jobbers and dealers who are ordering shotshell stocks for 1927 business will do well to accept this chart as a guide and specify these powders which have clearly demonstrated their superiority in the ballistic laboratory and in the field —Du Pont Bulk and Du Pont Oval.



By referring to this map, the reader may locate at a glance any of the operations described in the text

INSIDE THE BOUNDING MAIN

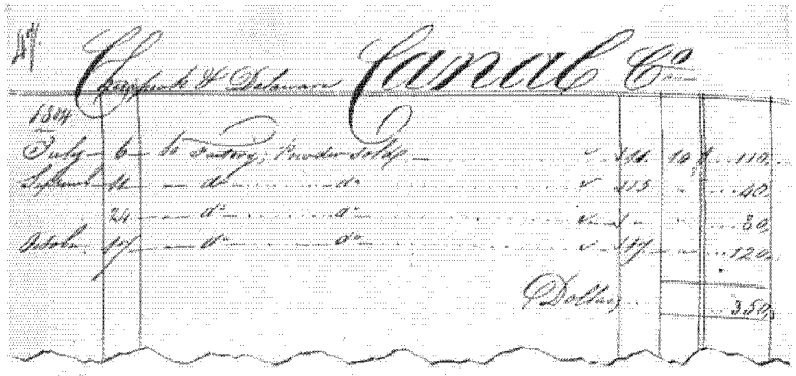
The man in charge of reconstructing the Chesapeake and Delaware Canal carefully describes this $10,000,000 unit in a proposed chain of waterways along the Atlantic seaboard

By Colonel Earl I. Brown
Corps of Engineers, U. S. A.

THE first unit in a proposed inland waterway system reaching down the Atlantic seaboard from New York to Florida will be ready for traffic on March 1 of this year, when the reconstructed Chesapeake and Delaware Canal will be officially opened.

New impetus has thus been given the plans for an "inside" ship route, along which both natural and artificial bodies of water are to be used. Even now small craft can navigate for a large portion of the 1200-mile stretch by using a number of antiquated canals, but vessels of larger displacement are forced out to open sea.

A waterway of adequate size was under consideration by the government as early as 1912. Since that time, a great deal of preliminary work has been done, routes have been charted and estimates made, but this 20-mile sea-level channel between the Delaware and Chesapeake bays is the first link in the chain to be completed. Government engineers are now contemplating an inland waterway across New Jersey, from New York Bay to tidewater in the Delaware River. Improvement and rebuilding projects, notably in Virginia and the Carolinas, are also to be considered as units in an interlocking system of channels which, if completed, will afford not only a valuable addition to national defense but also a safe, convenient and highly profitable trade route.



Old ledger entries showing that du Pont powder aided the first attempt to dig the canal (1799-1804). The second, and successful, operation began in 1824

The Chesapeake and Delaware Canal was acquired by the United States from its former owners, the Chesapeake and Delaware Canal Company, on August 13, 1919, for the purpose of constructing along its route a sea-level barge canal having a depth of 12 feet at mean low water and a bottom width of 90 feet.

The original canal, constructed 1824–1829, had its entrance through a tide lock at Delaware City, and extended 4.3 miles to the town of St. Georges, where the canal level was raised 10 feet by means of another lock, making the new level 17.6 feet above mean low water in the Delaware River. Thence it was continued 9.3 miles to Chesapeake City where a descent of 15 feet was made by a third lock to the level of Elk River, an upper branch of Chesapeake Bay. The old canal was 10 feet deep and 36 feet wide; the locks,

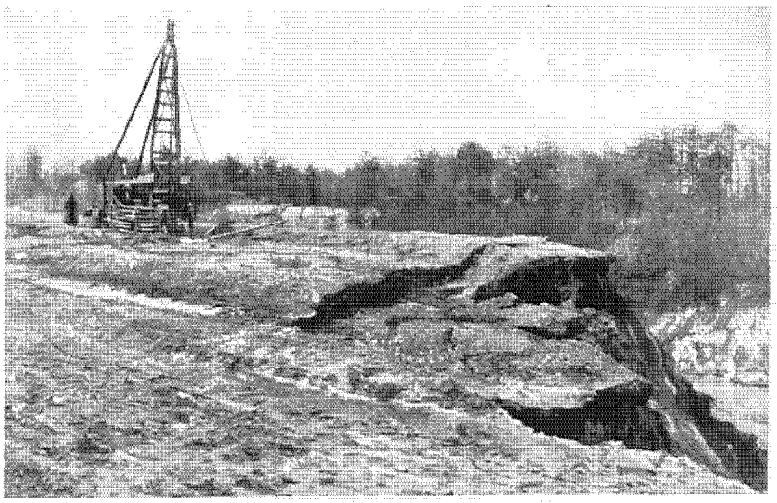
220 feet long in the chambers and 24 feet wide. This limitation as to width of vessels capable of passing through the canal was for many years a much more serious handicap to its serviceableness than lack of depth.

The new canal has been dug around the old locks, leaving them as portions of the present embankments.

The summit level of the canal passes through a divide, the average height of which is 85 to 90 feet above mean sea level. This necessitated a deep cut about four miles long to allow the canal to pass through at a relatively low level. For the remainder of the distance, the cuts were moderate.

The first federal appropriation for reconstructing the canal was $3,000,000, of which $2,520,000 was paid the owners as an upset price for all their property, rights, and appurtenances, leaving only $480,000 for active operations.

The original estimated cost of reconstruction in 1916 was $8,000,000. In 1919, when war prices prevailed, a new estimate was made amounting to $13,000,000. Manifestly, the small balance of the original appropriation did not permit operations to be begun upon a large scale. A small contract for steam shovel excavation was let in 1921, and the remainder of the funds used for detailed surveys, making working maps, studying the problems and preparing specifications for letting large excavation contracts when funds should become available.



Drilling holes for du Pont dynamite along the top of the "deep cut" embankment. The result of a loosening shot may be seen in the foreground

The work resolved itself into four distinct classes—excavation, bridges, jetties and miscellaneous, such as surveys, disposal basins, provisions for drainage, dikes in low marsh lands, changing existing roads and removal of old locks. It was decided to do the first two classes of work by contract and the last two by hired labor, because their execution involved many uncertainties as to conditions, quantities and other requirements inconsistent with definite specification.

In planning all operations certain primary considerations had to be kept in mind. First, in authorizing the work, Congress imposed the condition that traffic should be interfered with as little as possible, since from 30 to 50 vessels pass through the canal per day. Second, the spoil from excavations had to be disposed of as near as possible to the point from which it was taken; every additional foot it was transported added to the cost. Third, in the deep-cut section it was known that landslides had occurred and probably would recur during operations. Fourth, since highway and rail traffic to and from the Delmarva peninsula cross the canal on the various bridges, this communication must not be broken.

Work Divided into Sections

In planning the excavation it was necessary to decide between dredge or steam shovel operation. This involved an extended study of relative costs under varying conditions. For this purpose, the canal was divided into four approximately equal sections, in each of which the work was of practically the same character as to probable cost of excavation. These four sections were designated as:

A—From deep water in the Delaware River to the lock at St. Georges.

B—From St. Georges to the Pennsylvania Railroad bridge through the summit level.

C—That portion of the canal, known as the "deep cut," extending from the Pennsylvania Railroad bridge to Guthrie's Run.

D—From Guthrie's Run to the Chesapeake City lock and thence down the channel of Back Creek to its mouth in the Elk River.

The combined length of all sections is 20 miles.

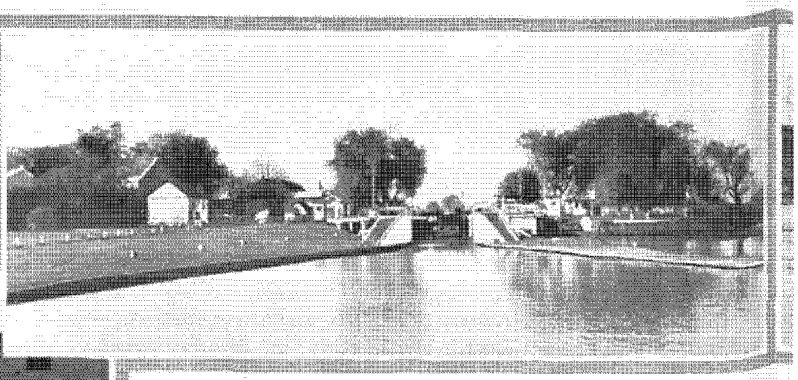
Section A: Practically all the material to be removed in this section was under water; hence it was a dredging proposition. This section also comprised a new entrance to the canal. The old entrance at Delaware City was defective for two reasons.

First, it debouched into the Delaware River in a secondary channel, which, while deep enough for present plans, would be of insufficient depth should this waterway ever be enlarged to a ship canal. The new entrance debouches near the ship channel in the river, and is no longer than the old alignment to Delaware City.

Second, the new entrance is south of Fort du Pont, on the Delaware River, and adds to the military strength of that point.

How Dredges Came In

The new canal entrance joins the original line about two miles inland. In dredging this section, part of which lies at sea level and part at the embanked level of the old canal, care had to be taken in passing the dredge from one position to the other, so that water in the embanked portion would not escape. When the dredge was about to pass from the new entrance into the old canal, it built a dam across the channel behind itself and was left floating in a completely enclosed pond. Water from the canal was then admitted into this pond, raising the dredge to canal level, whereupon the dredge cut through into the

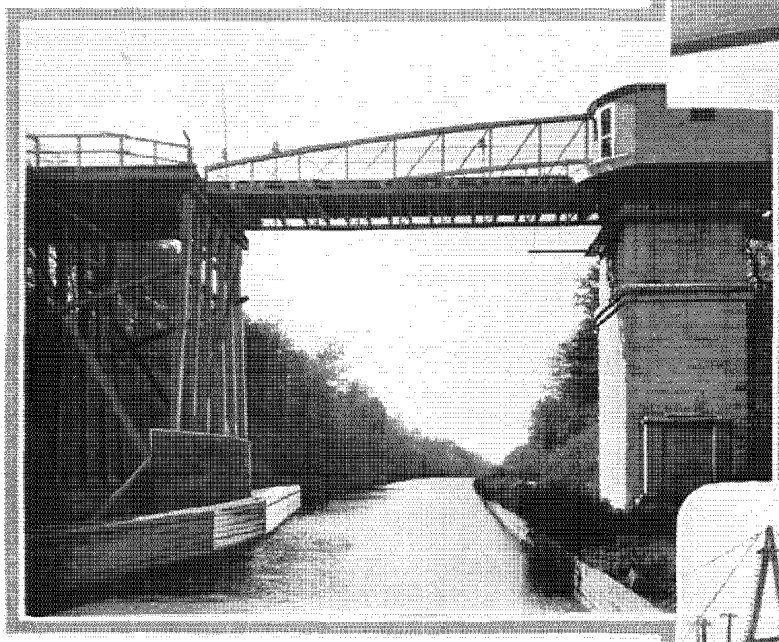


Right—Approaching the lock at St. Georges before work began

ALONG A PICTUR

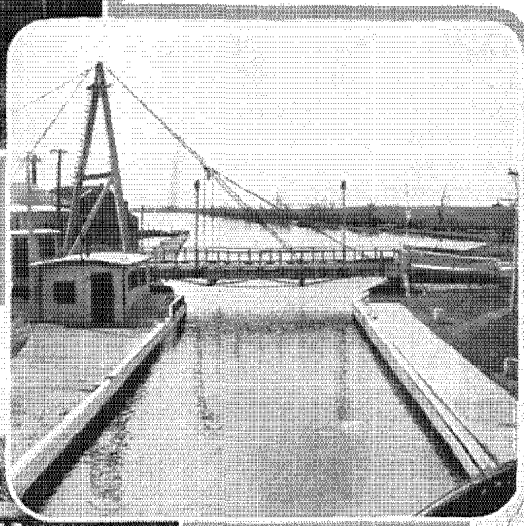
A group of camera studies taken during peake and Delaware canal. The new sea open for traffic on March 1, is part of a route down the Atlantic seaboard

Photographs, c
U. S. Engineer
Wilmington, D



Above—Old Summit Bridge and part of the original "deep cut" before excavation was begun

Below—Approaching the lock at Chesapeake City, the western terminus of the canal



*Below—Pumping sta
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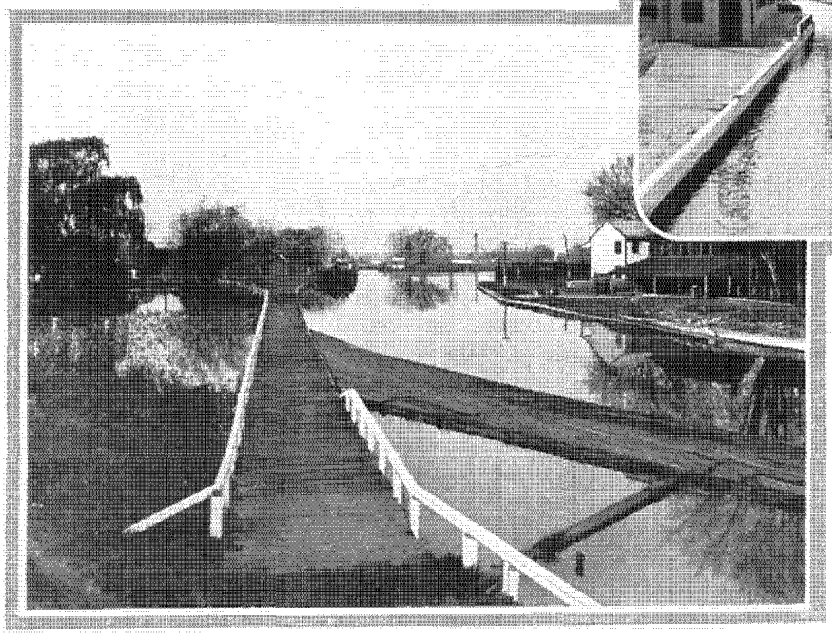
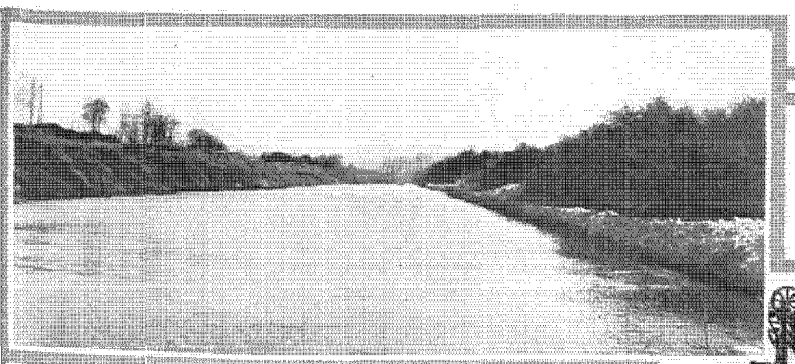


Above—A quaint spot along the old channel. The highway bridge at St. Georges before the dredges came





Left—The new channel, looking west from Summit Bridge

ESQUE WATERWAY

g the reconstruction of the old Chesa-
ea-level channel, which will be thrown
a proposed government-owned "inside"
rd. This unit cost $10,000,000

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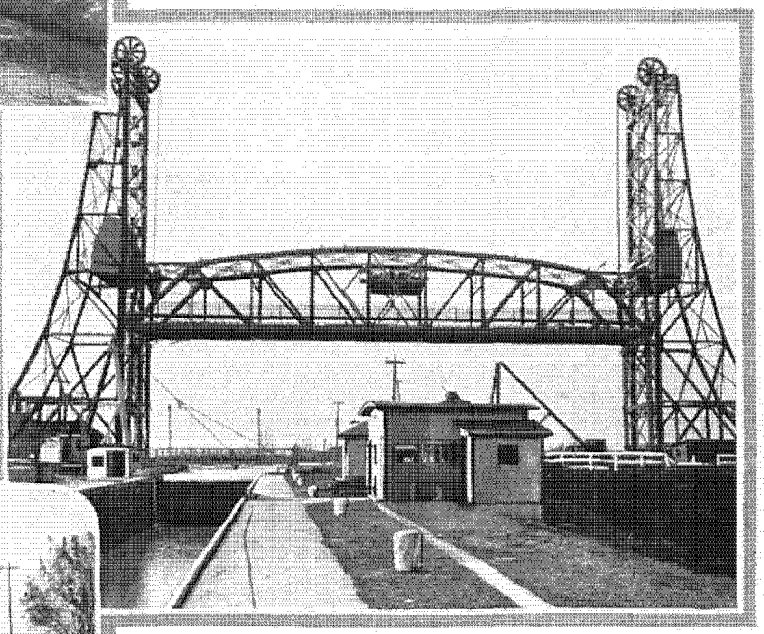
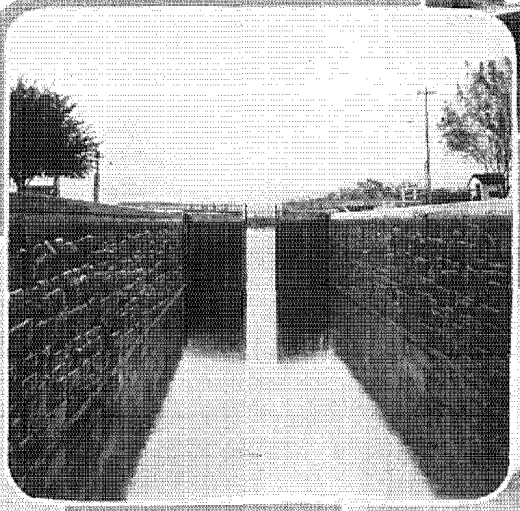
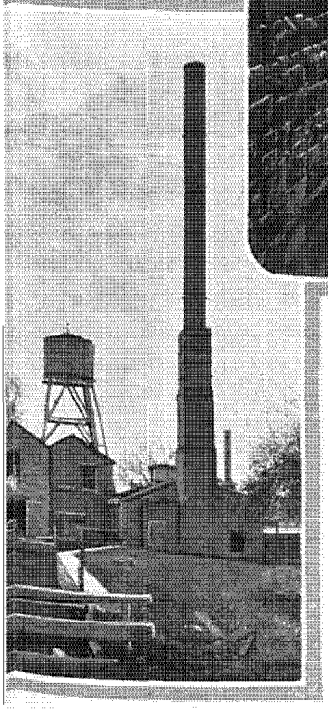


Above—One of the new vertical lift bridges dwarfs an ancient lock along the canal

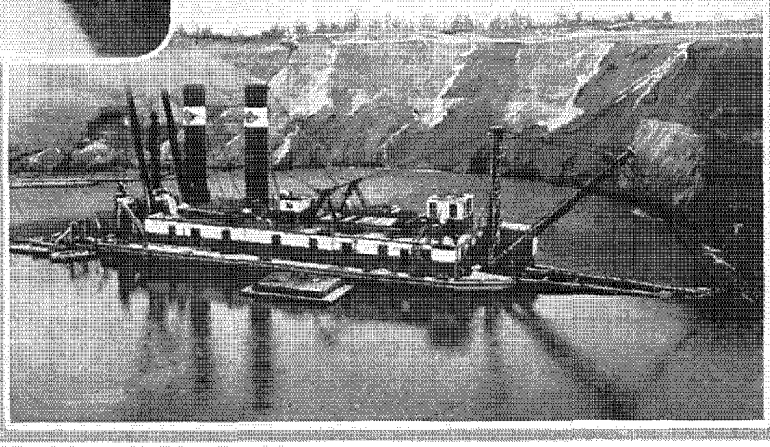
Below—The dredge "Claremont" tearing away at a high bank just west of Summit Bridge

station at Chesa-
andoned when the
nel is opened





Above—A close-up of the old St. Georges lock. Note the sturdy masonry and the hand-operated gates





During cold weather, breaks in the embanked areas such as this one were discouraging incidents of the dredging operations

old canal and completed its work. This operation was reversed in coming out.

Section B: This section contained practically no material above the canal surface and was also a dredging job. The only question was whether a dredge could be introduced into the canal between two narrow locks. A method of doing this, however, was devised at Chesapeake City.

Two cofferdams of steel sheet piling were provided in two sides of a reservoir basin, adjacent to the canal. By removing one of these cofferdams, communication was established with Back Creek and the dredge moved into the basin. This cofferdam was then restored, the water in the basin raised to canal level, whereupon communication was gained between basin and canal by removing the other cofferdam. The operation was reversed to take the dredge out of the canal. Altogether, six dredges were handled in this manner.

Section C: This comprised the portion of the canal called the "deep cut" through the summit divide. Here the choice between wet and dry excavation was most difficult to make. The original canal builders had piled the spoil from this cut close along its edges, overloading the banks and adding greatly to the amount of earth necessary to remove for enlargement. It was planned to take from this cut approximately 7,000,000 cubic yards of material of which perhaps two-thirds could be removed by steam shovels by first deepening the canal level enough to lower it 10 feet preliminarily, but the remainder below water level would have to be dredged and serious slides would be induced which would greatly obstruct traffic.

It appeared best in the light of these facts to use a dredge, and to do the work without the preliminary lowering of the water. Since the bottom of the new cut was to be at elevation —12 feet and the canal summit level was to be held at 17.6 feet, this provided a depth of 30 feet of water into which slides might come with little danger of entirely closing this large channel. The objections to the use of dredges here were (1) the difficulty of disposal of the material, and (2) that of getting a large and powerful enough machine into the canal, since one could not be passed through the locks.

To dispose of the material nearby some 300 additional acres of adjacent land were purchased, around which earthen dikes were built to form a sort of reservoir. Here the spoil was pumped, the solid matter settling and the water flowing back into the canal through sluices and weirs. The high lift for the pumps, averaging from 60 to 90 feet above the canal level, precluded any but powerful machines, and even then it was expected that auxiliary pumps would be required with each machine.

"Deep Cut" the Key

Having resolved that all the work could be done by dredging, and having in mind that the "deep cut" was the key to the operation, an allotment of $2,500,000 was made and specifications were prepared with a view to placing a contract for the removal of about 5,500,000 cubic yards. These specifications allowed the contractor to use any method he might choose.

The method actually chosen follows: First a steam shovel and dump cars were used to take off part of the old spoil bank to build a heavy earthen embankment varying in height up to 25 feet, parallel to the canal and at proper distance away from it, to form one side of the spoil reservoir. The other sides were usually thrown up by a drag-line excavator.

A twenty-six inch hydraulic dredge having about 1800 h. p. on the main engine was then brought into the canal at Chesapeake City as already indicated. This machine had an average capacity of about 10,000 cubic yards per day, and was easily able to place all the spoil behind the embankment. The dredge boldly attacked the highest banks without receiving any injury from material falling in upon it. It worked by undercutting the banks so that the material slid easily to the suction pipe. This action, however, was promoted by setting off light charges of blasting powder, and by streams of water flowing over the face. A second dredge of similar type and capacity was constructed by the contractor on the job, and the work was easily and satisfactorily completed within the time limit.

Section D: This was also clearly a case for dredging.

Subsequent appropriations permitted all sections to be placed under contract, and soon six large dredges, having a combined capacity of one million cubic yards a month, were in operation. Incidentally, the average cost of all contract dredging was about 22 cents per cubic yard.

The combined length of all sections is 20 miles and the total amount of material excavated was 16,000,000 cubic yards.

Jetties Erected for Protection

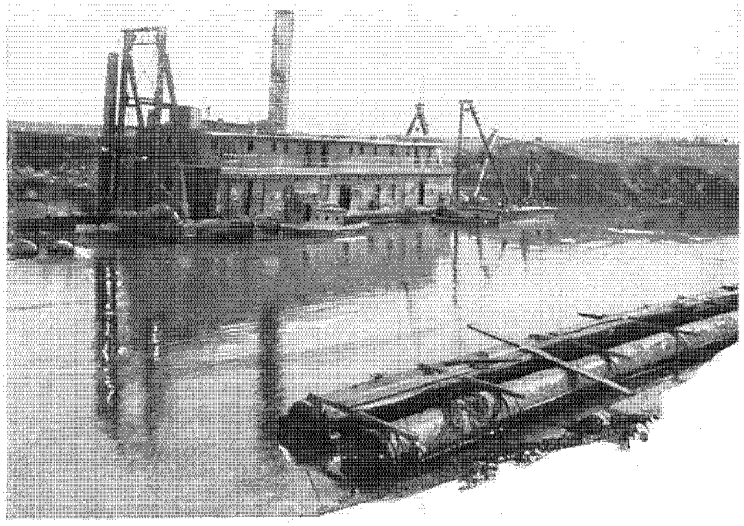
After starting the excavation work, the next task was to construct jetties at the outlet of the new entrance in the Delaware River.

The river bottom at this point is very soft mud to a depth of about 35 feet. Tidal currents, flowing back and forth across the front of the entrance, would wash this soft material into and quickly fill a dredged cut if it were not prolonged into deep water between jetties, which both concentrate the canal flow and protect it from the river currents.

After studies were made of the character of bottom and of various types of jetties, it was deemed best to use a rubble mound stone jetty founded upon a brush mattress. These jetties were constructed by hired labor. The brush and stone were purchased by contract.

The two jetties are each approximately 1350 feet long and extend from the shore line to a depth of about 25 feet in the Delaware River. They are 500 feet apart at the shore end and 800 feet apart at the outer end, measure 10 feet wide across the top and are at a height of 10 feet above mean low water.

The brush mattresses extending the entire length are two feet thick and 60 to 80 feet wide. They were sunk by a two-foot layer of small stone placed upon them and upon this small stone was placed the larger stone forming the body of the jetty. The large stone varies in size from ten-ton blocks to one-man size. The jetties have not yet shown signs of settlement, indicating the efficiency of the brush mattress as a support.



The dredge "Clinton" at work near Guthrie's Run. In the foreground is a reserve pontoon which supports the pipe line to the spoil area

Vertical Lift Bridges

New bridges had to be provided for one railway, three main highways, and one secondary highway crossing the canal. Although the present project contemplated only a barge canal of limited depth and width, there is every probability that some day it will be made deep enough to allow the passage of seagoing vessels.

In considering permanent structures like railway and highway bridges, it would have been folly to construct bridges suitable only for the present, with the probability that they would have to be torn out and rebuilt on an adequate scale later on. A study of principal types of draw bridge in use, excluding all horizontal swing types as obsolescent, resulted in the final choice of the vertical lift type as most suitable and economical. Experts were employed to design these bridges. The cost varied from $275,000 for the lightest type to $650,000 for the double-track railway bridge. As each new bridge was put in commission, the old structure was removed and the remaining excavation work at each site completed.

Keep Within Appropriations

Total appropriations and allotments for the canal amounted to $10,125,000. With this money, not only was the work completed as originally estimated, but several other large items of expense not included in the old estimate were covered. For instance, original estimates allotted only $650,000 for bridges, while the actual contracts for bridges amounted to $1,570,200, an increase of $920,200. The United States also assumed the payment of two-thirds the cost of the Pennsylvania Railroad bridge, which cost $450,000 above the estimates, and finally it was found necessary to construct along the new entrance, parallel to the channel, a large tidal dike to prevent the tides from inundating reclaimed meadow lands permanently. This dike, not included in the original estimates, cost $250,000, making a total increase of $1,620,200, all of which has been met out of sums already allotted.

The soundness of a prediction for an early increase in capacity of this waterway has been questioned. Antagonists of waterway improvements have said they were a waste of public funds. Such is not the case in the instance of the Chesapeake and Delaware Canal. Assuming that it is for public good, public convenience, and public economy, this canal makes an excellent showing for the funds expended upon it. Omitting all pleasure boats, passenger and empty vessels, it gives passage to from 600,000 to 700,000 tons of freight annually.

Knowing the classification of this freight, its points of origin and destination, together with the proper carriers' rates, it is possible to compute the actual cost of transporting that freight by water and what the cost would be if shipped by rail, thus finding the direct saving, if

(Continued on page 19)

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

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Vol. XXI FEBRUARY, 1927 No. 2

LINCOLN

AMERICAN history is in part the biography of great leaders who have shaped the destiny of the nation. Abraham Lincoln was one of them. Of humble parentage, reared amid the privations of frontier life, he nevertheless forced his way to the pinnacle of fame by sheer intellectual power, largely self developed.

Many pictures of Lincoln portray him at a time when he guided the Ship of State at Washington. To commemorate his birth, the illustration chosen for this number portrays an incident of his early manhood when he studied while at work, preparing himself for future opportunities and responsibilities.

A POINT WELL TAKEN

EVERY so often, a consumer points out some advantage of Tontine shades which has not been particularly stressed. Mr. H. W. Aronson, assistant manager of the Pioneer Building, St. Paul, Minnesota, one of the largest structures devoted to offices in that city, writes as follows:

> "There is one advantage of your shades over the opaque type which you fail to stress; namely, while they admit sufficient light to work by, they entirely exclude the glare."

Mr. Aronson is right. Due to the unusual construction of Tontine shades, they admit well-toned light without glare. This feature is of particular importance in shading large office buildings. Most modern office structures have large windows for the sake of admitting as much light and air as possible. Large window areas, however, also admit more direct sunlight. Shades of Du Pont Tontine temper the glare of the sun's direct rays while giving ample, well-regulated daylight.

Effective January 1, 1927, the Bowman Biltmore Hotels Corporation assumed management of the Hotel du Pont at Wilmington under a lease from the Hotel du Pont Company owners. The name has been changed to du Pont-Biltmore, adding the prestige of a nation-wide hotel organization to that of du Pont.

A BELTING CONTROL SYSTEM

(Continued from page 5)

occurs when used on the types of drives mentioned unless it is backed with a leather capable of resisting the transverse action of shifting forks and the sides of stepped cones. If the diameter of the pulleys warrants it, the oak side can be made much heavier than that of the special tannage because it is the special tannage leather that pulls the load and develops the tensile strength. Naturally, the cost of special tannage and combination leather is higher than regular oak, but the first cost is insignificant when compared with the results obtained.

Belt standardization and schedules of application are practicable because both are based on engineering facts and experience. Belting is essential to industry, and its proper selection and control directly influence the profits or losses of any manufacturing organization.

TREE PLANTING WITH DYNAMITE

(Continued from page 8)

deep enough so that the shot will break and heave up the soil without throwing it into the air. For peach, orange or cherry trees the proper depth in average soil is usually from fourteen to eighteen inches. For deep-rooted trees a depth of twenty-two to thirty inches is usually required.

The holes for the charge can be bored either with a hand or machine soil auger, or they can be driven with an iron bar. If a bar is used, one octagonal in shape, pointed at the end and made of tool steel is most satisfactory.

A common and entirely satisfactory method of shooting is with cap and fuse, using No. 6 caps. However, it is safer to use electric blasting caps and a blasting machine.

Immediately after firing the shot the loosened dirt should be removed, leaving the hole open to insure complete aeration and to prevent caving and puddling in time of rains. It is well to allow these cleaned-out holes to remain open until time to plant the trees.

The only time to blast holes for tree-planting work is when the soil is dry. Under wet conditions blasting results in more harm than good, for it has a tendency to pack rather than loosen the soil. It is best not to wait until spring to blast the holes for then the soil is often too wet.

The most satisfactory way to plant a tree is, first, to put good top soil in the bottom of the hole, set the tree in the hole and pack the soil firmly around the roots. If fertilizer is needed, mix it with the soil after planting rather than put it in the hole at the time of planting. Never place manure in the bottom of a hole when you plant a tree. It goes without saying that it pays to plant thrifty trees, free from insects and diseases.

Trees planted in blasted holes grow faster, are sturdier, bear sooner and more heavily, and live longer than trees planted in holes dug entirely with a spade or shovel. By using explosives, tree planting is made easier and speedier, and the results are surer and far more satisfactory.



Courtesy California Peach and Fig Growers Association, Fresno, Calif.

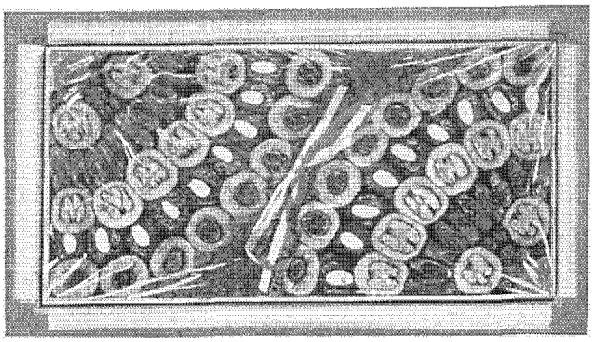
DRIED FRUITS THAT DEMAND ATTENTION

California packers have discarded unsightly kegs and barrels in favor of Cellophane-wrapped packages for the display of their products—and Cellophane makes a mighty good salesman

By O. F. Benz

THE American public is becoming health-conscious. It is recognizing more than ever the value of proper food as an insurance against illness. The eating of raw vegetables, fruits and nuts as an aid to health has been greatly stressed in numerous articles appearing in leading periodicals.

Among the important items of diet which are being recommended and advertised are dried fruits, dates, prunes, figs and raisins. These are uncooked except by the sun's rays. They represent high food values and, from a digestive standpoint, they are excellent. Because of the increased public interest in dried fruits as an agency to better health, it may be interesting to know something about the industry which has done so much to encourage consumption of these foods.



Courtesy L. H. Davis, Fresno, Calif.
A glimpse into an attractive gift package of California fruits and nuts, fresh and clean under a Cellophane wrap

The home of dried fruit is in California, where the climatic conditions offer exceptional advantages for the growing and dressing of these products. At present nearly a billion pounds of dried fruits are grown and packed in this state each year and distributed throughout the entire United States and to several foreign countries.

The development of this industry from its beginning shortly after the California gold rush up to the present is full of romance and is credited largely to the initiative and energy of American business men. Great progress has been made in growing the right kind of fruit under the proper conditions and in marketing it in an attractive, sanitary manner. Not so long ago, dried fruits were sold to the public in kegs, barrels or boxes, all open to contamination and all unsightly. Today, due to an increasing use of unit packages, one can buy dates, figs, raisins and other fruits in a score of attractive and convenient packages. One of the practices adopted recently by the dried fruit industry is the use of transparent Cellophane for wrappers. Dates and figs have a particularly appetizing appearance and should always be visible to the buyer. They have, however, a great affinity for dust and dirt and, if not protected, quickly become contaminated and unsalable.

Cellophane is particularly adapted to meet this condition because it gives the buyer an opportunity to see the attractive fruit, and at the same time it insures absolute protection. Buyers can always feel confident when they see a package so wrapped that the fruit is being properly cared for and will reach them as clean and wholesome as it was when originally packed.

The packers of dried fruits have long wanted a sturdy wrapping material, such as Cellophane, that would enable them to market their products on sidewalks, roadside stands and in railroad stations. Dealers in turn like the Cellophane package for it allows them to display the goods without fear of deterioration.

Because a Cellophane wrap is the only way of giving a fruit product this combined protective visibility, it is rapidly growing in public favor. The next time you pass a stand where dried fruit is on display, notice the large percentage of merchandise items of all kinds that are wrapped in this sparkling, transparent material.



Courtesy Goldenripe Fruits, Inc. San Francisco, Calif.

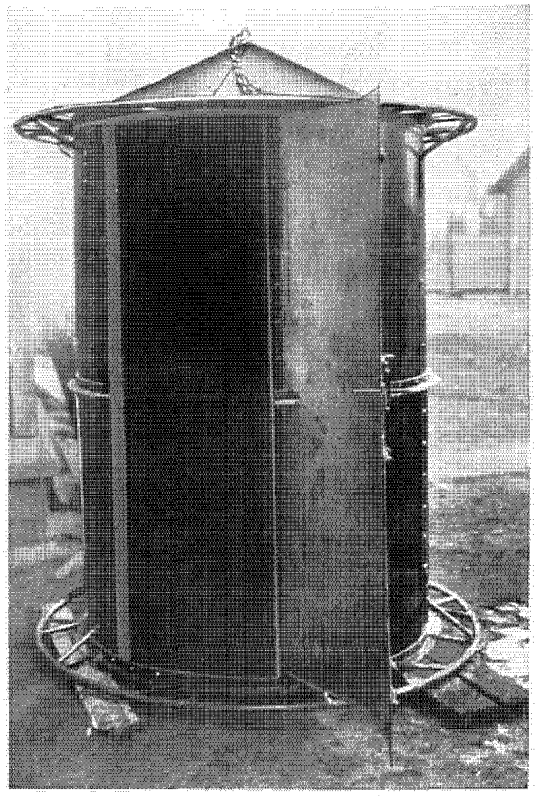


PROTECTING BLASTERS ON THE IRON RANGE

In the second of his series of articles on safe practices Mr. Hurter continues the discussion by describing some methods and devices employed in the Lake Superior district

DESPITE the high quality of explosives now in general use and the increased attention being paid to their intelligent handling on the part of blasters, unnecessary risks and careless practices continue to be contributing causes in a large number of pit and quarry accidents. Probably accidents of this kind will never be wholly eliminated, but with preventive measures adopted and safety rules enforced, a great deal may be done to reduce their frequency. In concluding this series of two discussions on safeguarding the army of blasters, the first of which was published in the January number of this magazine, Mr. Charles S. Hurter, a du Pont technical representative, reveals some interesting means being taken in the Lake Superior iron mining district for the safety of outside blasters. Here, the numerous activities going on within range of blasts have caused several operators to lay down rigid rules regarding the practices used in loading and firing "shots," and for the conduct of those who are working nearby.

"One of the greatest dangers in outside blasting," writes Mr. Hurter, "is from projected débris. As a rule, this is not so great in major primary blasts unless they are overloaded, but with blockholing, mudcapping, hole springing and smaller blasts, care must always be taken to guard against damage from fragments thrown by the blast. The first precaution is to see that all approaches to the blast are properly guarded to keep people from coming too close. The second is to prevent fragments from being thrown, if possible. This can generally be done by placing rope or wire mats, piles of logs or railroad ties or brush over the hole before firing. The illustrations on the opposite page show a chain mat which it is the practice in the Oliver Iron Mining Company to place directly over a bore hole just before a springing shot is fired. To prevent spalls from being thrown from springing shots in snake holes, some operators use cylindrical blocks of hardwood bound around with two flat steel bands and provided with two handles. The block is placed directly in front of the snake hole and about two or three feet distant from it.



One of the sheet steel shelter houses used by the Oliver Iron Mining Company for protecting workmen

A Shelter on Wheels

"The Oliver Company also uses a very practical portable shelter house. This is cylindrical in shape with a rim set out from the top and another from the bottom to serve as wheels. When it is desired to move this shelter a short distance it is a very simple matter to tip it over on its side, roll it to the new position and set it up again. This shelter also has a ring in the top so that it can be picked up by a wrecking crane and placed on a flat car for longer moves. It is a rule that one of these shelter houses must be kept immediately back of each steam shovel, so that there is no reason for anyone taking shelter beneath a shovel when a blast is fired. Additional shelter houses are provided at

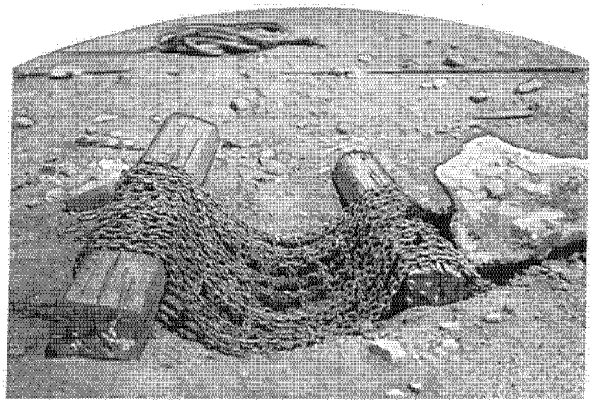


Ready to place a chain mat over the bore hole shown in the foreground. Such a device reduces danger from flying missiles

convenient places where blasting is being done, so that track crews and others may have a place of security at all times.

Secondary Blasting

"Secondary blasting requires a number of safety precautions. In the past, it was customary for a man to continue lighting pop shots as long as he thought it was safe to do so. Now, most companies have a rule limiting each man to lighting five fuses at one time. Very few allow less than two and one-half feet of fuse to be used and a great many place the shortest length of fuses to be used at three feet.



A close-up view of the mat in place

"Some people consider the tamping of pop shots unnecessary. From the economy standpoint this opinion has been proved wrong, and it is wrong from the standpoint of safety also. As the fuse burns, it twists around, and I have known of several premature shots caused by a burning fuse twisting in such a manner that the fire from it was directed against the explosive in untamped holes. To prevent such accidents all pop shots should be tamped or covered in such a manner that fire from the burning fuse cannot strike the explosive.

"Where it is necessary to spring holes it is of utmost importance to be sure that the chamber is properly cooled each time before a subsequent charge of explosives is loaded. Some blasters test the temperature of the hole by leaving the tamper in it for five or ten minutes and then feeling to see if it is hot when withdrawn. Others leave a sprung hole several hours before loading it. One large limestone company provides special thermometers for testing the temperature of sprung holes, and no explosives are introduced if it is possible to get a reading above 90 degrees Fahrenheit. Where conditions are favorable, water tamping can be used for the springing shots. This serves to keep down somewhat the temperature of the bore hole. Some operators even pour water into the hole after the springing shot to cool off the chamber. Others blow compressed air into the cavity. Paper, sawdust, or other inflammable materials should never be used for tamping springing shots, as they may leave sparks or embers in the chamber. Investigations of the operation of springing holes tend to show that the danger of loading explosives too soon after the springing shot is due to hot pieces of rock in the chamber and, in the case of cap and fuse firing, to embers from the fuse rather than to hot walls. On this account one source of danger may be removed by firing all springing shots by electricity."

INSIDE THE BOUNDING MAIN

(*Continued from page 15*)

any, due to the canal. From annual savings so computed over the entire period of government-ownership, we have deducted all actual operation costs, an assumed sinking fund of two per cent to amortize the total cost in fifty years, and interest on all appropriations at four per cent. The net saving in transportation costs, to be added to the national wealth, is thus about $1,000,000 per year, or $1.25 for each ton of freight passing through the canal.

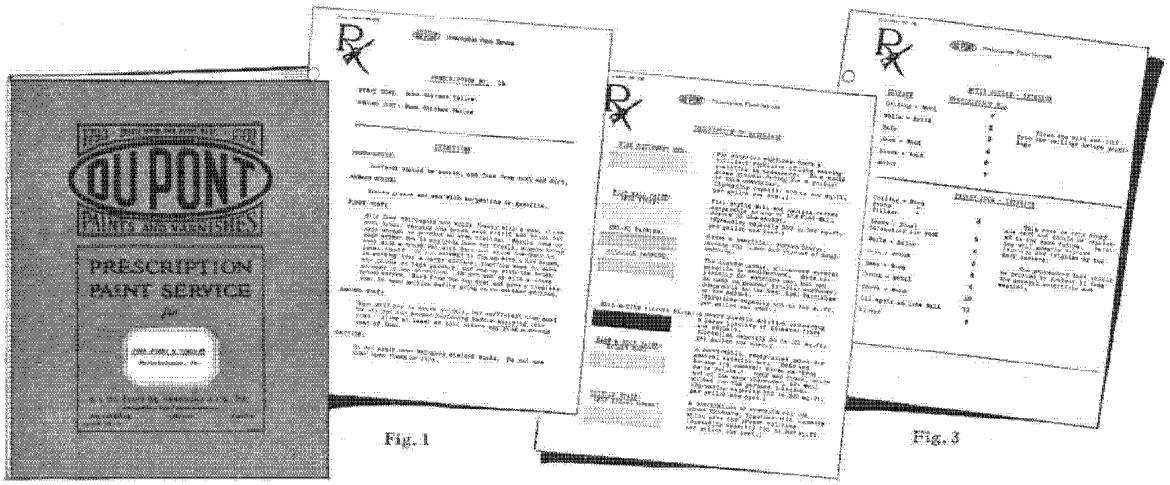


Fig. 4 Fig. 1 Fig. 2 Fig. 3

Some pages from a typical report by a Prescription Paint Service engineer, showing how carefully and thoroughly the buyer's paint needs are worked out. See text for details

SYSTEMATIC PAINTING PAYS

Especially is this true in plant maintenance work. Du Pont Prescription Paint Service, described here, points the way to an intelligent selection of the right type of paint for each surface

By R. C. Sheeler

THE yearly consumption of paint and varnish by industrial plants, institutions and office buildings reaches enormous proportions. It is estimated that a large amount of such products purchased by this group are either not used under proper conditions or do not constitute the best type of material to give most durable and lasting results. For this reason the maintenance field has been considered one requiring a great amount of service from the paint manufacturer. It is realized that in the long run, the manufacturer who is in the best position to give authentic information to his customer on all points of usage will reap the largest benefit from his service investment.

With this thought in mind the Prescription Paint Service Division was organized a number of months ago and has since been in a position to give a high type of service to many industries and institutions having maintenance problems to meet. A few words about the organization, how it operates and how it can be of value to you, may not be amiss.

Organization

In the short period of time since the creation of the division, the service rendered has covered practically all parts of the country. The office at Everett, Massachusetts, takes care of this work in the New England territory. The Philadelphia office is responsible for Prescription Paint Service from New York to Texas, east of the Mississippi. The remainder of the country is served through the Chicago office. No matter where a prospect is located, the du Pont organization is in a position to give prompt service of the very highest type.

Operation

Painting by prescription is essentially a departure from the usual method, and as such requires more service than the average paint and varnish salesman can give. Sales work is very important in this field, but supporting that is the work of our engineers. These men are thoroughly trained in all matters relating to paint usage and have spent a great deal of time familiarizing themselves with the variety of conditions to be met in industry which, naturally, affect the life of the paint or varnish coat. We have conducted in our laboratories a large number of practical experiments showing exactly what happens to all types of protective films when subjected to such conditions as high degrees of heat, moisture, acid, and gaseous fumes. With this as a background the engineers are in a position to go into a plant and thoroughly analyze the normal and abnormal conditions, prescribe the kind of material to use under each condition of the surface, methods of treatment prior to painting, proper application of material, and all other factors contributing to successful results.

In addition to this, the facilities of our Experimental Station are without a par for developing facts and figures regarding the service that may be expected from

practically all paint and varnish products under every conceivable condition and use.

The Engineer's Report

We have worked out in advance what we term "prescriptions" which will successfully meet practically every condition under which paint or varnish must be applied in maintenance work. The engineers are fully acquainted with these prescription forms and, in preparing their field notes, enter the proper data on the printed forms designed for that purpose. The engineer uses a separate data sheet for each room or building and makes careful note of every surface requiring paint protection. The nature of the surface, whether wood, steel or masonry, is shown, and then in an adjoining column he notes the prescription number which will meet its requirements.

Figure 1 shows a typical prescription. The proper material to use is indicated at the top and the prescription includes carefully planned directions for the application of each coat of paint.

The engineer's report, when finally submitted to the user, contains information regarding the purpose of the report, method of use to obtain the best results, general information on the preparation of the surfaces, the stirring of the material, how best to apply it and so on. One section is devoted to a list of the products to be used. Opposite a short description of each product, with its spreading capacity indicated, is the corresponding color chip. Figure 2 is a reproduction of one of these pages.

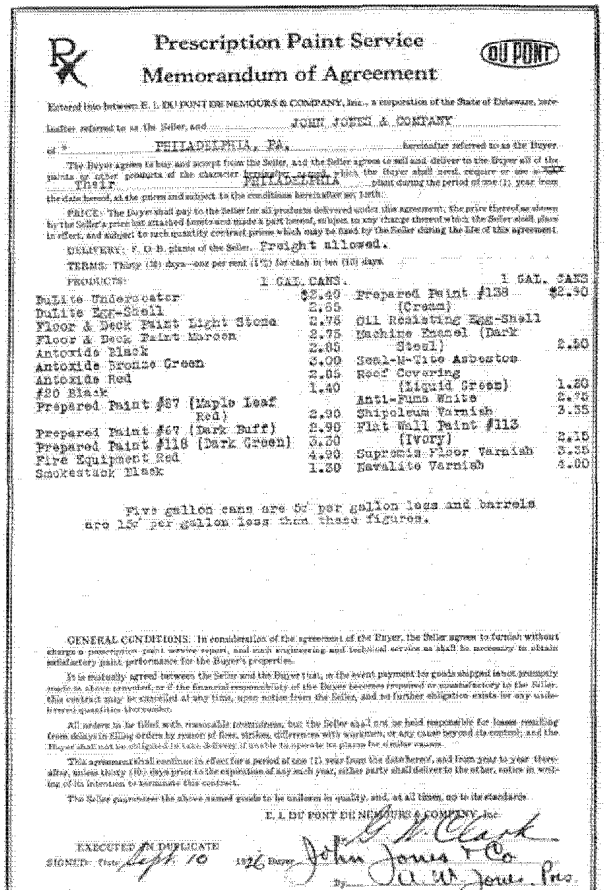
The individual surfaces of each section of a plant, room, or building call for separate handling. Each one is catalogued and shows the exact prescription to use. Figure 3 shows one of these pages, illustrating how completely the subject is covered.

Value to Users

Our experience during the short period of time in which this plan has been in operation has proved conclusively that handling the maintenance of industrial plants and institutions by this means takes up-keep painting out of the "rule-of-thumb" method entirely. It places it on a scientifically correct basis, and the completed report, Figure 4, forms a guide which may be followed from year to year for the maintenance of all interior and exterior surfaces.

An instance of the appeal which this method makes may be gathered from the following: The managers of one large corporation contracted for this service before they had ever used a drop of du Pont paint and varnish. They saw that any organization which could go into a matter of this kind to the extent that we did could also be depended upon to stand back of its goods, so they had no hesitancy whatever in signing up.

The officials of another large industrial plant admitted that the survey we submitted covering their needs was the finest thing they had ever seen, and the engineering department considered it of the highest importance and agreed to follow our prescriptions very carefully. A purchasing agent, buying for six plants, stated that this would take the painting work at these plants out of the hit-or-miss class, that it would assist definitely toward a correct standardization, and would keep him posted on conditions at each one of the plants. A large public utility corporation, having a number of plants, immediately saw the advantage of this service and adopted it, without reservation, covering all painting needs throughout its entire organization. The chief engineer agreed that our standardization plan was just what he was looking for.



Prescription Paint Service

Memorandum of Agreement

DU PONT

Entered into between: E. I. DU PONT DE NEMOURS & COMPANY, Inc., a corporation of the State of Delaware, hereinafter referred to as the Seller, and JOHN JONES & COMPANY

of PHILADELPHIA, PA., hereinafter referred to as the Buyer.

The Buyer agrees to buy and accept from the Seller, and the Seller agrees to sell and deliver to the Buyer all of the paints or other products of the character hereinafter specified which the Buyer shall need, require or use at PHILADELPHIA plant during the period of one (1) year from the date hereof, at the prices and subject to the conditions hereinafter set forth:

PRICE: The Buyer shall pay to the Seller for all products delivered under this agreement, the price thereof as shown by the Seller's price list attached hereto and made a part hereof, subject, to any change thereof which the Seller shall place in effect, and subject to such quantity contract prices which may be fixed by the Seller during the life of this agreement.

DELIVERY: F. O. B. plants of the Seller. Freight allowed.

TERMS: Thirty (30) days—one per cent (1%) for cash in ten (10) days.

PRODUCTS:	1 GAL. CANS.		1 GAL. CANS
DuLite Undercoater	$2.40	Prepared Paint #138 (Cream)	$2.90
DuLite Egg-Shell	2.55	Oil Resisting Egg-Shell	
Floor & Deck Paint Light Stone	2.75	Machine Enamel (Dark Steel)	2.30
Floor & Deck Paint Maroon	2.75	Seal-N-Tite Asbestos	
Antoxide Black	2.85	Roof Covering (Liquid Green)	1.20
Antoxide Bronze Green	3.00	Anti-Fume White	2.75
Antoxide Red	2.85	Shipoleum Varnish	2.35
#20 Black	1.40	Flat Wall Paint #113 (Ivory)	2.15
Prepared Paint #87 (Maple Leaf Red)	2.90	Supremis Floor Varnish	3.35
Prepared Paint #87 (Dark Buff)	2.90	Navalite Varnish	4.00
Prepared Paint #118 (Dark Green)	3.20		
Fire Equipment Red	4.90		
Smokestack Black	1.20		

Five gallon cans are 6¢ per gallon less and barrels are 15¢ per gallon less than these figures.

GENERAL CONDITIONS: In consideration of the agreement of the Buyer, the Seller agrees to furnish without charge a prescription paint service report, and such engineering and technical service as shall be necessary to obtain satisfactory paint performance for the Buyer's properties.

It is mutually agreed between the Seller and the Buyer that, in the event payment for goods shipped is not promptly made as above provided, or if the financial responsibility of the Buyer becomes impaired or unsatisfactory to the Seller, this contract may be cancelled at any time, upon notice from the Seller, and no further obligation exists for any undelivered quantities thereunder.

All orders to be filled with reasonable promptness, but the Seller shall not be held responsible for losses resulting from delays in filling orders by reason of fires, strikes, differences with workmen, or any cause beyond its control; and the Buyer shall not be obligated to take delivery if unable to operate its plants for similar reasons.

This agreement shall continue in effect for a period of one (1) year from the date hereof, and from year to year thereafter, unless thirty (30) days prior to the expiration of any such year, either party shall deliver to the other, notice in writing of its intention to terminate this contract.

The Seller guarantees the above named goods to be uniform in quality, and, at all times, up to its standards.

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

EXECUTED IN DUPLICATE

SIGNED: Date Sept. 10 1926 Buyer John Jones & Co.

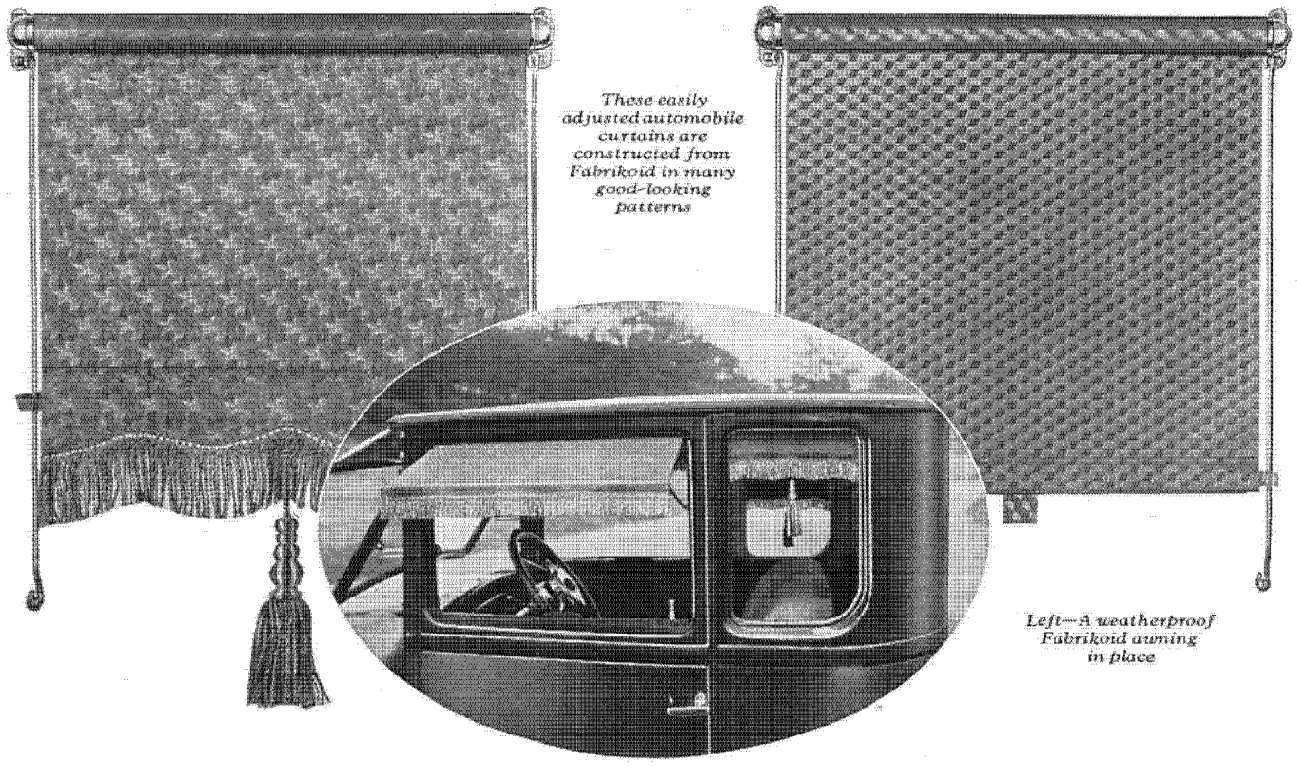
By Jas. W. Jones, Pres.

Fig. 5—After the paint survey is completed comes this straightforward agreement to the buyer, setting forth all the necessary materials and their prices

Price Schedule

Figure 5 shows the form of a memorandum of agreement which is filled out with the schedule of prices applying to all products covered in the survey. This agreement simply places the transaction on a business-like basis.

The Prescription Paint Service Division was created to give a broader service to customers having maintenance problems to solve. It is distinct and different from that offered by any other house. If you are connected with a mill, factory, institution, or any concern having valuable property to maintain, and are interested in learning further details of our method of operation, may we suggest that you write this division either at Philadelphia, Chicago, or Everett, and this service will be explained fully.



These easily adjusted automobile curtains are constructed from Fabrikoid in many good-looking patterns

Left—A weatherproof Fabrikoid awning in place

KEEPING "IN THE COOL"

An advance tip for the motorist who fidgets under the glare of a hot sun. These shades and awnings are easily adjusted and are very serviceable

By R. A. APPLEGATE

AUTOMOBILE manufacturers are concerned today not so much with power units, which have almost reached perfection, but rather with interior finishes and appointments, the importance of which may be laid to the dominant popularity of the closed car. Foot rests, robe rails, ash receivers, heaters and curtains—such details are receiving constant attention.

Among the latest fittings for closed cars to be perfected are the sun-proof awnings which have been added to the line of curtains made by the Hall Curtain Corporation of Dallas, Texas.

Because of its weatherproof and washable qualities and the attractive designs and colors offered, Fabrikoid was chosen as the ideal material for these awnings. The particular type for this purpose is coated on both sides with pyroxylin which protects the surface and enables it to withstand the action of the sun, driving rain or sudden changes in temperature. For the same reason dust cannot work into the awnings. When soiled to any slight degree they can be cleaned with soap and water.

Aside from the added driving comfort they afford, the awnings lend a smart touch to your car. They may be purchased to match any shade equipment or upholstery and will be delivered with or without silk fringe tassels.

A few moments' work is all that is necessary to install them on a standard make of car. One end of the brace rod is first placed in the upper left-hand corner beneath the felts in the glass slot. This operation is repeated with the other brace rod, after which both are pushed to the top of the door. The lower arms or braces are then inserted between the door frame and felt and the awning is ready for service. Its presence does not interfere with the raising or lowering of the window glass to the full length of the frames.

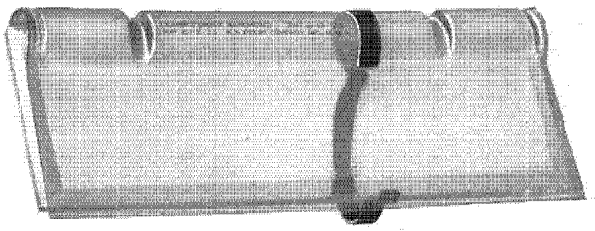
Sales of these smart new appointments are made exclusively through automotive jobbers in the United States and through special distributor representatives in foreign countries. Readers who desire to know the name of the nearest distributor or who want further information about these sun-proof awnings and curtains should address their inquiries direct to the Hall Curtain Corporation, 103 South Houston Street, Dallas, Texas.

A NEW BID FOR SAFETY

A practical device steps forth to aid the motorist who drives at night

ONE of the things which contributes to the strain of driving at night, as nearly every motorist knows, is the glare in the rear-view mirror from the headlamps of a car behind. When strong lights are reflected at just the right angle through the mirror, the effect is blinding and greatly disturbs the view of the road ahead.

To reduce this annoyance, there has recently been placed on the market a device known as the Kilglare. This is actually a piece of green Pyralin sheeting molded in such a form that it may be clamped directly over the rear-view mirror and raised or lowered at will. During the daytime, the Kilglare is raised to permit full vision through the mirror. For night driving in traffic, where lights behind cause dazzling reflections, this device may be quickly snapped back into place. While eliminating the glare, it still allows sufficient vision for the driver to see the roadway behind him. Furthermore, the Kilglare obviates the necessity of pulling down the rear curtain in a closed car, a remedy that accomplishes its purpose but involves an element of danger in that it completely shuts off the driver's vision toward the rear. Many states have already declared this practice to be unlawful.



How the Kilglare is clamped to the mirror. In daytime, it may be raised to allow the usual reflection

When once fitted to the mirror, the device will perform its duties indefinitely. It is unbreakable and unaffected by heat or cold. The Kilglare is manufactured by the N. A. Petry Company, 328 North Randolph Street, Philadelphia, Pennsylvania. Interested readers may procure a folder containing more detailed information by writing to the above address.

FOR THAT SMART TOUCH

Colorful rayon scarfs like those illustrated here are popular with both men and women

SCARFS are in vogue. Notice the people you meet on the street that a great majority of them—men and women alike—are wearing scarfs of all designs and hues.

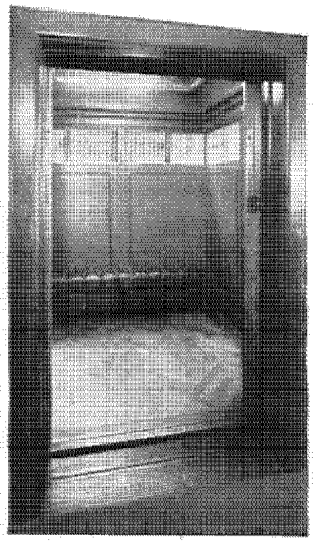
Among the most popular scarfs are those made from a superior grade of rayon known as "Super-Extra." This yarn, because of its dull luster and added softness, has enabled manufacturers to produce especially attractive and serviceable scarfs. A special point of advantage is that they are reversible and so can be worn twice as long as ordinary scarfs without being soiled.



The two scarfs shown here were made by the Trabulsi Knit Fabric Co., which has a well-established reputation for making merchandise of exceptionally high quality. Du Pont Super-Extra yarn was selected by this concern because of the added advantages it would give to the finished products of the house. The company emphasizes the fact that its scarfs are quality products by attaching to each one a tag bearing this legend: "Tu Way Reversible Scarf—Made of Du Pont Super-Extra Rayon."

A folder describing these scarfs, together with the names of local dealers from whom they may be purchased, will be sent to interested readers upon request. Inquiries should be addressed to the Trabulsi Knit Fabric Co., 92 Bleecker Street, New York City.





A Duco-finished American elevator carries shoppers in the famous Buenos Aires department store of Gath and Chaves

AROUND THE WORLD WITH DUCO

(Continued from page 7)

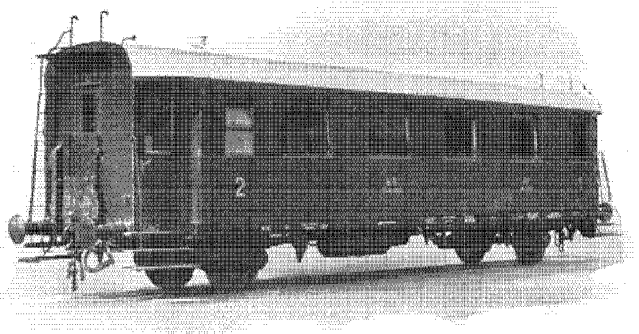
in Denmark, filing cabinets; in Norway, furniture; in Austria, adding machines and typewriters; in Switzerland, electrical equipment, toilet seats and various other articles.

A quick trip into Germany discloses an interesting fact. In some places, third and fourth generations of craftsmen are at work making clocks, just as their fathers, their grandfathers and their great-grandfathers made them. Change is taboo. They see no reason why they should alter the interior construction or exterior design. Yet they have discarded the old type of finishes. Every clock is finished with Duco. Obviously they must have found a reason for this that was persuasive. Progressive, industrial Germany, as you might expect, has found a variety of ways in which to use Duco to advantage. For instance, it is applied to dental chairs, hospital furniture, radio cabinets, sewing machines, metal furniture, filing cabinets, safes and, of course, to automobiles.

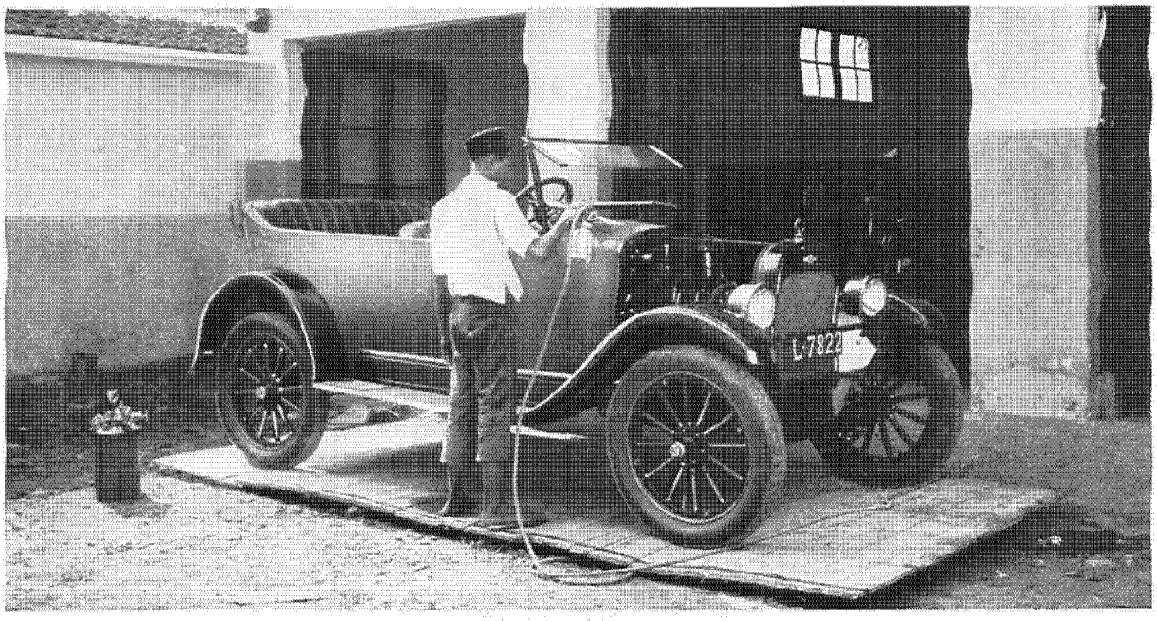
Spain, too, has taken kindly to Duco. Spain's greatest railroad has standardized on Duco as a finish. In the royal garage at Madrid are a number of Duco-finished cars for use by the King and the royal household. Automobile body builders and refinishing shops in far-off Australia have adopted Duco with much enthusiasm.

Even on the southern tip of the African continent where English enterprise has pushed back the African veldt to make room for colonization, we find Duco the standard finish for the East London Tramway Company; in fact, there is a color already known as East London green.

A foreign telegraph key starts to click. It says—"*Ducofinish, Parlin, N. J.*"—the cable address of the Chemical Products Division. In a hundred different places, thousands of miles away, one word stands out in a message that is otherwise entirely coded. The operator looks intently at the four letters—D-u-c-o. Presently he decides that it must be something new—and it is. It is a new idea that has been well received in many countries and has developed enthusiastic praise in almost every language.



Many American tourists traveling in Austria last summer may have recognized the Duco finish on this standard railway coach



On the other side of the world: A native of the Dutch East Indies refinishing a car with Duco

DU PONT

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

General Executive Offices

WILMINGTON DELAWARE

All Inquiries Regarding du Pont Products Should Be Addressed to the Company—the Nearest Office

ACIDS AND HEAVY CHEMICALS

Acids, alums and miscellaneous heavy chemical products.

Philadelphia, Pa.
35th & Gray's Ferry Rd.
Newark, N. J., 250 Vanderpool St.

AMMONIA

Anhydrous and Aqua Ammonia.

Lazote, Incorporated
Du Pont Bldg., Wilmington

CELLOPHANE

Du Pont Cellophane Company, Inc.
New York, N. Y., 40 W. 40th St.
Chicago, Ill., Railway Exchange Bldg.
Michigan Ave. and Jackson Blvd.
San Francisco, Calif.
Balfour Bldg., 351 California St.

CHEMICAL PRODUCTS

Bronze powders, collodion, household cement, leather belting cements, Duco, pyroxylin lacquers and enamels, split and patent leather solutions and other pyroxylin preparations and solvents.

Boston, Mass., Everett Station 49
Chicago, Ill., 2100 Elston Ave.
Detroit, Mich., General Motors Bldg.
Flint, Mich.
Parlin, N. J.
San Francisco, Calif., 569 Mission St.

DYESTUFFS

Dyestuffs and dyestuff intermediates. Rubber chemicals and seed disinfectants.

Boston, Mass., 274 Franklin St.
Charlotte, N. C., 232 W. First St.
Chicago, Ill., 1114 Union Trust Bldg.
New York, N. Y., 8 Thomas St.
Philadelphia, Pa., 126 S. Front St.
Providence, R. I.
709 Hospital Trust Bldg.
San Francisco, Calif., 569 Mission St.
Bombay, India, Jacob Sassoon Bldg.
Rampart Row, P. O. Box No. 1010
Kobe, Japan
No. 88 Nakamachi-Dori
P. O. Box No. 384
Hankow, China
No. 23 Tung Ting Road
Shanghai, China
Robert Dollar Bldg.
3 Canton Rd., P. O. Box No. 393
Tientsin, China, 52 Taku Road

MOTION PICTURE FILM

Positive and Negative.

Du Pont-Pathé Film Manufacturing Corp.
New York City, 35 West 45th St.

EXPLOSIVES

Explosives for all industrial, agricultural, military and sporting uses.

Birmingham, Ala.
601 Brown-Marx Bldg.
Boston, Mass., Harvey Building,
Chauncey & Bedford Sts.
Buffalo, N. Y., Prudential Bldg.
Chicago, Ill., 1814 McCormick Bldg.
Denver, Colo., 406 Ideal Bldg.
Duluth, Minn., Hartley Bldg.
742 E. Superior St.
Huntington, W. Va.
Suite 1004 Union Bank Bldg.
Joplin, Mo., 816 Joplin Nat'l Bank Bldg.
Juneau, Alaska, P. O. Box No. 231
Kansas City, Mo., 225 Scarritt Bldg.
Miami, Florida, 305 Clark Bldg.
343 S. W. North River Drive
New York, N. Y., 120 Broadway
Pittsburgh, Pa., Fulton Bldg.
Portland, Ore.
Northwestern National Bank Bldg.
St. Louis, Mo.
17th Floor, Arcade Bldg.
San Francisco, Calif.
Suite 403 Balfour Bldg.
351 California St.
Seattle, Wash.
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