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NO. 6

DU PONT MAGAZINE

DECEMBER
1919

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and
A Happy New Year*

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WILMINGTON,

DELAWARE

DU PONT

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Highways to Lower the High Cost of Living

John S. Beall

TO say that unimproved roads increase the cost of living is to assign a single cause for a complex condition. Economists are raising their voices against waste and mismanagement, both of which undoubtedly add to the fast-mounting cost of everything we eat and wear. Today, we hear that blame should be placed upon the middleman; yesterday, the effect of the World War was proclaimed the reason for high prices; tomorrow, we shall hear that the high cost of everything is due to some other single cause. But in my opinion, the present high cost of living is due to a combination of causes, no one of which is altogether responsible.

When we consider that following every great war, with its necessarily vast destruction of property and slowing up of production, prices rise and the cost of living consequently increases beyond the income of the average person, we must look behind the alleged causes which are today said to be making prices high, and get down to the fundamental causes which made the cost of living higher than it should have been before the great world conflict. In other words, we must find out what made living as high as it was before 1914.

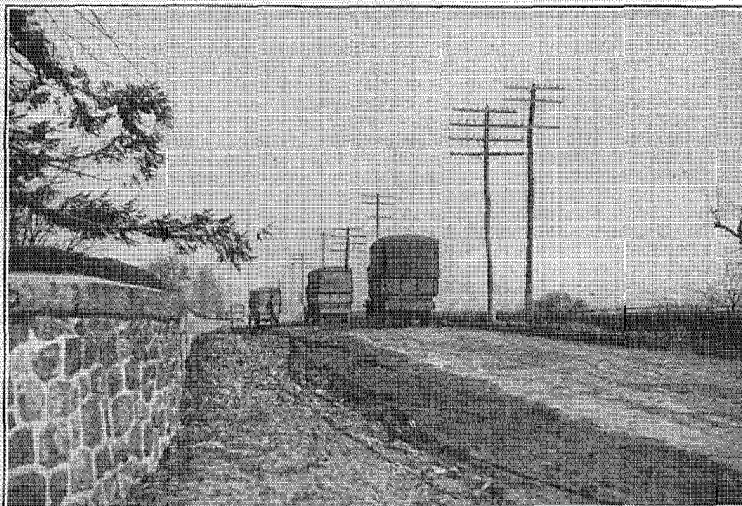
The past fifty years have seen the growth of huge cities in many parts of the country, and a consequent concentration of population in these cities. Where eggs were six cents a dozen fifty years ago, they now cost sixty-six cents. Where they were eaten fresh from the barn yard fifty years ago, they are today transported to cities, placed in cold

storage, and later—months later—sold to the consumer, often at a price considerably higher than he can afford to pay for them. The farmer who once "drove to town" with his load of eggs, has now been pushed, by the growth of cities, many miles from the city markets; and he depends upon the railroads to carry his products to a place where he can receive a price high enough to allow him to carry on his farming business and supply himself and his family with the necessities of life—necessities that he cannot himself produce.

Just as the railroad seemed to make the farmer independent of the highway, so the motor truck is helping to make the producer of food stuffs independent of the railroad. The railroad, however, is an organization owning the rolling stock and tracks over which the cars are operated, while the motor-truck owner is often an independent farmer, operating over a

road controlled by the money of every road-bond buyer and taxpayer in his community and the communities through which he must pass if he transports his products by motor-truck to market.

It has been said that the cost of food has *not* been greatly lowered in eastern cities where farmers, operating either as individuals or as groups, transport their products by truck from farm to market. This is true where the farmer sells to the wholesaler, and the wholesaler sells to the retailer, who in turn sells to the customer, the ultimate consumer. By this method, only the high freight and



Good Roads Make Transportation by Motor Trucks Practicable, and Help to Reduce Living Costs

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express rates of the railroad are eliminated, and these are replaced by the cost of motor transportation.

But where municipal retail markets have been established, the cost of food products has been materially lowered. The farmer drives in with his produce and sells direct to the consumer. Many cities are developing these municipal markets, where those who cannot afford to pay the high prices charged by the retailer—prices made necessary by the number of hands through which the products pass—can purchase on the cash-and-carry plan.

Until production gets back to normal, and supply and demand are to some extent regulated by the completion of the reconstruction period through which we are now passing, we cannot hope for greatly lowered prices. But we can turn our minds today toward the construction and maintenance of good roads which play a big part in all national development and lasting prosperity. The federal government and the state officials have realized this. We see evidences of their activity in the great, road-building plans now in operation or under consideration; in the vast amount of money set aside for road construction purposes, and in the active promotion of legislation to bring about a nation-wide system of improved highways.

Conspicuous among the highway legislation before Congress, is a bill now pending in the United States Senate, which was introduced by Senator Townsend, Chairman of the Committee on Post Offices and Post Roads.

It is proposed by this measure to create a vast system of highways under federal control and maintenance. This system will embrace not less than two per cent, or more

than five per cent, of the mileage in actual use in each state of the Union.

What will such a system, when completed, mean to the people of the United States? For one thing—and it is a fundamental that has long been neglected, and never properly considered—it will bring our food-producing areas nearer to our manufacturing centers. Vast numbers of people engaged in manufacturing will, with proper legislation designed to bring about the condition, pay less for the food they eat, and for everything that is produced to supply their needs.

The man who lives near the highway, and produces food products for urban markets, will benefit by highway improvement, because the cost of transporting the products he raises to the local market will be less. If he transports his products direct to the consumer in the city via the municipal market, or direct to the home, he will have the benefit of the profit now paid to the railroad company, the middleman, the cold storage plant and the retailer. In this way the farmer can get much more for his products than he receives at the present time, and still sell them to the public at even lower prices than he did before the war.

From this brief survey it is clear that the improvement of roads should be the concern of every person, whether he be laborer, farmer, merchant, banker, doctor, lawyer or otherwise, living either in the city or in the country. The improvement of highways is a definite, fundamental step toward decreasing the high cost of living. Let us put our shoulders to the wheel and roll the mud holes into better roads.

The "Sugi" Finish

SUGGESTIVE of far away Japan, cherry blossoms and wistaria, the "Sugi" finish possesses a peculiar charm. This type of finish is seldom used for general interior work, but meets the demand for something different for the den, smoking room, grill room or tea-house. It is also particularly adapted for use on small novelties, such as humidors, jewel cases, collar boxes and similar wooden articles, which may be made by the handy man or boy. Such articles make excellent birthday or holiday gifts.

The name "Sugi" is derived from the Japanese Sugi, or cedar tree, but the finish comes about from the Japanese custom of making furniture and novelties from driftwood.

The modern "Sugi" finish, however, is more attractive than the Japanese driftwood, in that color has been added to produce several attractive effects. While this finish may be produced on several of the American woods, yet of all these, cypress is by far the best medium. It seems to possess somewhat the same qualities as the Japanese driftwood.

In selecting the wood for the work you have in mind, be sure to secure cypress with an intricate grain, for the more intricate the grain, the more attractive is the final finish.

The first process is to char the wood uniformly over the entire surface, using a blow torch for the purpose. The wood should be charred thoroughly, until the surface is almost black. When this has been done, remove the charred wood, using a wire brush, and you will notice that the sappy grain of the wood has been burned but little, while the soft parts have been burned deeply, giving the wood a very rough hill-and-valley appearance.

Now apply with a stiff brush a coat of Wheeler's Special White Paste Wood Filler and allow it to stand for four or five minutes. Then wipe off the surplus filler from the high spots or ridges, leaving the deeper indentations untouched. Let the work dry for forty-eight hours and complete the finish with two coats of Bridgeport Standard Wonderlac.

If it is desired to produce a different color than that produced with the white filler, this may be done by tinting the filler to any desired shade by the use of color in oil.

You will be agreeably surprised at the quaint, yet attractive effect produced, as the intricate graining of the wood will be developed to the highest possible degree, and will be accentuated by the use of the colored filler in the deeply charred portions.

A Visit to Toyland

J. Coleman Bentley

DID you ever wish you were someone else? Particularly at this time of the year, whenever I hear some one express such a wish, I always think what a pleasure it would be to change places with that old master toymaker, Santa Claus. All of us have experi-



The First Step in Doll-making. Cutting and Forming the Wooden Parts

enced some of the happiness that comes to him each Christmas eve as he makes his rounds distributing gifts, but I wonder how many of our readers have had the opportunity to wander through the workrooms of Santa Claus' shop to see how all the wonderful toys are made. I recall my boyhood days and the keen desire I had to visit the land of Santa Claus, but every time I mentioned the subject to my parents, they gave some evasive answer that left the desire unsatisfied.

Recently, the ambition of my childhood was realized. I visited Santa's shop right in the heart of Philadelphia, where is located the largest exclusive toy shop in the world, the five-acre plant of A. Schoenhut & Company. Not only is this factory the largest of its kind, but its products have set new standards for the world, both in originality and quality of toys made for American children.

As I passed from one department to another, pausing to watch the men and women at work on the toys, I sensed the atmosphere of the place, the joyous spirit of the Yuletide. For although the physical output of the factory is toys, the definite plan and purpose in the making of each toy is to make little boys and girls happy. Careful thought is put into the design and manufacture of all the toys; they are real toys for real American children to play with, toys built for real boy-and-girl service.

For more than 150 years the Schoenhut name has been linked with the toy-making industry. Albert Schoenhut, who established the business in this country in 1872, is

one of the third generation of this family, every member of which has been a toymaker. In the eighteenth century the Schoenhut family made two or three kinds of toys in one of the rooms of their cottage home. In this twentieth century, hundreds of different toys are made every day in a modern concrete factory building, where five acres of floor space are divided into large, light airy rooms to house the greatly enlarged Schoenhut establishment. Machinery was unheard of in the older days, but today automatic machinery has supplanted the hand tools of the earlier toymakers. The daily output has been multiplied, and better toys are made for less money.

The first product made in this American factory was the toy piano. At that time a few toy pianos were being made abroad, but they were hardly to be classed as instruments. Tones were produced by the mechanical striking of wooden parts against glass plates, which were held in position by strings glued to them. Music? By no stretch of imagination could one associate the sounds produced with music. Beating on a cracked dinner plate with a hammer handle would give better musical tones than these foreign-made pianos could sound.

Mr. Schoenhut manufactured a piano equipped with steel plates, each one so accurately tuned to pitch that the tones of the scale are perfectly reproduced. The American child's ear for music is developed by this instrument, instead of being dulled by the discordant sounds of the foreign-made piano. And as the steel plates are unbreakable, the instrument never gets out of tune. The



Assembling the Parts and Inserting the Joints

keys on all keyboards of both large and small pianos are of standard width, so that the little girl or boy may learn unconsciously to spread the fingers the distance required to play on a real piano later on in life.

This toymaker started a new era in toy-making—the

era of realistic, true-to-life toys. Before that time, toys were fanciful creations of the mind of the toymaker; they were designed principally to amuse. Child psychology, and the part that toys can be made to play in education, was so slight a factor as to be practically negligible. Deep down in the heart of every little child is the passion for real toys. The American toymaker has been quick to realize this,



The Dressmaking Department of the Doll Factory

and has built toys such as the piano, just described, an instrument that really can be made to play music.

I noticed, too, in one part of the factory, toymakers assembling many odd-shaped pieces of wood, metal and other materials into such toys as metallophones, xylophones and comic vocophones.

As we passed through the various rooms of the plant the master toymaker, my guide, pointed out the modern machine tools that Santa Claus uses in his establishment. There were circular and band saws, forming machines and lathes on which operators were forming many peculiar shapes in wood; there were various drills, lathes, punch-presses and other automatic machines for making queer shapes in metals, and batteries of sewing machines for making doll dresses and clothing of various kinds. There seemed to be more specially-made machinery than machines of standard stock types. In one room I saw a complete machine shop where the special forms, dies and machines were made.

Deep down in the heart of every normal boy is the desire to shoot. Long before his parents feel safe in furnishing him with a real gun, this desire is frequently and emphatically voiced. The acceptable compromise is the toy shooting gallery, which consists of various mounted targets and a gun made to shoot rubber balls and corks. As we were passing into one department, we saw a full truckload of these guns which will furnish sport for hundreds of sons—and fathers, too—on Christmas day.

The pursuits of the sailor are scarcely less attractive to the growing child than those of the hunter. Toy sailboats have always been popular. The imported toy boats of a few years ago were attractive enough in their gaudy colors, but they were no more at home in water than on

land. Capsizing was their forte; they could not be made to sail, and they would not stay painted. The same criticism does not apply to toy ships made at this American plant. Every boat is constructed by special machinery to conform with the best patterns of ship design. Here is a boat scientifically built to sail, and it does not capsize. Moreover, the boat is fitted so that the child can raise, lower and reef the sails just as the real sailor does. Finally, it is finished attractively in oil colors or enamels that are both permanent and waterproof. These boats are built in different sizes. Hundreds of them were finished and painted, and hundreds more were in various stages of completion.

Although the circus was a Roman institution, and traveling bands of clowns and troupes with trained animals flourished during the middle ages, centuries passed before any one thought of constructing a toy circus. The Schoenhut Company recognized the field for toys of this sort, and developed the Humpty-Dumpty Circus toys, which are now almost universally known by the children of this generation. These circus toys with their quaint figures have gained wide popularity, not only because they are ingeniously contrived and substantially built, but also on account of their versatility in the play uses of imaginative children. A large force of workers were building these toys.

In passing through the factory one gains the impression that in this place are made and stored toys enough for all the babies of the world. There seem to be almost an endless variety and number of toys for creeping babies. And they are all finished in enamel so that the colors will not come off, should a baby put one of them in its mouth. One type of these toys particularly attracted my attention,



Here the Lifelike Painted Hair is Applied. Enamelled Hair is Washable and Very Sanitary

the so-called "Rolly-Dolly" toy. You may not identify it by the name, but probably every reader will recognize the type that refuses to lie down on the floor; that always regains its upstanding posture on account of a weight placed within the toy at the bottom. This toy receives considerable attention by the master toymakers.

Now we come to a department of particular interest to

little girls who love dolls. For dolls are cherished equally by the little Miss no matter whether she lives in a tiny tenement or in a big brown-stone mansion. The Schoenhut All-Wood Perfection Art Doll, made here, would gladden the heart of either one of these children. All the doll faces are beautiful models of children's faces. A famous sculptor designed the heads, and they are faithfully reproduced by thousands on special machines. You will observe from the accompanying illustrations that the heads are made of wood, and all the other parts, trunks, arms and legs are similarly formed from wooden blocks, through which holes are bored to accommodate the steel springs and swivel joints. To anyone who has had the opportunity to see how all these parts are made, and to observe how they are assembled, the word "unbreakable" as it is applied to dolls, takes on a new meaning.

Let us proceed to the dressmaking department. Here all the dainty doll clothes are made and fitted, but you will observe that Her Dollship, unlike a lady in real life, has no opportunity to survey her dressmaker's work before a mirror. For the doll is not provided with its head until after the dressmakers have completed their work. Indeed, during this operation the doll's head is in another department in the hands of the hair dressers and make-up artists; but more of that later. The dressmakers do not make mere doll clothes, but facsimiles of real children's dresses, as up-to-date as those worn by real little boys and girls. In style, material and workmanship the clothes made in this department would be a credit to any child's modiste.

Doll purchasers are keen critics of doll heads and doll faces. Not only must a doll please by perfection of its



Manufacturing the Dolls' Wigs From Mohair

features, but the complexion, the hair, and particularly the eyes and their expression must be lifelike. No shortcoming here can be outweighed by other perfections, mechanical or otherwise. The Schoenhut Company lays particular stress on making their doll heads perfect in every way. Artists are employed to paint the doll heads faithfully to represent the exquisite complexions of happy, healthy children. The Technical Department of the

Du Pont Company co-operated with the master toy-maker in developing the paints and enamels for this purpose. All the colors used are permanent. Water has no injurious effect upon the fine colorations that make up the pretty doll complexion. And just as this specially developed paint serves to reproduce the rosy cheeks of childhood, it is also effectively used to imitate closely the



The Final Assembling and Dressing Up of the Lifelike Dolls

natural colors of a child's hair. Dolls for very young children are made with the hair painted on, while those for older girls are made with wigs. Real mohair, and only mohair, is used in making these wigs, and they are in every respect as carefully made as any other part of these Perfection Dolls.

After the doll heads have received all the finishing touches, operators finally put the heads on the fully dressed doll bodies, and before you stand beautiful models of childhood that no little Miss can help but love. Here are real little playmates—friends for life; for these All-Wood Art Dolls grow old gracefully; never lose an arm or leg, nor does that fatal catastrophe—a broken head—ever occur. And they can be posed to run or jump, to stand up or sit down—everything except to laugh and cry, or to speak and sing. As I saw these beautiful dolls carried away to the packing room, where eventually they would find their way into the homes of little girls in all parts of the country, I thought of the joyous reception each doll must receive and the happy times to follow in each household.

I have referred several times to the use of oil colors and enamels, and in one instance to our co-operation in developing a special finish for these American-made toys. It may be pertinent to add that the Paint and Varnish Division of the Du Pont Company makes a complete line of primers, pastes, colored varnishes and many special finishes, sold under the Harco label, for manufacturers of toys, novelties and kindred products. We are glad to have included in our list of users the Schoenhut Company, makers of good toys, and more than that, makers of happiness for thousands of tots who are probably asking their daddies now to take them on a trip to Toyland.

Lead—Silver—Zinc Mining

In the Coeur d'Alene District, Idaho

E. F. King, Sales Department, E. I. du Pont de Nemours & Co., Inc.

THE characteristic geological formation of the Coeur d'Alene district is sedimentary rock, known as quartzite and slate, originally deposited in beds or layers during the pre-Cambrian period and afterward compressed and folded into its present form. This rock is extensively exposed throughout the district, runs to a depth of over five miles in many places, and contains rich deposits

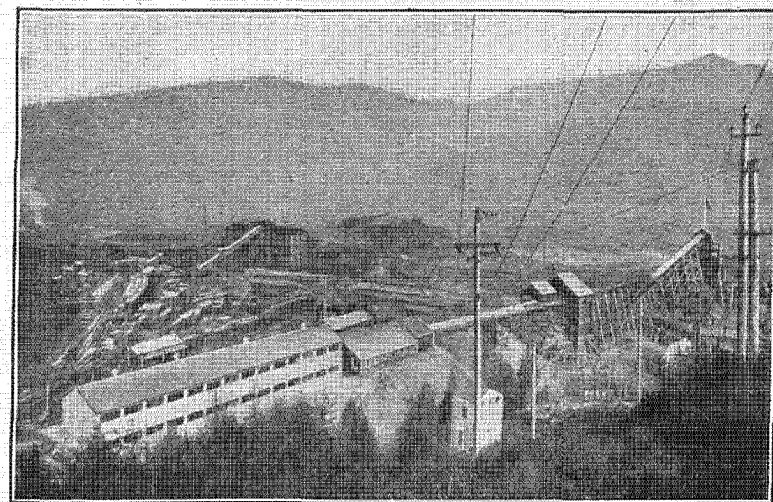
one on top of the other. The original layers have been shifted, tilted and folded by volcanic activity which also forced up, under high pressure, gases and heated liquids, rich in metals, through the cracks and fissures of the rock. Thus have been formed the rich veins of ore being mined today.

The first five strata named are the mineral-bearing rocks. They contain the richest values of lead-silver ore; also the largest ore bodies occurring in the Burke and Revett formations, and the largest bodies of zinc ore in the Prichard slate.

The principal ores found in this district are galena or lead sulphide, which is by far the greatest source of lead and silver; lead carbonate, which occurs in the upper strata near the surface workings; and zinc sulphide, occurring in the lower strata. Some very high silver values are found associated with gray copper ore, and in some parts of the district low grade copper ores of commercial value are encountered.

The ores occur in fissure veins that usually lie in a more or less vertical position. The average dip varies from 70 degrees to vertical, but in one part of the district the veins run at an angle of about 42 or 43 degrees. The width of the ore varies from about 12 inches to 50 or 60 feet, with a probable average of approximately 15 feet. In exceptional instances ore bodies of 120 feet in width have been exposed.

After a mineral lode is discovered and proved by surface workings, the next step is to get as much depth as possible



Bunker Hill & Sullivan Mining and Concentrating Company's Mill, at Kellogg, Idaho

of lead, silver and zinc. The successive strata, beginning with the oldest in point of time and the deepest below the surface, are as follows:

1st—Prichard slate, a stratum of an undetermined thickness composed of an accumulation of sediment in the form of bluish-gray slate.

2nd—The Burke formation, a stratum about 2000 feet in thickness, composed of siliceous rocks of fine grain ranging from nearly pure white quartzite to dark gray slate.

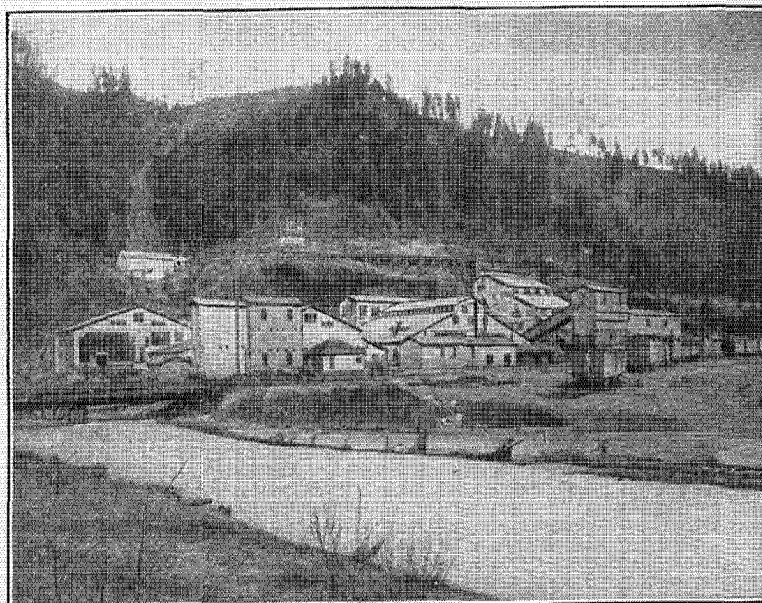
3rd—The Revett formation, a stratum about 1200 feet thick, composed mainly of white, hard-bedded quartzite.

4th—The St. Regis formation, a stratum about 1100 feet in thickness, composed of shale and sandstone resembling the Burke formation, but dark green or purple in contrast to the light-colored Burke rock.

5th—The Wallace formation, a stratum about 4000 feet thick, consisting chiefly of thin-bedded shales and sandstones.

6th—The Striped Peak formation, the uppermost stratum, about 1000 feet in thickness, composed of shaly, siliceous sandstones.

Although these various strata generally occur in the order mentioned, they do not lie horizontally

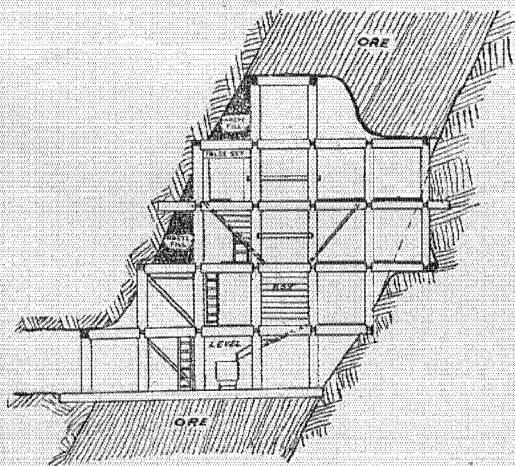


One of the Large Concentrating Mills at Wallace, Idaho, Operated by Hercules Mining Company

beneath the surface discovery. This is done either by sinking a shaft or, preferably, by driving a tunnel from a lower elevation to cross-cut the vein at the greatest practicable depth. Then, if ores of commercial value are encountered, they are extracted by stoping upward, following the veins. The obvious reason for getting beneath the ore bodies is to take advantage of gravity in breaking and loading the ores.

The average tunnel, in rock that will stand without timbering, is driven about five feet wide and seven feet high; but if timbers are necessary, the section is enlarged sufficiently to accommodate them. A tunnel of this size requires an average of 12 bore holes; that is, about three cut holes, three breast holes, three back holes, and three lifters. In very hard rock, possibly two or more additional holes called "helpers" would be used.

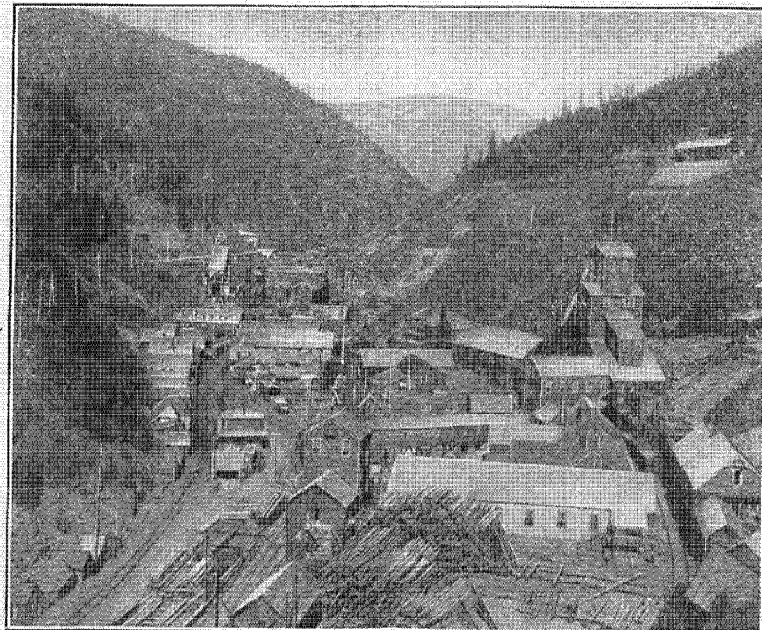
The main work-tunnels or drifts in the larger mines are usually seven or eight feet wide and nine feet high in the clear, inside the timbers. A tunnel or drift of this size accommodates a haulage track for the ore cars (propelled by electric locomotives) carrying from one to five tons of material; and also provides room for ore chutes on the side, passing space for miners afoot, air and ventilating pipes above, and a drainage ditch along the side of, or beneath, the track.



SQUARE-SET STOPE
CROSS-SECTION

The methods of stoping most generally employed are the "square-set," the "stull-set," the "back-fill," the "rill," the "timbered-rill," and the "shrinkage," with minor variations and combinations to fit local conditions.

The "square-set" is used where the veins are large, or



View of Burke, Idaho. Hecla Mine in Right Foreground

where the rock walls will not stand without timbering. It consists of posts, caps and girts of fir or hemlock and, when in place, is ten feet high and five feet square. The vertical posts are set on five-foot centers, so continued to fill the entire width and length of the stope; these sets are covered on top with three-inch lagging, which forms the floor for extracting the ore for another set above, and so on. They are built upward one post on another as the ore is blasted and drawn above each set.

The "stull-set" is practically the same as

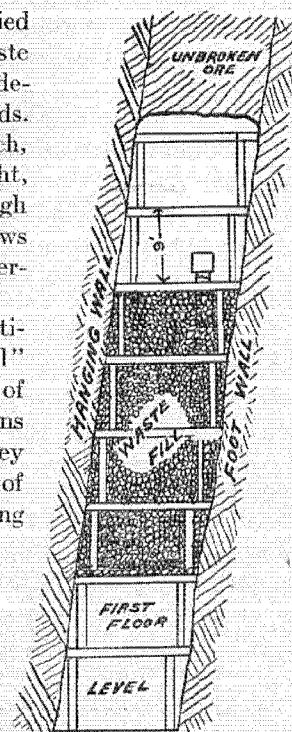
the "square-set" except that the caps are of random lengths up to 16 feet, and the posts are set near the ends of the caps, without regard to the posts underneath. The "square-set" is used where the weight is from above and the "stull-set" where the weight is a side pressure.

After about three floors have been mined, or about 30 feet, vertical distance, this section is filled up with waste rock, usually from development work or from waste raises; then the same stoping operation is continued above.

In the "back-fill" method no timbers are used above the first floor, the work being carried on directly on the fill of waste rock instead of on timbers as described in the foregoing methods. In this system one cut or bench, six to nine feet in vertical height, is carried horizontally through the stope, and the filling follows directly behind the mining operation.

The "rill" system is practically the same as the "back-fill" method, except that instead of the mining and filling operations being carried horizontally, they are carried at about the angle of repose, the action of gravity being utilized to move the ore to the chute and also to re-fill with waste rock.

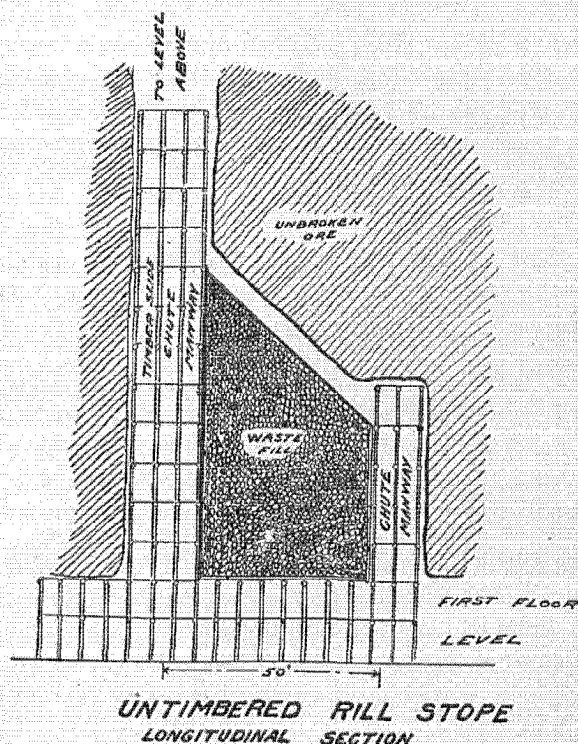
The "timbered-rill" is used where the character of the ledge-matter overhead requires support to prevent its dropping in; otherwise, the principle is the same as



STULL-SET STOPE
CROSS SECTION

the "rill." Smaller timbers can be used than in "stull-sets," because as each cut is taken out of the back, a corresponding fill is made below, and not more than 16 feet of wall is left exposed at one time.

The "shrinkage" method consists of driving a sill-floor and timbering one set in height to leave passageway and



ore-loading space beneath. Ore chutes are placed so that cars can be loaded by gravity. Only enough ore is drawn through the chutes to offset the increased volume of broken ore, caused by blasting from the solid ore in place, and to give the miners working space above. The operation is continued upward, cut after cut, until all the ore is broken in the stope. This eliminates the necessity of timbering and leaves the ore ready to be drawn when wanted.

Practically all the stoping, or actual ore-breaking, is done overhead, by drilling "upward holes" at an average of 65 degrees from horizontal and blasting down slices of ore from above. This operation continues upward from one level to the next.

Air-feed machine drills are generally used with $1\frac{1}{8}$ or $1\frac{1}{4}$ inch cruciform drill steel, both with and without water-spray attachment. Compressed air under about 85 pounds pressure is delivered to these drills.

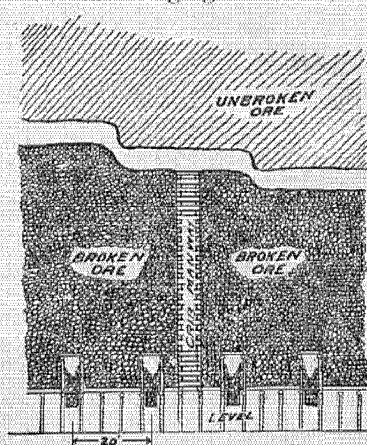
In "drifting" and "cross-cutting" the water Leyner-type machine drill is used almost exclusively, with an occasional exception where the reciprocating piston machines are used. The water Leyner-type machine uses $1\frac{1}{4}$ inch round hollow drill steel, through the center of which air and water are forced to the bottom of the drill-hole to eject the cuttings and allay the dust. Bore holes of approximately two-inch diameter at the collar, tapering to about $1\frac{1}{2}$ inches at the bottom, are drilled to an average depth of from five to six feet. Holes are spaced about two feet apart, this spacing varying, of course, to suit the

character of the material blasted and the width of the stope. No springing or chambering of bore holes is done, but they are usually loaded about two-thirds full of dynamite and no tamping material or stemming is used. The advantages of tamping are generally conceded, but the difficulty of securing suitable material and of forcing the miners to use it, is the probable reason why tamping is not a common practice.

The primer cartridge is loaded near the last with one or more cartridges of dynamite on top, except where the character of the rock is such that the blasting of one hole might cut off the upper part of another, making it necessary to put the primer nearer the bottom. Several methods of making primers are followed. A hole large enough to receive the blasting cap is punched straight into the end of a dynamite cartridge, or at an angle in the side about the middle of the cartridge. Another method is to punch a hole diagonally through the cartridge near the end, drawing the cap and fuse through this hole and inserting the cap into another hole punched in the side. In this latter method there is danger of igniting the dynamite from side-spitting of the fuse.

In stope-blasting, gelatin dynamites of 30, 35 and 40 per cent strengths are used almost exclusively. The usual practice, in loading the dynamite, is to split the paper-cartridge shells lengthwise with a knife, and push each cartridge into the bore hole with a wooden tamping-stick, pressing the dynamite in firmly to fill the section of the hole. Cartridges $1\frac{1}{4} \times 8$ inch and $1\frac{1}{8} \times 8$ inch are used both in stoping and in development work, with an occasional exception where 1×8 inch cartridges are used in stoping. In most of the development work in this district 40 per cent gelatin dynamite is used, but where the rock is exceptionally hard, some 50 and 60 per cent gelatins are used.

Standard high grade fuses, cut in seven and eight-foot



lengths, are universally used. Short fusing is positively prohibited. High grade blasting caps, No. 7 and No. 8, are used, for mine operators have recognized the greater efficiency and consequent economy obtained by the more complete detonation of explosives.

Fuse-cutting and capping are generally done in surface buildings by a man detailed especially for this work.

Fuse is cut practically as needed, and care is taken to cut it squarely and cleanly with a sharp knife. The blasting caps are then put on and gently pressed to make sure that the end of the fuse is well seated on the composition in each cap. Caps are then crimped with the approved type of cap

(Continued on page 18)

American-Made Dolls and Toys for Young America

Sue C. Smith

WHO played with the first doll? Of what was it made? History fails to give a satisfactory answer. Recorded history does not go back to the time when there were no dolls. Since the early ages they have apparently been the presiding deities of the hearthstones and cradles of all peoples. It is certain that dolls were common in the time of Moses. For beside the mummy forms of babies have been found pathetically comical imitations of themselves—little dolls, no doubt, placed there by loving mothers.

Probably the oldest dolls in the world are in the British Museum. They were found in the tombs of Egyptian children, some of them buried more than 4,000 years ago. Queer little manikins they are, but they command immense respect as being the veritable doll babies that the brown-skinned children of Pharaoh's land loved and put to sleep centuries before the Christ-child was born.

The presence of dolls in the graves of these children is accounted for by the fact that it was an ancient custom to bury a child's dolls and toys in the tomb with the body. This was done with the expectation that the spirits of these inanimate objects would rise with the child's spirit and continue to amuse it in the world beyond, as they had done in this life.

The doll has been used in the symbolical and ceremonial rites of all nations. Its first use was for worship in connection with ceremonial incantations, and not for juvenile amusement. Early writers tell us that a pagan custom required children to make votive offerings of their dolls and toys to the gods when they reached a certain age, and Roman

girls at the time of their marriage were accustomed to offer their dolls to Venus, the Goddess of Love.

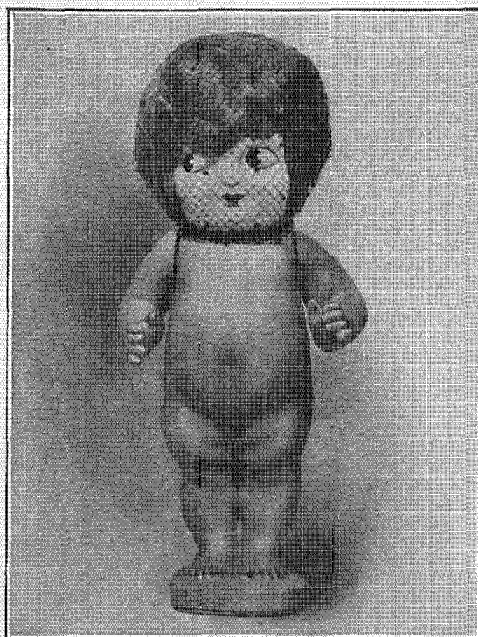
In some countries, the transition from the symbol to the child's toy was direct. The first children to inhabit the earth were little savages, who ran through the forest finding acorn cups, bird feathers, pebbles and shells for their toys. One of these little girls must have invented the stick dolly that has delighted the heart of every little girl at some time or other; and one of the small boys must have broken down a green bough and invented the first hobby-horse.

The first dolls made of baked clay were not very beautiful. The first mud dolls had no arms or legs. Later, dolls carved in stone and bone appeared with arms and legs. At a later time came wooden dolls—and much later the wax and bisque doll. Now the strenuous, modern child again has the doll made of wood and other "unbreakable" compositions.

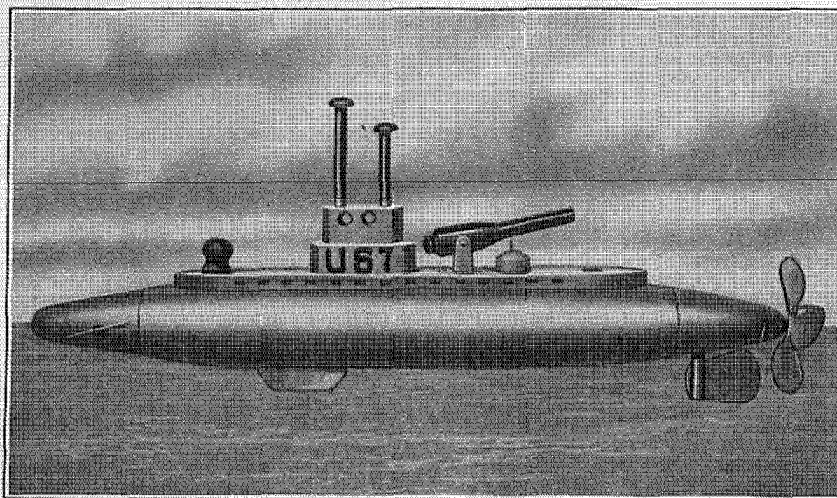
The old home of the doll was Thurmzia, especially the town of Sonneberg, near Coburg, Germany.

Most of the inhabitants—men, women, and children—were engaged in this industry before the war. Making dolls was the chief occupation and source of revenue throughout the year.

The German child is taught to be an efficient mechanic, and later develops into a good mechanical soldier. But the American child is a better soldier partly because, even in the grim business of war, he knows how to play. To quote an eminent kindergartner "the boy is a better fighter; the girl, a better mother because both are taught to be better players." In the consuming grind of business life, play is



The O-U-Kid, a Popular American-made Doll, Prettier Than Her Name and Made So With Du Pont Pyralin Enamel



Du Pont Pyralin Enamel Gives an Excellent Finish to This American-made Submarine Toy

an essential. The man or woman who knows how to relieve nerve tension by timely play is the one who is going to live to work another day. So it comes to this: our children must play, and they must have "Made-in-America" toys to play with.

Ten or more years ago the doll world was made up chiefly of vacuous-faced figures from over the sea, all cut from the same wearisome pattern. Foreigners, chiefly Germans, controlled the toy industry and its markets. It was almost an axiom that no manufacturer in the United States could hope to compete against cheap foreign labor and materials. "Made in Germany" was a stonewall against which scarcely a toymaker in America dared to butt.

During "our late unpleasantness," however, it was necessary for the resourceful Santa Claus to find other places of supply. "Business as usual," being his motto, he moved his headquarters to the United States, and there he will remain. American toy manufacturers are helping him and are now at work developing higher standards, and putting forth better toys rather than cheaper toys.

Toys "Made in Germany" for American children! The idea is not pleasant. "To imagine the Hun in the rôle of a maker of playthings that delight the hearts of children is as incongruous," says the *Virginian Pilot*, "as it would be to think of a rattlesnake spitting attar of roses from its fangs."

American children should have American-made toys. American toy manufacturers have stripped us of the last vestige of an excuse for the purchase of toys made by the Hun. Our factories are making more toys each year than we ever imported in an equal period, and they are not the flimsy jim-cracks we formerly bought in Europe. There is a concerted movement among American toy manufacturers to make the public more fully acquainted with the real merit and superiority of toys made in this country.

Before the war, preference was given by American people to foreign-made toys. Several years ago, Americans regarded things stamped "Made in Germany," or "imported" from Switzerland, England or France, as superior to anything made at home.

The war has given all true Americans a new point of view; and the American toy manufacturers aim to prove to our home folks the greatest of the resources and their own accomplishments in the manufacture of playthings. One has only to view the toy exhibits shown at one of the annual conventions of the American Toy Manufacturers of the United States of America to realize that they are living up to the trust Americans are placing in them.

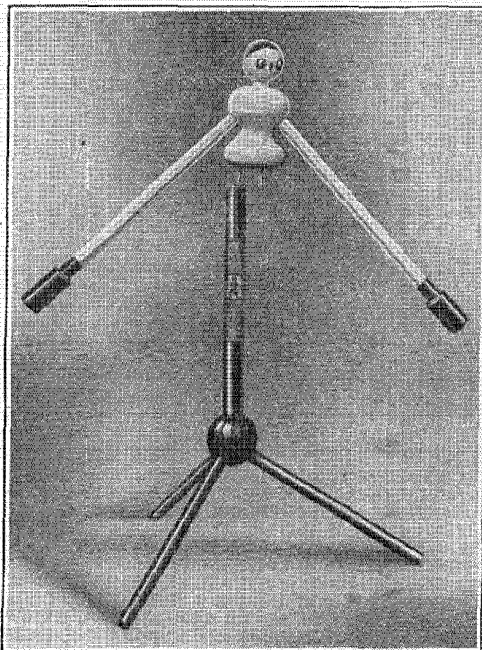
In some cities last year the manual training and domestic science rooms of the public schools, turned over all their equipment to the making of wooden toys. In Los Angeles, the toy merchants offered to buy the entire output of the schools. Eight thousand articles were thus made and sold through the shops in two months for \$1,586.00. This money was given to the Red Cross, and the Germans were shown that "Made in America" suits us.

Almost a dozen years ago the first character dolls appeared in our stores and found instant favor with young American "mothers," who were tired of the breakable wax and bisque type imported from abroad. Since that time not a year has elapsed which has not brought some new unbreakable "character" doll.

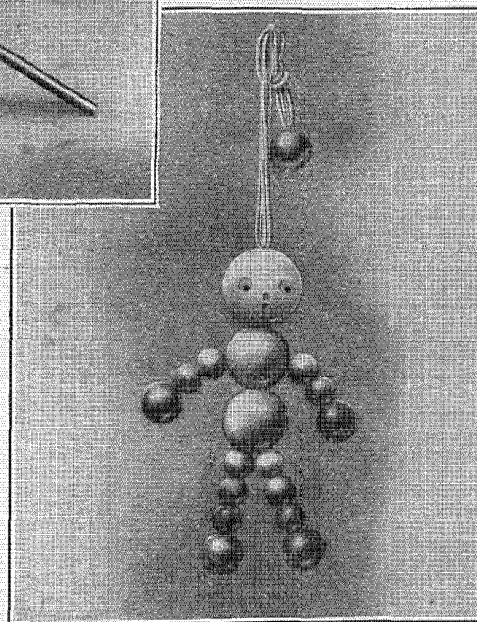
There is a particular demand now for wooden dolls. These are unbreakable and amusing. For example, see Tilly and Tommy Tinker illustrated here. These dolls are made in America by Americans, and they are enameled with American made Du Pont Pyralin Enamels.

In fact, these enamel finishes are now much used in Toydom. With them the toymaker can

vary the complexion and the color of the tresses of his little people to suit the most discriminating "mother." Never before were doll-babies seen in such variety—dark-skinned Topsyies, blue-eyed and fair-haired "vamps," red-cheeked lasses and, unlike many of their counterparts in real life, their complexions are waterproof and will come out of the daily bath, which is such a necessary part of every doll-baby's training, none the worse for wear. The waterproof enamel is particularly desirable on a doll intended for the baby, for the little tot usually shows affection by putting "dolly" into its mouth.



Tilly Tinker, the Terpsichorean Queen, Gyrate in a Dance Never Before Seen on any Stage. Best of all, She's an American



Tommy Tinker, the Baby's own American-made Doll, Enameled with Du Pont Pyralin Enamel

Red Gum—The “Mocking Bird”

of the Southern Forest

S. L. Johnston

OF all the birds of the South, none has a more varied song program or a more imitative one than the mocking bird. His vocal versatility is a conspicuous trait. While it may be far-fetched to refer to the red gum tree as the “mocking bird of the southern forest,” the metaphor is apt in these particulars: It grows in the same clime the mocking bird frequents; and red gum, as a finished product, has the distinction of being adapted for more uses, and more imitative uses, than any other southern wood.

Like all other woods, red gum is found in certain districts, where weather conditions and soil fertility are best adapted to its growth. This district embraces the southern and south central states, an area in which may be found magnificent forests of this wood.

Red gum is the more common name given to this wood, although in some localities it is known as sweet gum, gum, satin walnut and hazelwood. Sap gum, so called, is the sapwood or outer part of the red gum tree and is not, as many persist in stating, a different species.

The availability of red gum has been brought to the fore. The producing and selling organization back of this wood is so thoroughly developed and extended that every prospective user can obtain it in practically every section of the country. This does much to encourage its use by those who base their selection on the merits of a wood that will best express their ideas in home decoration.

A hardwood, of easy working properties, close texture and of uniform grain, red gum is a master material in the hands of the skilled woodworker or cabinetmaker. It permits a full expression of the wood-turning art and finds its chief outlet in the manufacture of high class furniture, cabinet work and fine interior finish.

Red gum will not warp; is not easily marred and possesses great strength. These

qualities make it especially suitable for flooring and paving blocks, and when used for the latter purpose no creosote preservative is necessary. The sap gum is the wood always used for this purpose, and, although less expensive, it is none the less durable than the heartwood.

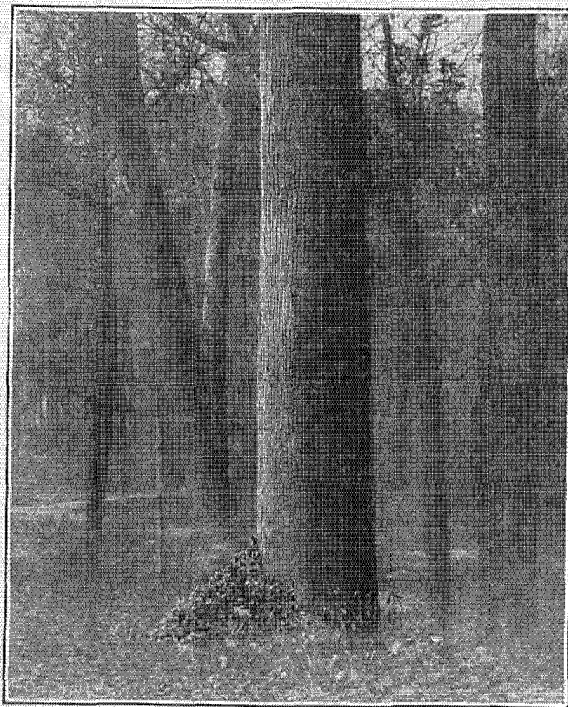
A variety of effects in grain may be had, plain or figured, either straight or quarter sawed, enabling unusual effects in uniform tone or elaborate figure.

In the manufacture of furniture and also in the finishing of interior woodwork, this wood may be used in reproducing effects very closely resembling the costly imported woods. It is this quality that has earned for it the name “the mocking bird” of the southern forest. Costly figured mahogany and the rare Circassian walnut are so closely reproduced that even experts are deceived. To detect the difference between these woods and well finished gum requires not only the casual glance but the closest scrutiny of grain, texture and figure of the wood.

Inasmuch as red gum is extensively used in the form of woodwork, doors and floors for prominent public buildings and private residences, it is interesting to note that it is adaptable for any type of work calling for an effect that is of the proper uniformity to radiate simplicity, and yet sufficiently distinctive to create an atmosphere of individuality.

It presents a splendid medium for the use of stains, fillers and varnishes, besides forming a superior base for enamel effects. The color effects obtainable cover a variety to meet any need, and the finished appearance is one of great beauty and refinement.

Full-paneled or half-paneled walls of red gum are particularly attractive, possessing an appearance that is striking in its rich coloring and soft satin sheen. This is true whether the wood is finished in the natural or in stained effects. No matter



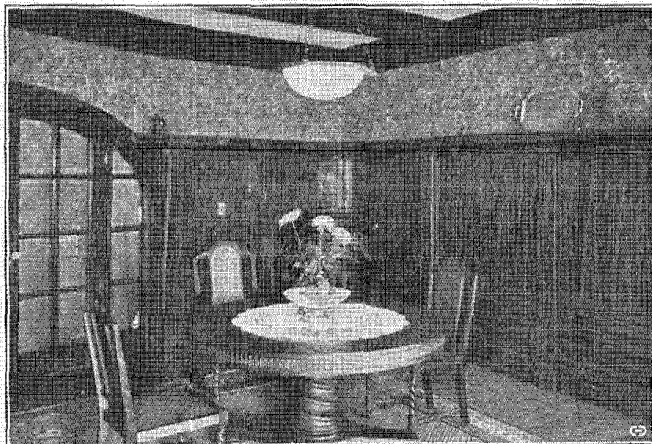
The Gum Tree in the Foreground is a Typical Specimen



The Characteristic Grain of Red Gum

what finish may be selected, the characteristic natural beauty of the wood will not be overshadowed by the beauty or coloring of the finish applied.

The natural finish is one of the more popular effects obtainable on this wood. This is merely the natural wood protected by finishing material to preserve the color, and



A Handsome Dining-room in Which the Figured Gum Woodwork is an Attractive Feature

to accentuate the beautiful grain. The effect is produced with Wheeler's Transparent Paste Wood Filler and Wheeler's Interior Varnish. The finish may also be obtained by the use of shellac and Bridgeport Standard Prepared Wax over the filler. It is merely a matter of personal preference as to choice.

Another effect that has a peculiar charm on red gum is the gray finish, produced by the use of Bridgeport Standard Gray Acid Stain, No. 2001 Smoked Pearl Toner and Bridgeport Standard Wonderlac. This is a soft-toned gray on a slight purple cast, suitable for the living-room or bedroom.

The American Walnut Finish is a rich brown color—the standard American walnut effect—and is particularly suitable for woodwork where it is desired to have it harmonize with furniture of the same finish. The effect is obtained by the use of No. 1893 American Walnut Acid Stain and Wheeler's Interior Varnish.

Circassian Walnut Finish: This is a light brown color—one of the most popular on red gum—producing an effect that very closely resembles genuine Circassian Walnut. Stain the wood with No. 2303 Circassian Walnut Penetrating Stain and complete the finish with shellac and Bridgeport Standard Prepared Wax. Figured red gum should be used to obtain the proper effect.

The White Enamel Finish is one of dignity and refinement, unfigured red gum being used for the purpose. This effect is produced by the use of Wheeler's White Enamel Undercoating and Wheeler's White Enamel.

The Dark Mahogany Finish on this wood very closely resembles genuine mahogany. The color is a deep, rich red, produced by the use of Dark Mahogany Penetrating Stain, Mahogany Primer, and Wheeler's Interior Varnish.

A deeper shade of mahogany, on the brown tone, is obtained by the use of Brown Mahogany Penetrating Stain, the finishing coats over the stain being the same as

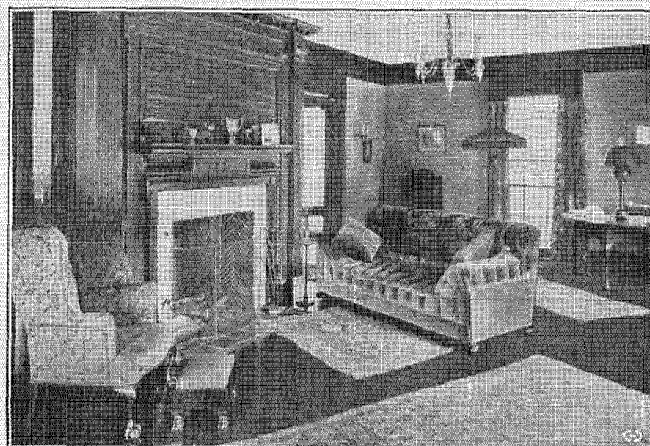
those used for the Dark Mahogany effect mentioned above.

The English Oak Finish is a medium shade of brown on the red cast, and is one that will harmonize well with either a brown or mahogany finish on the furniture. The effect is produced by the use of English Oak Penetrating Stain and Waxed Finish, finished over with Wheeler's Interior Varnish, or shellac, and Bridgeport Standard Prepared Wax.

A lighter shade of brown may be obtained in the Brown Oak Finish, by the use of Brown Oak Penetrating Stain and Waxed Finish, finished over with Wheeler's Interior Varnish, or shellac, and Bridgeport Standard Prepared Wax.

All the effects mentioned, with the exception of the White Enamel Finish, fully accentuate the natural beauty of red gum, without obliterating or hiding the intricate and delicate graining. Any of them may readily be reproduced practically and economically on this wood in your home.

Red gum, while possessing qualities that class it with the costly imported woods, is not so high in price as to prevent its use in the construction of the moderate priced home; and it does enable effects, individual in tone and figure, that possess exceptional beauty.



This Living-room Owes Much of its Attractiveness to the Red Gum Trim and Paneling

The art of wood finishing is seemingly a complex one, yet with the literature, booklets and panels available, the problem becomes simply a matter of knowing what to do, and how to do it. In this connection, the Architectural Service Bureau, Paint & Varnish Division, is prepared to furnish full data on any type of finish desired for red gum woodwork.

The prospective user of red gum may secure, without any obligation, authoritative information dealing with his particular needs—information that will prove of value and assistance in working out any wood-finishing project under consideration.

This service relates not only to the finishing of woodwork, but to the entire decorative scheme for walls and floors as well, so that proper harmony may be maintained throughout the interior.

[Editor's Note: This is the sixth of a series of authoritative articles on woods and wood finishing, appearing exclusively in the Du Pont Magazine. Subsequent articles discussing specific woods and methods of finishing, will appear in early issues of the magazine.]

The New Ether

ONE of the important branches of our manufacturing activities is that concerned with the production of sulphuric ether, or as it is technically designated, di-ethyl ether. For many years the Du Pont Company has been making this useful chemical in vast quantities as an essential material in the manufacture of smokeless powder, and, for a somewhat shorter time, in large and continually increasing volume expressly for anesthesia purposes. Although the same chemical compound is used as an industrial solvent and as an anesthetic, it is, of course, well known to everyone in any way familiar with the subject that there is a great difference in refinement between the two ethers. In fact, the difference is so great as to require radically different methods of manufacture. The transition from one field of application to the other called into service the best efforts of chemical and medical experts and skilled factory operators. Even after the problem appeared to be solved and Du Pont Anesthesia Ether was being sold throughout the United States and abroad, the work of these investigators continued. Indeed, investigation work on this ether still goes on.

It was in accord with this policy of constantly striving to improve our products and increase their sphere of usefulness that one of the Du Pont staff physicians was requested to attend a lecture on "New Ether" given by Dr. James Cotton, of Toronto, Canada, at McGill University, Montreal, on June 13, 1917, and a demonstration the following day at the Royal Victoria Hospital. Dr. Cotton had been investigating anesthesia ethers from a chemical and physiological viewpoint for the past four or five years, and as a result of his study had been able to produce highly refined di-ethyl ether, so modified by the addition of certain gases as to give the product new and desirable characteristics. These in brief were: *the ability to induce and maintain analgesia* (conscious insensibility to pain) as distinguished from anesthesia (insensibility to pain plus narcosis or loss of consciousness), and the property of inducing and maintaining anesthesia with material reduction of the *subsequent nausea and other troublesome effects* which commonly follow the use of ordinary anesthesia ether.

The results of the demonstration were so impressive that the Du Pont Company immediately arranged to follow out the elaborate and highly refined process of manufacture in their own laboratories. During the course of the experiments the Company's experts were successful in preparing an ether having the characteristics claimed by Dr. Cotton for his "New Ether," that is, an improved anesthesia ether combining the analgesic properties with greater freedom from after-effects, as described by Dr.

Cotton. It is this new type of anesthesia ether, now prepared on a commercial scale, which we offer to the medical and surgical professions as Du Pont Anesthesia Ether (Cotton Process).

FIELD OF USEFULNESS

ANESTHESIA

The Du Pont improved ether is primarily a high grade anesthesia ether which fulfills all those requirements naturally expected of such a product. Results in numerous cases where this new ether was used show that it possesses superior anesthetic power and that the after-effects are markedly less than with other anesthesia ethers. No special procedure has to be adopted in administering this new ether for anesthesia purposes, and its range of usefulness covers all cases requiring a good anesthesia ether.

ANALGESIA

It is believed that the future field of usefulness for this new ether, as an analgesic, will be varied and wide. It is a general analgesic adapted to the numerous cases where insensibility to pain

without loss of consciousness is desirable, not only in surgical practice where anesthesia ether is now used, but also in the many operations which are performed by surgeons and physicians with the aid of local anesthetics, or else without any attempt whatever to eliminate pain. Although much of the field remains to be explored, reports on numerous cases indicate that this ether, as an analgesic, is especially adapted to such minor surgical cases as the sewing of wounds, opening and treatment of abscesses, changing packings and dressings and short, emergency operations.

It is probable that in obstetrical cases and in dentistry the analgesic properties of this ether have been most appreciated thus far. In former cases only a small amount of this special type of ether is required to relieve the pain, and it does not interfere at all with the progress of labor. In dentistry the ether can not only replace nitrous oxide for extractions, but may also be used to render painless such operations as nerve treating, removal of roots and drilling and filling of teeth, which hitherto have been performed without an anesthetic.

In using the new ether as an analgesic it is not necessary to learn new and complicated methods of administration. The operator may, and should, employ the method most familiar to him.

Satisfactory results usually can be obtained by dropping the ether directly from the container onto an open mask; in fact, many cases of minor operations have been reported

The announcement of new and better methods for the relief of suffering never fails to excite general interest. Particularly in dental work and obstetrics, elimination of pain will be welcomed as a boon by millions. We, therefore, take special pleasure in placing before our readers this article on a new and improved type of ether known as Du Pont Anesthesia Ether (Cotton Process).—EDITOR.

where the desired effect was produced merely by having the patient inhale the vapors from a saturated towel, napkin or gauze. From ten to twenty slow and deep inspirations are generally sufficient to induce analgesia in the average case. The condition is maintained by additional inhalations from time to time as required. Momentary retention of the breath before exhaling enables the ether to function most effectively.

A few cases are given below to show the action of the new ether as an analgesic and anesthetic. It is thought these will be of interest to the general reader as well as to specialists on the administration of ether.

ANALGESIA:—CASE 1

EXTRACTION OF WISDOM TOOTH, EXCAVATION OF CAVITIES

Bottle inhaler used. "I took the ether myself, had a wisdom tooth removed and was conscious all the time. In fact, I told the dentist when to remove it. Did not feel any pain whatever. I then administered it several times to volunteer patients for excavating sensitive cavities, for which it proved very satisfactory. At the Dental Convention at Swampscott, Massachusetts, I had four patients—all for excavating, which was done without pain or loss of senses. The method of administration was from a four-ounce bottle with by-pass and glass tubes for insertion in the nostrils, connected with the bottle by rubber tubing. The analgesia lasted long enough to prepare one cavity. I think perhaps a nose mask would be better, as the patient could inhale while the work was being done on the tooth. I think it only a matter of time before it will be universally used." Dr. E.W. Marvin, Lynn, Mass.

ANALGESIA:—CASE 2

LAPAROTOMY

Open mask administration direct from container. Male; age 18; weight 180 lbs.; operation, adhesions and resection of tubercular mass from abdomen. Time of operation, 1 hour and 10 minutes. Patient remained very clear mentally and cracked jokes throughout. He was given a small meal while the surgeons were operating on him. Abdomen was completely relaxed. Eyes were slightly dilated and pulse remained at 80. Amount of ether used, 3 ounces.

ANALGESIA:—CASE 3

ARM OPERATION

Open mask administration direct from container. Male; age, 33; weight, 190 lbs.; returned soldier; operation, opening arm. Patient complained of feeling dull; otherwise, he was normal. Time of operation, 45 minutes. Time of

induction to analgesia, 6 minutes. While under, he stated he did not want merely to lose sensation to pain, but wished to go to sleep, as he was tired. Amount of ether used, 3½ ounces. At two previous operations it was impossible to induce him with commercial ethers, and chloroform had to be resorted to.

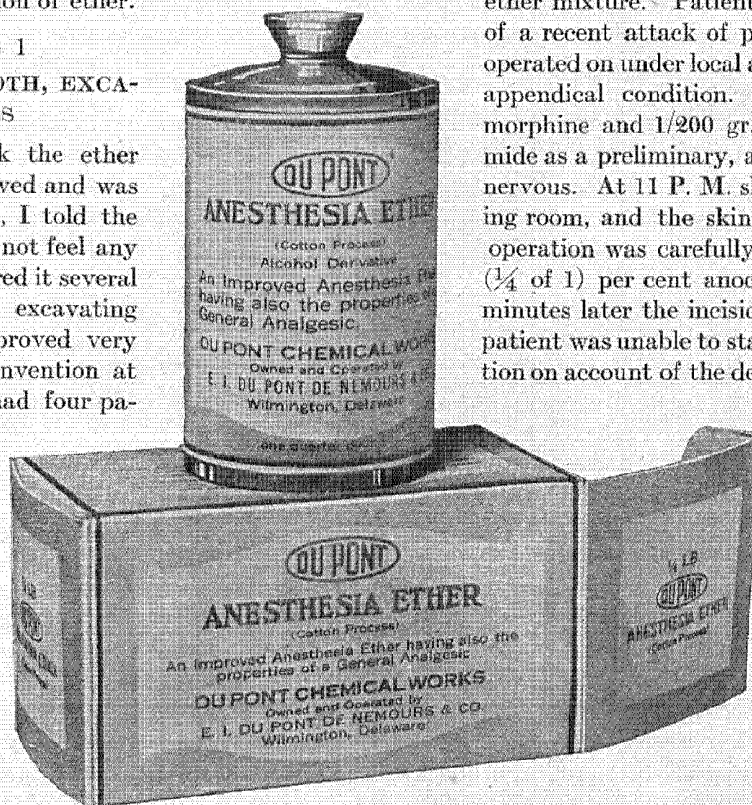
ANALGESIA:—CASE 4

APPENDECTOMY

Open mask administration direct from container. Comparison of Cotton Process ether with ordinary chloroform-ether mixture. Patient, aged 24, on account of a recent attack of pneumonia, was to be operated on under local anesthesia for an acute appendical condition. She was given ¼ gr. morphine and 1/200 gr. hyoscine hydrobromide as a preliminary, as she was exceedingly nervous. At 11 P. M. she entered the operating room, and the skin over the site of the operation was carefully infiltrated with 0.25 (¼ of 1) per cent anocain solution. A few minutes later the incision was made, but the patient was unable to stand further manipulation on account of the deep soreness of the under-

lying abscess. At the request of the surgeon, the houseman started the administration of the C-E mixture. The patient became excited and, after 1½ ounces had been used, she dropped into a light sleep, but the abdominal muscles were ex-

tremely rigid and there was a tendency to stop breathing. The incision, made through the anterior aponeurosis, was followed by severe muscular spasm. The use of an ampule of the special ether on the open mask was then suggested. The patient was allowed to waken, and the special ether was then given on the open mask, without the usual surrounding towel. Within four respirations her muscles relaxed completely and she was entirely without sensation. She was able to answer questions clearly, was not excited, and would do anything requested. The operation continued and the abdomen was opened. The appendix had not ruptured, but the whole of the cecum was adherent to the abdominal wall and pelvis. One ounce of the special ether had been used by this time, and as another ampule had to be fetched from the storeroom, the C-E mixture was again administered to note its effect. Sensation returned and the patient became blue if the C-E mixture was pushed. The special ether was again used. The patient awoke and was able to talk. Her abdomen again relaxed. Operation continued for one hour. Adhesions were broken down, and the appendix successfully



removed. Three ounces of the special ether were used. During its use, many times during the operation, the patient could have walked as easily as she talked. Afterwards she remembered answering questions, but did not know anything about the operation while under the special ether.

One peculiar fact was noted. While under the special ether the pulse ranged about 80, but under the chloroform-ether mixture it would immediately rise to 120. The patient stated that she was hungry and thirsty during the operation, as she was also afterwards. There was slight dilation of the pupils, but otherwise they were normal. The eyes would roam about when covered, but remained fixed on any object when uncovered.

The hyoscine seemed to cause an excessive excitement which prevented a successful local anesthesia being sufficient.

Patient was as clear mentally at the end of the operation as at the beginning. Pain recurred within 3 minutes after cessation of the anesthetic. The local anesthetic was not used for the deeper layers.

ANALGESIA:—CASE 5

REDUCTION OF FRACTURE

Modified vapor apparatus, devised by Dr. Cotton, was used. A woman had been knocked down by a motor car and had her clavicle fractured. She was prejudiced against taking any anesthetic until told that she could give it to herself. The patient talked throughout the whole operation and was entirely without pain until six minutes after the anesthetic was stopped. She then stated that she wanted more of it as it made her happy. There were no objectionable after-effects.

ANALGESIA:—CASE 6

AMPUTATION OF DISTAL PHALANGE

Modified vapor apparatus, devised by Dr. Cotton, was used. The patient, a young colored boy, was given the ether by means of this semi-closed type of inhaler. In about five minutes he was insensible to pain, although able to carry on a conversation. He laughed and talked a great deal, said he felt very queer and that he was sure he was dead. The operation consisted of the amputation of the distal phalange of the thumb and lasted about 15 minutes. Occasionally the patient would feel some pain, but did not realize what was being done and was very much surprised when the operation was over. He recovered quickly without vomiting and went back to work in an hour or so.

ANESTHESIA:—CASE 1

BREAST AMPUTATION

Administration direct from container on open mask. Patient, female; age 70; weight 112 lbs.; operation, breast amputation. Time of induction, 6 minutes to complete surgical anesthesia; operation, 1 hour. Amount of ether used, 5.5 ounces. No after-nausea, and patient recovered before reaching her room. Stated that she had enjoyed the sensation of going under the ether.

ANESTHESIA:—CASE 2

CHOLECYSTECTOMY AND APPENDECTOMY

Modified vapor apparatus devised by Dr. Cotton was used. Patient, female; age 35; weight 115 lbs.; operation, cholecystectomy and appendectomy. Time of induction, 5 minutes. Previous pulse, 100; pulse during operation, 70; relaxation during first part of operation easily obtained. Duration of operation, 1 hour and 20 minutes. Amount of ether used, 3.5 ounces. Regurgitated 4 ounces, but did not remember it or suffer from after-nausea. Patient was able to walk while being returned from the operating-room.

ANESTHESIA:—CASE 3 (Collective).

MISCELLANEOUS

Gwathmey oxygen semi-closed apparatus used. The value of this method was first brought to the attention of Dr. Cotton by Dr. J. F. Baldwin, of Grant Hospital, Columbus, Ohio, who was the first surgeon to use Du Pont Anesthesia Ether (Cotton Process) in any moderate series of major cases. The technic is one of Dr. R. A. Rice's "Perfecting Methods of Anesthesia" (described in the American Year-Book of Anesthesia and Analgesia, 1915-1916), in which oxygen, from a low pressure tank, is let through the Gwathmey three-bottle, dosimetric vapor apparatus, with its ascending and descending percentage control. The saturated oxygen-ether vapor, washed and moistened in the warm water bottle, is conducted by means of a rubber tube to a closely-fitting face mask, or oval airway, to which is attached a re-breathing bag. Baldwin reported 20 abdominal operations carried out, from start to finish, with this apparatus and method of anesthesia. The amount of ether used averaged from 1 to 3 ounces. The recovery was more rapid and the after-effects less than those occurring with ordinary ether. With this ether and method it was possible to induce anesthesia by the vapor method, whereas, previously, with other tinned ether, ethyl chloride was always used for induction, and almost double the amount of ether was found necessary for maintenance.

In an article such as this it is necessary to omit a great amount of detail of importance only to those professionally interested in anesthesia. For their use the Du Pont Company has prepared a booklet giving more complete information. This booklet will be mailed to any surgeon, physician, dentist, anesthetist or hospital superintendent upon request. Our medical and chemical experts will also be glad to reply to any questions not covered in this literature.

The price at which it is necessary to sell Du Pont Anesthesia Ether (Cotton Process) is higher than that charged for ordinary anesthesia ethers because of the intricate and costly factory operations required in its preparation. The new properties and improved results to be obtained through its use, however, so far outweigh any consideration of cost that we feel sure our course in placing this new product upon the market will be heartily endorsed by the medical and surgical professions.

Development of Soldiers' Gas-Protective Clothing

C. D. Abraham and George L. Schwartz

WE readily recall the time when the Germans introduced a new stage of warfare into the world conflict by sending a cloud of poisonous gas over the British lines. The effects of this new method of fighting were so terrible that the Allied leaders immediately made it their primary object to develop quickly a means of combating the menace. The British scientists rose to the occasion and within a few days after the first gas attack, crude masks with limited protective powers were being used by front-line soldiers. The development from this first mask to the highly perfected type that was being used at the termination of hostilities is well known and need not be repeated here.

The far-reaching effect of this method of warfare soon became evident to the Allied leaders, yet they were hampered in combating the gas warfare of the Germans by the conscience of the people whom they represented, and were prevented for a time from using the method which seemed to them to be most effective, that of retaliation. Soon, however, the introduction of lachrymatory gases (tear producers) made it imperative that retaliatory measures be adopted. When this decision was reached, the Allies entered into the manufacture and use of war gases with a determination to beat the Germans at their own game.

In 1886 Victor Meyer, a German chemist, investigated the properties of organic sulphides, among these being di-chlor ethyl sulphide, a substance that is liquid at ordinary temperatures and about as volatile as kerosene. Meyer and his assistants found that rabbits, cats, dogs and other animals, when exposed to the vapors from this gas readily developed pneumonia and died. He also observed that the portions of their skin, which came in contact with the liquid, developed serious burns that healed with great difficulty. Several of his assistants had come in contact with the liquid and were suffering from burns similar to those that the animals had received. Evidently, as Victor Meyer was somewhat more careful with human life than his government has been, and as he feared the toxic effects of this substance, further experimentation was discontinued. No further work on the examination of the properties of this substance has been published by the Germans; and the next data that the world obtained on its physiological action was observed early in October, 1917,

in the hospitals of France, where great numbers of Allied soldiers were being treated for burns from this substance. It soon became known as "mustard gas." It is not a gas at ordinary temperatures, and it is also chemically different

from mustard oil, but its common name was derived from the property it has of blistering the skin.

As American soldiers were already on the front line when "mustard gas" first came over the Allied lines, the Chemical Warfare Service immediately began an investigation to secure protection from it. The French army was first to take definite action, and responded to the need by the introduction of garments which withstood the penetration of "mustard gas" for a limited time, at least long enough to reduce the casualties from mustard burns to a considerable extent. The American Expeditionary Force then ordered protective garments modeled after the French design, which consisted of a union overall suit with the minimum number of seams and with tight-fitting cuffs at ankle and wrist. Hoods, gloves and boots were also required to keep out the "mustard gas."

The Chemical Warfare Service responded by first starting the development of tests in order to determine the kind of fabric that was best adapted to the purpose. At the same time they sent out requests to the various

manufacturers of coated and impregnated fabrics for samples of materials for protective suits, and furnished as much information as was available for the guidance of the manufacturers. A high resistance to penetration by "mustard gas" was of primary importance. It was essential also that the material should withstand rough wear, resist the action of sunlight and rain, and be pliable at all ordinary temperatures. Methods for chemical, physiological and physical testing were rapidly developed, and within a short time the Chemical Warfare Service was in a position to test fabrics which were submitted by various manufacturers of the country. It should be recalled that at this time the Allies were laying plans for a long war and the Chemical Warfare Service was starting the work with a proper foundation to build upon.

In the meanwhile, the Chemical Warfare Service made a comprehensive survey, accompanied by suitable tests, of all substances that were known to be used in coating or impregnating cloth. The results of these experiments



Overall Suit, Gloves and Boots for Field Service

showed that oxidized oils and water-absorbing colloids were in general the most resistant substances to "mustard gas." The oxidized oil-coated fabrics were best adapted to field use because they were weather resistant, although their resistance to "mustard gas" was considerably less than the hydrophilous colloids.

Early in August, 1917, a comprehensive investigation of gas mask materials had been started by the Experimental Station of the Du Pont Company at the request of the U. S. War Department. This work led to the same conclusions that had been arrived at by the Chemical Warfare Service, thus enabling the Experimental Station to submit quickly highly developed samples for protective clothing. These samples were tested by the laboratories of the Chemical Warfare Service and were then submitted with their recommendations to the Gas Defense Division, together with samples of fabrics that had been submitted by various other manufacturers in the United States. The Gas Defense Division selected the Du Pont oxidized oil-treated fabric as a standard for the preparation of union overall suits, and the entire Fairfield plant of the Du Pont Fabrikoid Company was placed at the disposal of the Gas Defense Division for the production of this material. Within a few weeks the capacity of the Fairfield plant had been reached. A larger plant was then secured for the production of this material on a scale commensurate with the requirements of the American Expeditionary Force.

Although the oxidized oil-coated material for protective suits was the best for the emergency and large quantity production was in progress, experiments were being pushed in the development of material for suits that would have a still greater resistance to "mustard gas." Among these was a coarsely woven cloth impregnated with oil, which was developed on a laboratory scale by the Chemical Warfare Service. This material permitted the free access of air to the body but filtered out the poisonous mustard vapor. Enough of this material was then made by the Newburgh plant of the Fabrikoid Company for the preparation of about 1200 overall suits, and these were sent to France for field tests. They were still in this stage when hostilities ceased.

The higher resistance of the hydrophilous colloidal materials to "mustard gas" and the superior comfort which they gave, due to their transpiration of moisture, recommended them for factory work where they were not exposed to the elements. The Du Pont Experimental Station had developed a fabric of this kind that was most satisfactory for the purpose, and a number of these suits were in use at the Edgewood Arsenal in September, 1918.

Although the preparation of this material was a novel process, an order for enough material to supply the factory needs was already started when hostilities ceased.

While oxidized oil-coated fabrics were best adapted for use in field suits, it was found that a heavier coated material was necessary for gloves and boots. Samples of the regular qualities of pyroxylin-coated fabrics that manufacturers had submitted were not found suitable for use as protective boots. By a few modifications of a standard quality of Fabrikoid, a material was obtained that answered the purpose and several thousand pairs of boots were made from it and were sent to France for field tests. These boots were made of pyroxylin-coated material in the form

of an old fashioned galosh reinforced with thin leather soles and were used as combination overshoes and leggings. The signing of the armistice occurred before the field tests had been completed, so no boot material had been adopted by the A. E. F.

In the development of protective gloves, because of the novelty of the processes, more difficulties were encountered than in any other part of the soldiers' protective clothing. It was finally found, however, that a pyroxylin-coated non-stretchable fabric was best adapted to the various conditions for which the gloves were used. Quantity production was an essential consideration; as labor was unobtainable, it was impossible to fill the orders for making gloves by coating fabric and treating the seams by hand afterward. The dipping process seemed to be the only solution of the problem, and the necessary dipping apparatus was accordingly provided. Suitable solutions were determined, and methods of dipping and drying were developed. When these processes were ready to be placed on



Semi-permeable Protective Suit for Factory Use

a factory scale, final samples were submitted to the Gas Defense Division and a contract was drawn up. Part of the Newburgh plant was remodeled for this work, and within a few weeks this novel process had become a factory procedure. Several hundred thousand pairs of gloves were in the process of manufacture, and preparation had been made for many times that number when hostilities ceased.

Coincident with the other investigations that have been cited, highly resistant curtain materials were developed for use in covering the entrance of dug-outs during gas attacks. Many of the front-line troops relied upon these dug-outs for protection during a gas attack. Three types of curtains were developed at the Du Pont Experimental Station. They had been tested by the laboratories of the Chemical Warfare Service and were considered sufficiently promising for field tests. Orders by the Chemical

(Continued on page 25)

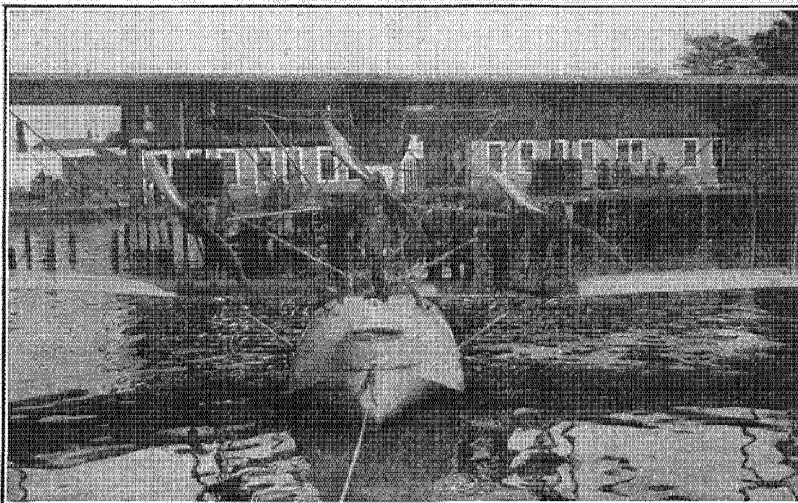
Fabrikoid in the N. C. 4

THE first airplane to cross the Atlantic was upholstered in Craftsman Fabrikoid. In this plane every detail was thoroughly considered from the standpoint of actual service requirements, and adopted only after exhaustive tests. Infinite caution and minute scrutiny of every component part were vital to success; price was not considered.

Fabrikoid was found to have just the qualities which were needed. Being absolutely impervious, there was no danger of its absorbing moisture from the fogs and clouds encountered. This would increase the weight to be carried and make the upholstery soggy and uncomfortable. Freedom from moisture, too, avoided the danger of its freezing and becoming stiff at high altitudes. Then, Fabrikoid has the rugged wear-and-weather-resisting qualities needed in an upholstery material that must stand severe

usage and almost constant exposure on an aerial voyage.

Fabrikoid was not an experiment on the N. C. 4; it has been used extensively in airplane construction ever since planes have been built in quantity.



© Underwood & Underwood
N. C. 4 at Government Dock, Washington, D. C. This Photo Shows Secretary Daniels Seated Beside Lieut. Commander Read in the Cockpit, which is Upholstered in Fabrikoid

When the United States Aircraft Production Board laid its plans for quantity production of training and fighting planes, orders were placed for thousands of yards of Fabrikoid of the best grade by factories building these planes. Many of these planes have been used for long periods, in every part of the United States and Europe and under the most strenuous conditions,

yet no single complaint of any difficulty due to the upholstery material in them has ever been reported to the Du Pont Fabrikoid Company. So far as can be learned from actual service tests Fabrikoid is the ideal upholstery material for all types of flying machines.

Lead-Silver-Zinc Mining

(Continued from page 8)

crimper, which makes a flat crimp about $1\frac{1}{4}$ inches wide, close to where the fuse enters. If fuses are to be used in very wet work, the junction of the cap and fuse is waterproofed by dipping or painting it with a standard capsealing compound made specially for that purpose.

The use of the less sensitive types of explosives, in connection with high grade blasting accessories, is doubtless an important factor in minimizing blasting accidents. The record of this district, in its comparative freedom from blasting accidents, is most commendable.

The storage of explosives in this district has been a problem because of the broken topography of the country. Narrow canyons, steep hills and congestion of buildings at the mines, have in several instances compelled the use of underground magazines. Tunnels are driven, apart from any other mine workings, back into solid rock about 100 feet, and a room is chambered out and lined with cement or timbers. Boards or wooden racks are put in to keep the cases of explosives off the floor and away from the walls. About 30 to 60 days' supply of explosives is stocked. This underground storage, although not considered by authori-

ties as ideal, because of dampness and limited ventilation, has nevertheless proved to be satisfactory for temporary storage. Where conditions permit, outside powder magazines of standard specifications are provided; that is, fire-proof, weather-proof, bullet-proof and properly ventilated. Blasting caps are never stored with explosives, but are kept in a separate magazine, or in a dry, safe place in a store-room.

The present cost of explosives (including blasting caps and fuse) per ton of ore broken varies considerably in the different mines, from a minimum of 11 or 12 cents per ton, where the ore is easily broken down, to a maximum of about 32 cents, where the material is hard and the veins narrow. These costs also vary from month to month in the same mine. The variation may range from 18 to 30 cents per ton, depending largely upon development work pursued, and whether blasting operations were productive or unproductive of ore. A fair average cost is rather difficult to strike, but in most cases probably 24 to 26 cents per ton is the average, where the ores are hard and tightly confined. Stated in another way, a ton of ore is extracted with from .5 to 1.5 pounds of explosives.

Making Prairies and Multiplying Manpower

Geo. D. Lowe

FOLLOWING the example set by Wisconsin in the white pine cutovers, the Georgia State College of Agriculture during September and October operated, along new and unique lines, a demonstration train called the Georgia Land Clearing Special. The topography of the coastal plain of the South—the yellow pine belt—is such that after the stumps are removed, the land is virtually of the rolling prairie type, while Northern Wisconsin land is hilly and broken. The Wisconsin Land Clearing Special carried only equipment used in land clearing, but the Georgia project featured tractors also. The basic idea was to show the farmers how to multiply manpower with tractors and machinery of other kinds, as well as to teach them the modern methods of getting rid of the stumps that prevent the use of such mechanical aids.

The Georgia Land Clearing Special was operated as a cooperative project under the auspices of the State College of Agriculture. The Railroad Administration, the Georgia Landowners' Association, E. I. du Pont de Nemours & Company, Inc., Williamson Steel Stump Puller Company, Hercules Manufacturing Company, through Stevens Hardware Company, International Harvester Company, Southern Moline Plow Company, Cleveland Tractor Company, W. J. Dabney Implement Company, Oliver Chilled Plow Works and McCord & Satterfield Tractor Company, cooperated in staging eighteen demonstrations in south Georgia.

The train was composed of nine cars, and the general method of operation was modelled after the Wisconsin plan.

Alfred Mathewson, the Du Pont representative on the Wisconsin train, went to Athens when the project was first launched to advise the college authorities in matters of detail. Because of the tractor combination, the southern train was much larger and more pretentious than the original Wisconsin train.

The deeply taprooted, highly resinous stump of the longleaf pine has been a baffling problem to the land clearers of two centuries in the coastal plain. The stump

is hard to burn in place, very difficult to dig out, and is extremely resistant to decay. Nature plays little part in its eradication. The character of this stump caused the tide of settlement in the Carolinas and Georgia to sweep over from the coast islands to the oak and hickory uplands of the interior, leaving the pineries for more than a hundred years to the uses of cattle rangers and sheep-men. When

Agriculture finally gained a foothold, the "lightwood" stump dominated farm practice, forced the cultivation of crops that could be grown in rows among stumps, and required the use of plows that could be swung around them.

Fortunate in the possession of an ample supply of cheap farm labor, the settlers of the coastal plain have made fair progress in recent years, but they have been confined in their efforts to raising crops that may be grown in rows, crops that produce a minimum of feed-stuffs and foodstuffs. Cotton, cane, tobacco, peanuts, corn and upland rice could be grown among stumps when there was ample labor; and so long as the labor question did not vex them, farmers in the coastal plain area made little effort to eradicate stumps.

South Georgia is the most highly developed section of the yellow pine belt, but there are spots in Alabama and Mississippi that have made as great progress as any part of it. One Georgia county produced 50,000 bales of cotton in 1917, yet not one-fourth of the fields there are free of stumps; an Alabama county shows about 60 per cent of stump-free land, which is the record, so far as known, in the coastal plain.

Every method known to the land clearer has been used on the "light-wood" stump, but the average farmer long since grew apathetic and resigned himself to the small plow and the row-crop. It has furnished the stump-puller its hardest task and the agricultural blaster his most difficult problem. The taproot is a buttress against wind pressure; it tapers downward to a point which is sometimes fifteen feet below the surface. The blaster cannot get his charge under it, and the puller is practically working



Upper: A Deep-rooted Pine Stump Before the Blast
Lower: After the Explosion—The Demonstrators Did Their Work Well

against the whole earth, whereas the white pine stump of the Northwest is difficult only because of its bulk. A puller-demonstrator who has worked on both the Wisconsin and Georgia trains says, that a fifteen-inch yellow-pine stump offers more resistance than a white pine stump six feet in diameter.

The characteristics that make the lightwood stump so hard to handle give it a salvage value above all other stumps in the United States. It is literally soaked in resin and turpentine, and from it, by various processes of destructive distillation, are made a long list of products. The pine stump makes fine fuel for the open fireplace, so dear to the southern heart. Unless the present supply be conserved, the lower South will some day feel its loss.

Through the efforts of the distillation companies, the method of blasting this stump has been rendered more economical; also, by recent work of Du Pont blasters, further improvements have been made. In order to blast this stump economically with dynamite, it is necessary to bore a hole into the taproot. The boring problem is quite difficult, but is now in a fair way to be solved with outfits that come within the reach of the large farmer and the contract blaster.

When the boll-weevil made the production of cotton extremely hazardous in the lower South, farmers began to diversify their activities, and they found the stump much more in the way than before. At the same time, they lost thousands of negro laborers, some frightened away by the change in farming methods and others drawn to the industrial districts of the East and West. As a result of this labor exodus, some sections lost headway and retrograded to a considerable extent, but south Georgia turned to the production of hogs, peanuts, velvet beans and tobacco, and land values steadily advanced. Immigration from the upper South continued to invade the section, and the stump was the only dark spot in the prospect.

At this point, the State college and other agencies for agricultural uplift decided that a leaf from the Wisconsin book would start south Georgia to eradicating the stump. Many farms were beginning to need the wood that was in the stumps; the market for stumpwood for distillation was good; but laborers were so scarce that many farmers realized that they must use more machinery. Land values had advanced to a point where farmers begrudged the room a stump occupied. The time seemed ripe to change the psychology of the south Georgia farmer; to start him to thinking in terms of tractors, instead of cotton mules; of gang plows, instead of "boy dices"; of mowers, reapers and harvesters, instead of hand operations, made necessary by the handicap of stumps; of adequate preparation, instead of futile scratching the ground, and of soil-building with legumes and rotations, instead of a single crop that depletes the soil.

It is doubtful if any demonstration train ever operated in the country with better prospects of accomplishing its object. The reaction of the farmers to the work has been all that the promoters could wish. The attendance has averaged 2,000 at each demonstration point and, around

the dynamite work, the crowds have been too large for efficient instruction. Farmers have come 150 miles to see the stump-blasting operations and to witness ditching with dynamite. Tractor salesmen following the train say that their sales have been extremely satisfactory and that their books show numerous prospects among men who have announced their determination to get rid of their stumps this winter and buy machinery next year.

The first demonstration was given on a farm near a growing town of 8,000 population. The land was valued at \$150 an acre; yet there was an average of 73 stumps to the acre, each taking up sixteen square feet of space.

Another demonstration was held under the shadow of the million-dollar packing plant of Swift & Company, at Moultrie, Georgia, on land worth \$200. Here the manager of the plant said that if his people had not seen the prairies of the West before the stumps were removed, no such investment would have been made by them in Georgia.

At Tifton, the demonstration field was in sight of the new packing plant of Armour & Company and on the grounds of the Coastal Plain Experiment Station, now being established by the State of Georgia.

The territory penetrated by the train has raised Georgia to fourth place in hog production in five years; to third place in peanut production, and it has increased the production of "bright" tobacco from three million to twenty million pounds this year.

The demonstration of ditching with dynamite has been the outstanding feature of each day's work. An extremely wet year put drainage foremost in the minds of many farmers and town officials. South Georgia will unquestionably see much ditching done by the "giant laborer" from this time on. This work has been extremely effective and convincing and has been given wide publicity. Contracts for thousands of feet of ditch have been offered on the fields to the dynamite crew; in fact, one of the helpers, a competent blaster, left service on the train to do work on his own account.

The Georgia Land Clearing Special was really the outgrowth of the county agricultural demonstration work done by E. I. du Pont de Nemours & Company Inc., last winter. Publicity given to the increased efficiency and reduced cost of stumping by methods now in use brought about a demand for a larger project, which resulted in the State College of Agriculture taking the matter up and giving it proper direction. Until that time no special interest in the stump problem had ever been shown.

Theoretically, stumping should have preceded farming in this territory, but it did not. From now on, however, it cannot be doubted that stumping operations will be carried on rapidly. The Georgia Land Clearing Special fulfilled its mission in showing how stumps can be removed economically, and how farming practice in that district can be improved.

Greater constructive work has not been done for any one section of the country than this promotive effort in south Georgia.

The Collar Develops

FOR ages collars of one kind or another have been worn about the necks of men, sometimes for restraint, sometimes for ornament, and sometimes for utility and convenience. Tennyson suggests the use for restraint in this line from his *St. Simeon Stylites*—"A grazing iron collar grinds my neck." For prisoners and slaves of early times commonly wore bands of iron around their necks either as a means of restraint or as a badge of their servitude.

Collars of another kind have been worn as an evidence of distinction by kings and others in high office. Charles V. of France, in the fourteenth century, granted to his chamberlain "the right of bearing at all feasts and in all companies the collar of Cosse de Geneste, which was a chain of couples of broom-cods linked by jewels;" and a collar similar to it was worn by Henry IV. of England, on the way to his coronation. After the Wars of the Roses collars of this type were a favorite decoration, particularly during the reigns of Henry VII. and Henry VIII. As a mark of dignity decorative collars of this kind are still worn by English officials, although only on occasions where tradition rather than choice rules.

The ordinary white collar, as an article of utility in men's apparel, may have developed from either of the other types mentioned. Occasionally, one may see on the street a passer-by whose collar is so tightly drawn together as to suggest all the discomforts of the ancient St. Simeon, with his iron collar. Occasionally, too, a collar may be observed with such ornamentation as to suggest the kingly collars of knighthood days. Portraits of Henry Clay and Daniel Webster show these distinguished statesmen with their necks encased in the starched stiffness of the so called "choker collars," and as one looks at their portraits the impression grows that freemen even in their period were compelled by the dictates of fashion to wear the badge of their servitude.

Then came the more comfortable lapel collar. Later on the fold collar was developed, and it marked man's emancipation from most of his collar discomforts.

Although the conventional white collar is almost universally worn for its utility and neatness, it soils easily and wilts in contact with water or perspiration. This involves high laundering costs. In late years, too, the initial cost of these collars has forced many men to purchase cleanable collars, not only because they are the only practical collars for men to wear at their daily tasks, but also because these collars have gained approval and wide

use by business and professional men, who are not accustomed to wear any inferior article.

Indeed, there is an increasing number of people who have discarded the use of the starched collar in favor of the modern cleanable collar, for aside from the high price of collars and high laundering costs, starched collars are short lived. Actual experiments have shown that 51 per cent of the life of a collar is taken out by laundries.

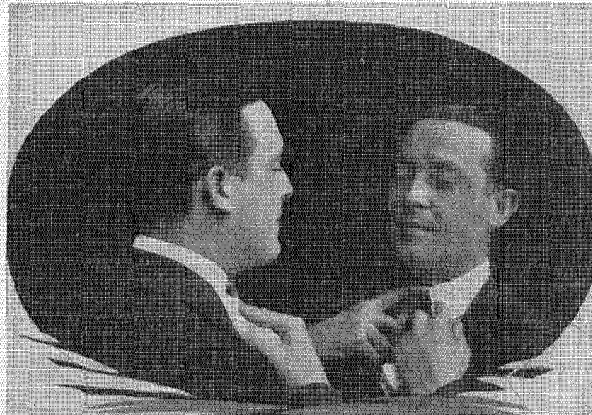
The way Challenge Cleanable Collars are now made,

they possess every essential of collar style, fit and appearance. Their base is a special grade of strong muslin, which gives them their long wearing quality; their outer surface is Pyralin, which is readily cleanable and gives them the required stiffness; and the so called "linen" finish of the collar, even to the stitched edge, is perfectly reproduced, to give the exact appearance of the expensive starch-stiffened cotton collar.

This modern collar, in addition to its finished appearance,

has the practical utility of being instantly cleanable. It may be cleaned on the wearer's neck by simply rubbing the surface with a damp cloth; or after wearing, by washing it with soap and water and then drying with a towel. It does away with laundry bills, and with the necessity of frequently changing one's collar during the day time. It is the ideal kind to wear on a railroad trip, or on a pleasure trip in an automobile. For followers of outdoor sports at all seasons of the year, it is the only practical collar because of its non-wilting and cleanable features. For traveling salesmen and tourists, it is particularly convenient; it eliminates the necessity of filling up one's wardrobe with a dozen or more starched collars. For policemen, trolley-men, firemen, trainmen, mail-carriers, army and navy officers—in short, all who are required to wear collars while on duty, these collars fill a real need.

It may be that men of future generations will adopt styles of collars very different from those now worn, for fashion is fickle and styles are subject to periodic changes. But regardless of form and style, the further evolution of men's collars will unquestionably be some modification of the cleanable type. The buying trend today is definitely toward practical utility in dress, toward the wearing of practical cleanable collars that combine economy and convenience with good style and appearance. No collars made today meet these requirements more fully than Challenge Cleanable Collars.



Ready for Any Emergency—It's a Challenge Cleanable Collar

Trapshooting Tournament Held Overseas

THE American trapshooting fraternity is proud of the fact that, when the first call for volunteers came, its ranks were depleted more than the ranks of any other sport organization. From 1917 to 1919 several thousand trapshooters were among the American Expeditionary Forces in France. The younger men sought service with fighting units; the older men, with the various welfare organizations.



General John J. Pershing opened the Tournament by shooting at the first target—and he hit it, too

Traps were first installed in France by the Y. M. C. A. at Chateau de Valencay, where at different times six or seven hundred officers participated in the sport. The Duke of Valencay also extended to these men the privilege of hunting on his vast estate, which embraces some eight thousand acres of forest land.

Because of the large number of men interested in the "sport alluring" and on account of its close relation to military training, a trapshooting tournament, open to officers and soldiers of the A. E. F. was authorized by General Pershing.

The management of this shoot was delegated to B. F. ("Buffalo") Smith, a Y. M. C. A. man who had wide experience in promoting trapshooting tournaments in this country. He undertook the work and, in a short time, arranged a program that attracted wide attention among the officers and men of several divisions.

On the morning of June 19, 1919, the plan of eliminating competitors, and the conditions of the tournament were determined. Previously there had been some elimination matches but there were fifty-seven entrants for the try-out on Friday, June 20th. After firing 200 rounds each, the number of contestants dwindled down to thirty-five, and after 100 more rounds had been fired, the number was reduced to twenty. Those who had kept the pace thru these qualifying matches were eligible to enter the final competition for 500 clay-pigeon targets.

A number of men who were sent from various divisions to shoot in the matches showed good form, but many of them had not had the advantage of trapshooting equipment at their stations and were consequently out of practice. Other ambitious shooters arrived late and it

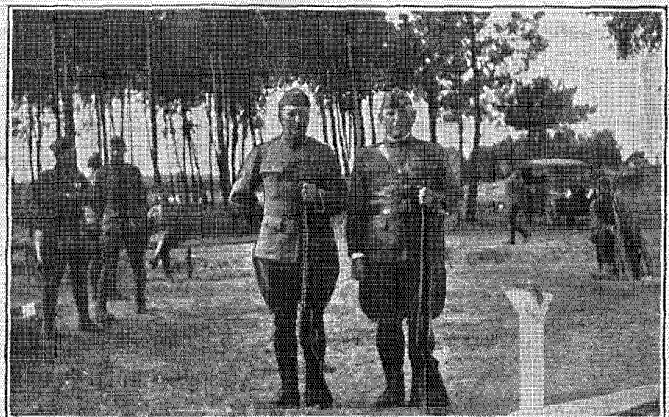
was impossible to give them much individual instruction.

The match was opened Monday morning, June 23, by General John J. Pershing, Commander-in-Chief, American Expeditionary Forces. He briefly addressed the competitors, and complimented them on their firing ability. He stated in substance that all classes of "fire" have a direct bearing on military training, and that those who show ability in the use of any firearm are able to instruct other soldiers on the important subject of aimed fire. General Pershing then advanced to the shooting station, gave the command, "Pull!" and as the target took its elusive flight, he fired. The aim was true. "Dead!" called the scorer. The General had broken the first target. The tournament then proceeded. One hundred targets were thrown for each competitor each day for five days.

Unfortunately, the weather conditions were not favorable for high scoring. Gusty winds frequently diverted the course of the flying targets, upsetting the calculations of the shooters.

First Lieutenant Larry R. Henry of Monroe, Louisiana, earned highest honors in the tournament by breaking 426 out of 500 targets thrown.

Second honors were shared in the main event by Lieutenant Colonel Lawrence E. Hohl of Lincoln, Nebraska, and Captain A. F. Griffiths of Brooklyn, New York. Both shooters scored 417. In the shoot-off,



"Buffalo" Smith (left) and his Aide Colonel Heally (right) developed the details of the Tournament, and insured the smooth running of each event

the superior officer won by a margin of two birds, scoring 24 x 25.

In like manner, a shoot-off was necessary to determine third honors. Both Major Louis R. De Roode of La Plata, Maryland, and Lieutenant A. A. Schwarz of Portland, Oregon, had brought down 414 birds. But the Major was declared the winner, when he shattered 23 of the 25 targets, defeating his rival by two birds.

The services of Mr. Smith were valuable in instruction, in promoting interest in the tournament, and generally, in handling the many details of the program. It is not too much to say that the success was in a large measure due to his energy and efforts.

Camphor and Camphor Trees in China

WITH the approach of winter housewives begin to arrange, on the cupboard shelf, various home remedies that are so useful when the youngsters exhibit the first evidence of colds. You may depend on it that a "camphor" bottle will stand in the front rank. There is nothing of apparent interest in the crystal-clear liquid except its medicinal properties, yet in its manufacture there are several interesting facts that the average housekeeper knows little about. The youngsters know only that it is good for colds and that, when compounded with sugar on a teaspoon, the dose contains far too little sugar in proportion to the camphor, even if only a drop from the bottle is added.

A great deal of the camphor used in the United States is imported from Japan and the Island of Formosa. However, the camphor industry in China is an important one in which both family and governmental interests are involved. Families are principally interested in the joint ownership of trees. It is not uncommon for a family that numbers as many as 2,000 people, considering both direct and collateral relations, to hold an equity ownership in a single camphor tree like the one illustrated.

Before such a tree can be sold, however, a license must be obtained from the central government authorities, and also from the local officials. After permission to sell a tree is secured, the sale takes place, and the proceeds, which average \$225 for a tree, are divided among the owners with regard to their several equities.

Unfortunately in China, the practice of manufacturing camphor results in the destruction of the tree. First the tree is felled and the trunk chopped into small pieces or chips of convenient size for the retorts. When the retort is filled, water is added, and a fire is built to carry on the simple distillation process. The camphor volatilizes under

the action of the steam, passes through a condenser, usually a bamboo pipe, and terminates in a wooden tub of cool water, where it is collected as camphor and camphor oils. It is a primitive process in China and a wasteful one for although the upper branches and leaves do not contain as much camphor as the larger members of the

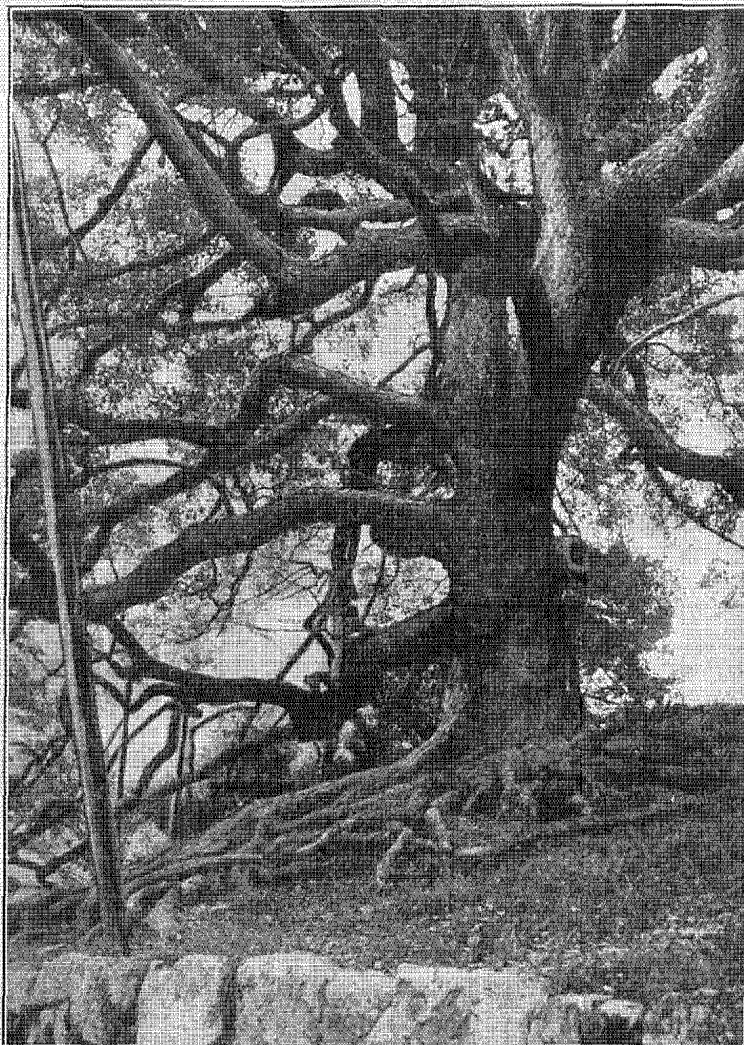
tree, the Chinese lose some of the product when leaves and branches are used for fuel.

Notwithstanding the primitive means employed and the loss of part of the product, the average yield of a tree is about one-half ton of camphor—enough to provide spirits for every household in a large city.

Some camphor is being produced in this country, and it is believed that eventually American production in Florida will suffice to take care of domestic needs. Thirty-six years ago the United States Department of Agriculture purchased a tract of 3,000 acres near Palatka, Florida, and planted camphor trees in long hedge-rows. This camphor farm is today a splendidly developed area. Hedge cuttings are gathered once or twice a year and distilled in accordance with modern chemical practice. By this method the life of the hedges is preserved and the product can be obtained

annually for many years. Considering that the life of the camphor tree in China is about 500 years, there is little fear that the industry in America will be short lived, for the trees thrive as well in certain favored sections of Florida as they do in China or other sections of the East.

In 1913, The Arlington Company, now one of the Du Pont American Industries, purchased a tract of approximately 12,000 acres at Waller, Florida, as the starting point in developing a large camphor farm.* This is probably the largest acreage devoted to camphor growing in America.



This camphor tree is centuries old. Photographed in Kiangsie Province, China. The limbs of the tree are so valuable that the owners prop them up with heavy timbers to insure against their breaking down during high wind storms.

* A description of this plantation was published in the July 1918 number of this magazine.

Transparent Pyralin Sheeting in the Air

The Latest Use of this Interesting Material of a Thousand Uses

FROM advertising novelties to curtain windows for automobiles; from baby rattles to safety goggles and gas masks; from toilet articles to scientific instruments—these are only suggestive of the wide range of uses for Pyralin sheeting. New uses for this product are constantly developing in the novelty and utility fields. One of the very latest uses belongs to the field of aviation.

The aeroplane has followed the natural evolution of other vehicles of transportation; utility first, then the refinements. From the uncovered ox-cart developed the prairie schooner with its protective hood. The enclosed carriage was an outgrowth of the early type of horse-drawn vehicle. Textbooks on American history show the first steam engine drawing an open carriage in which the passengers were exposed to the open air. Today modern railway cars are enclosed even to the vestibules. Similarly, the first trolley cars were built on the "summer car" pattern, but they, too, have generally given place to the enclosed type. The first automobiles were not provided with tops or enclosed bodies, yet the tendency of today is toward enclosed cars of the limousine type. Likewise, when the Wright brothers first took the air in their epoch-making aeroplane, protection against the winds and chills of the aerial regions was given little consideration; it was a refinement that awaited its turn in the evolution of the plane. Behold now the passenger aeroplane built to carry twelve people comfortably inclosed in a compartment with transparent Pyralin windows.

Pioneer aviators encountered many difficulties in making flights. Many of them were due to mechanical imper-

fections in the construction of the planes. Others were linked with the question of control, and still others were concerned with the equipment of the aviator himself. The development of the gas motor solved the question of power. Through experiments the Wright brothers learned the secret of control, and demonstrated it,

transparent wind shields made of Pyralin or other similar products. These shields protect the driver or observer without obstructing his vision.

Another difficulty arose from the fact that, as a plane flew from the comparatively warm atmosphere near the earth to the heights above the clouds where the air has the frigid qualities of the

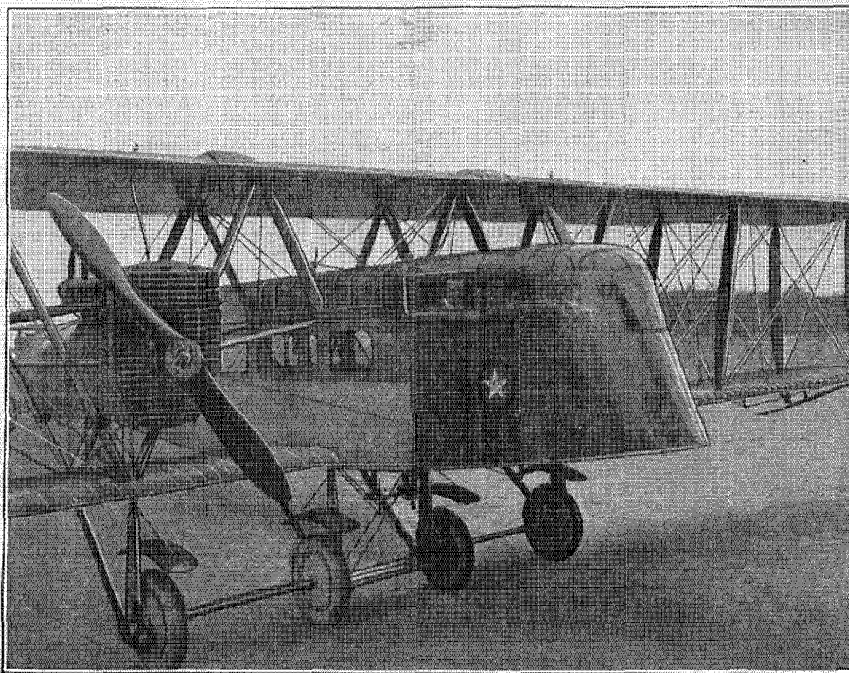
Arctics, the need of warm protective clothing became imperative. While this condition was overcome in part by the use of heavy protective clothing and head and ear shields, these were only make-shifts, and were not satisfactory for planes carrying passengers who were unaccustomed to sudden atmospheric changes.

During the late war the aeroplane played an important part. American manufacturers concentrated on the task of building various types of war planes for use in Europe. The best mechanical minds of

the country were set to work, and they brought out many improvements that will be adopted in the commercial planes of the future. Some of these improvements, introduced as protective mediums during the war, will doubtless be adapted for the greater convenience of aerial passengers of the coming day.

Plans were being perfected to manufacture a large fleet of army transport planes for service in France when the war ended. These planes were designed to carry at high speed a large force of soldier passengers to repel sudden enemy attacks in any sector of the line where the regularly stationed fighters might be in need of reinforcements. Each plane was planned to carry, in addition to the pilot and his mechanic, ten fully-equipped soldiers. One can well imagine the number of

(Continued on page 52)



© Underwood & Underwood

The First 12-Passenger Army Transport Plane Driven by an 800 H. P. Motor and Equipped with a Pyralin-covered Nose

but the equipment of the aviator was given little consideration until the late war brought the subject to the front and paved the way for revolutionary changes.

One of the difficulties of the aviator had been to withstand the constant air pressure against his body while the plane was in rapid flight. Flying against strong head winds added to his discomfort. With no protection other than the characteristic head mask, goggles and closely woven garments, trouble from this cause was experienced even on a calm day when the machine was flying at high speed. This difficulty was largely obviated by improvements in the design of aeroplane bodies. Modern planes are so made that only the head of the driver projects above the top of the cock-pit, and the late models are equipped with

Home-Made Christmas Decorations

CHRISTMAS is preeminently the children's day, and no home where the merry laughter of children is heard is without some sort of Christmas tree.

It is, however, not necessary to have a tree burdened with tinsel ornaments from the shops. Children really enjoy simple things more than elaborate ones. The value of more personal and simple decorations is doubly enhanced because their manufacture is a part of the thrillingly happy Christmas preparations.

A great many simple paper ornaments which are both effective and inexpensive can be made at home by the children or grown-ups. Some cardboard, a few sheets of stiff, white paper, a can of Du Pont Gold Enamel are all the materials needed to make a large number of tree ornaments.

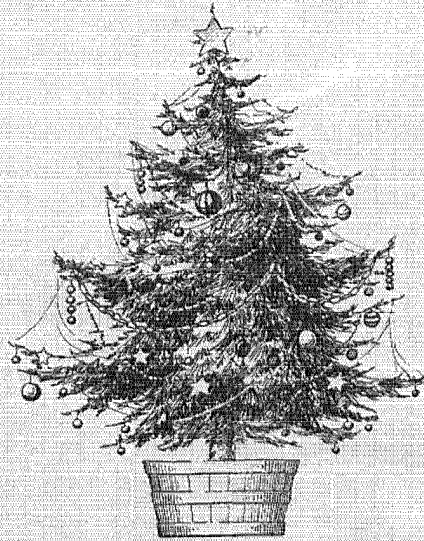
Here are some suggestions: First a single star, larger and more beautiful than all the rest, for the topmost bough, to recall to the merry makers that other star which flamed above an Eastern hillside on the first Christmas eve nearly two thousand years ago.

This star should be five pointed and can be made of cardboard as follows: Cut three stars exactly the same size, one of cardboard and two of smooth, white paper; cover the cardboard with the paper stars, by pasting them together. After the paste has dried, gild the star on both sides with Du Pont Gold Enamel.

Strings of paper disks decorate well and are easily made. It is best to paint the paper with the Gold Enamel first, and after the enamel has thoroughly dried, cut out the disks. These disks should be perfectly round, a pair for each disk, for they must be the same on both sides. When the disks are cut out, lay one down bottom side up, and cover this with good paste. Then lay a white cotton string across the center of the disk, and place another disk directly over the first one, being careful that the edges are exactly even. Paste each disk on the string about one-half inch apart. All the disks on some of the strings may be of one size; on others they may be graduated to quite small ones at the ends. Allow about ten or twelve to a string, with six inches of string at the end to tie to the tree.

A paper link chain can be made of narrow strips of paper that have been previously covered with Du Pont Gold Enamel. These strips of paper are pasted together to form inter-linked rings.

Rubber balls that are broken slightly



Why Buy Christmas Tree Ornaments When You Can Make Them Inexpensively at Home With Gold Enamel and Pegamoid Aluminum Paint?

and are no longer useful as such, may be coated with the enamel and suspended on a thread. Eggshell ornaments made of "blown" eggshells, cornucopias, strings of two-inch stars, pine cones and walnuts, which have been covered with Du Pont Gold Enamel, all add radiance to the tree.

Attractive costumes for Christmas and New Year parties can be made of some simple muslin, or even cheese-cloth, decorated with tinsel and gold enameled paper disks. Such a costume, finished with a gilded paper hat and a pair of slippers that have also been gilded, (for Du Pont Gold Enamel works very well on kid) is very attractive for a "kiddies" party.

All of these ornaments can also be made with a silver or frosted finish, which contrasts nicely with the gilded trimmings. The silver finish is obtained by using Pegamoid Aluminum Paint, another Du Pont product.

Du Pont Gold Enamel and Pegamoid Aluminum Paint, which can be used to make all of these decorations, are very different from other prepara-

tions of the kind. The pyroxylin bronzing liquid of which they are composed produces a neutral transparent film that prevents the oxidation of the powder and protects it from the air. The original brilliancy is thus preserved much longer than with other preparations.

The Gold Enamel is put up in combination packages containing Du Pont Bronze Powder and Du Pont Bronzing Liquid ready for mixing. The Pegamoid Aluminum Paint is sold in quarter-pint cans. You can obtain from your dealer or direct from us, postpaid, a quarter-pint can of Gold Enamel for 65 cents and Pegamoid Aluminum Paint for 55 cents. Both products will serve in the preparation of a large number of ornaments.

Development of Soldiers' Gas-Protective Clothing

(Continued from page 17)

Warfare Service for field-test samples of these materials were filled only a few days before hostilities ceased.

Not one of the materials that was required for soldiers' protective clothing was prepared by a regular factory procedure and, with the one exception of boot material, radical changes in the factory processes were required to produce them. These rapid and radical changes in factory processes are evidences of co-operation between the various departments and are also demonstrations of the ease with which the Du Pont Fabrikoid organization can adapt itself to current conditions.

In common with most war work, the signing of the armistice marked the termination of experimental work on the development of materials that had not reached the factory stage, and the close of production of materials that were already being produced at the Fabrikoid plants with a rapid adjustment of these plants to a peace-time production.

The Du Pont Fabrikoid Company feels that the intensive research and plant work done on these projects has greatly increased its laboratory and technical knowledge of coated fabrics. The lessons learned under the stress of war requirements will be thoroughly applied in the products needed by a world at peace.

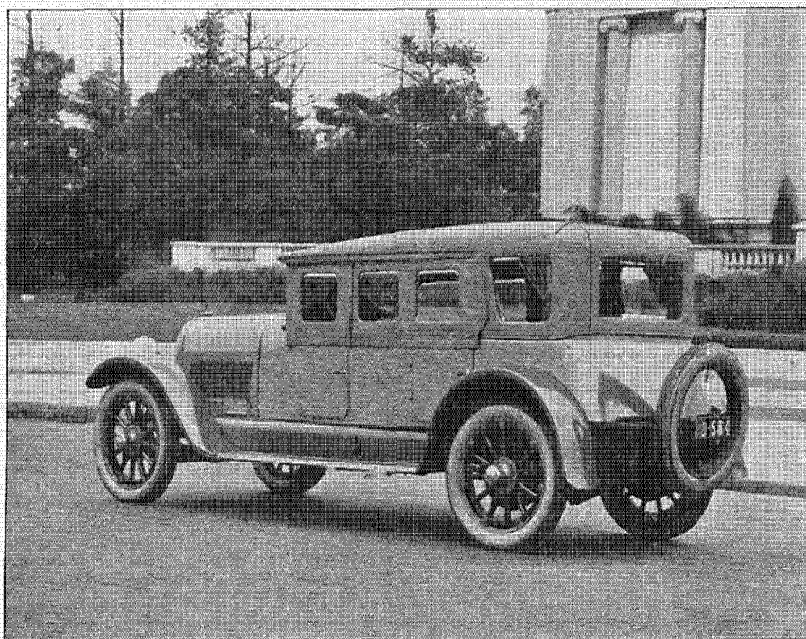
The "Class" Permanent Top

THE construction of tailor-made, permanent tops built on artistic lines is no longer confined to California and the West Coast. Tops of this type have become too generally popular to be localized in manufacture, and, as a result, various shops in the Middle West and the East are now equipped to produce them. One of the first shops to take up the idea east of the Mississippi and to acquire an enviable reputation for turning out shapely, smart tops was The General Top Co., of Cleveland, Ohio. The accompanying illustration shows one of their "Class" Permanent Tops, a top of distinctive elegance which gives the ordinary open car all the individuality and beauty of the fine custom-built model.

The "Class" top can be fitted to any open car, being designed to conform to and accentuate the lines of the particular car on which it is built. It is a rigid, permanent top, being constructed upon a strong framework of wood and steel, which is metal anchored into the body of the car. This eliminates all vibration of the top and makes it an integral part of the car.

The "Class" Top is covered with heavy-weight Moorish Fabrikoid, and the curtains are of the same material. Fabrikoid is generally used for tops

of this type wherever they are built. It is the ideal material for this purpose, as it combines great beauty with superb endurance. It is rugged, wear-and-tear-defying and challenges every test of travel. Heat, cold, rain, snow, dryness, alkali dust, atmospheric gases,—none of these affect Fabrikoid. In California, where tops



The "Class" Permanent Top

of this type are in use by thousands, and have been for the past three years, the material has proved to be unchangeable in service and just as permanent as the top itself.

It is apparent that on a top like the one illustrated there is no bending or flexing whatever of the covering material, and that the characteristic most needed in the material is chemical

stability—the quality of keeping its texture and its good appearance unchanged. The pyroxylin coating of Fabrikoid imparts this chemical stability to an almost absolute degree. Besides, the material is stain-proof as well as waterproof and weather-resisting. The covering is not subjected to bending or friction, because it is al-

ways supported in place by the upholstering underneath and so keeps its shape perfectly.

In upholstering the "Class" Top, the rigid wooden frame is first covered with heavy webbing, tightly stretched. Over this webbing is tacked a strong canvas cover, upon which is spread a thick layer of curled hair. Layers of cotton wadding are laid upon this curled hair and the whole is built up into the desired shape. This stuffing is covered with muslin to keep it in position. The Fabrikoid is then stretched into shape over the

muslin and firmly fastened down.

All this work is done by skilled craftsmen. The beauty, style and permanency of the finished top, evident to anyone who has paused to admire cars so equipped, well repay the car owner for the cost and trouble.

The "Class" Top must be seen without side curtains attached to get the best idea of its beauty.

The Plague of Bookworms

A RESIDENT of Santos, Brazil, complaining of the bookworms in his library, says he has tried camphor, naphthalin and formalin without any success.

As in other things, an ounce of prevention is worth a pound of cure in the treatment of bookworms. It certainly is a difficult matter to get rid of the worms once they are in the book, but it is a splendid insurance against their depredations

to buy books that are bound in Fabrikoid.

In Brazil, the Philippines, India, Egypt and tropical countries having an exceedingly warm climate, the immunity of Fabrikoid from attacks of bookworms is well known. This material is surfaced with a pyroxylin film, which, being absolutely impervious to the bookworm, prevents its entry into the book covers and, consequently, into the body of the book.

The film is also inedible by minute animal life and, better still, is repellent to the various small worms and insects that "lunch" on leather bindings and bindings of cloth and paper.

It is not at all difficult to have books bound in Fabrikoid, or to have them rebound with it. Bookbinders the world over are familiar with this material, and it is obtainable at all the leading bookbinders' supply houses.



Look for the Tag on the Bag

You get out of luggage only what its maker puts in. Service is determined by workmanship and material. Workmanship is a big factor but material is basic. The best workmanship cannot guarantee service unless the material used will give it.

**DU PONT
FABRIKOID**
REGISTERED
*Craftsman Fabrikoid Luggage
is now made by the following well-
known manufacturers:*

American Leather Goods Co.,
Philadelphia, Pa.
The Belber Trunk & Bag Co.,
Philadelphia, Pa.
Berg Auto Trunk & Specialty Co.,
New York, N. Y.
Buffalo Trunk Mfg. Co.,
Buffalo, New York.
Katz Bros. Leather Goods Co.,
New York, N. Y.
J. F. Parkhurst & Son Co.,
Bangor, Me.
Petersburg Trunk & Bag Co.,
Petersburg, Va.
H. W. Rountree & Bro. Trunk &
Bag Co., Richmond, Va.
J. H. Seitz & Son,
Philadelphia, Pa.
Seward Trunk & Bag Co.,
Petersburg, Va.
Samuel Sherman,
New York, N. Y.
Travelers Bag Mfg. Co.,
Cleveland, Ohio.
Union Trunk & Bag Co.,
Richmond, Va.
Virginia Trunk & Bag Co.,
Petersburg, Va.



Craftsman Quality

makes every piece of Craftsman Fabrikoid luggage rugged, sound and serviceable, because it is water-proof and easily cleanable; immensely tough and strong. Responsible luggage makers use it because they know it will fully sustain their reputation. You may purchase a bag or suitcase made of Craftsman Fabrikoid secure in the knowledge that it will save you money and give you service.

Our Trade Mark is Your Protection

It identifies luggage made of real DuPont Fabrikoid Craftsman Quality and is plainly stamped on the bottom of each piece.

Du Pont Fabrikoid Company

Wilmington, Delaware



DU PONT AMERICAN INDUSTRIES

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

of Wilmington, Delaware

WISHES TO ANNOUNCE that neither it, nor any of its subsidiaries or affiliated companies, nor any of its officers or directors, is in any way connected with, or interested in, the Nemours Trading Corporation, the Allied Industries Corporation, the Merchants and Manufacturers' Exchange or the French-American Constructive Corporation; sometimes indefinitely referred to as "the du Ponts, of Wilmington."

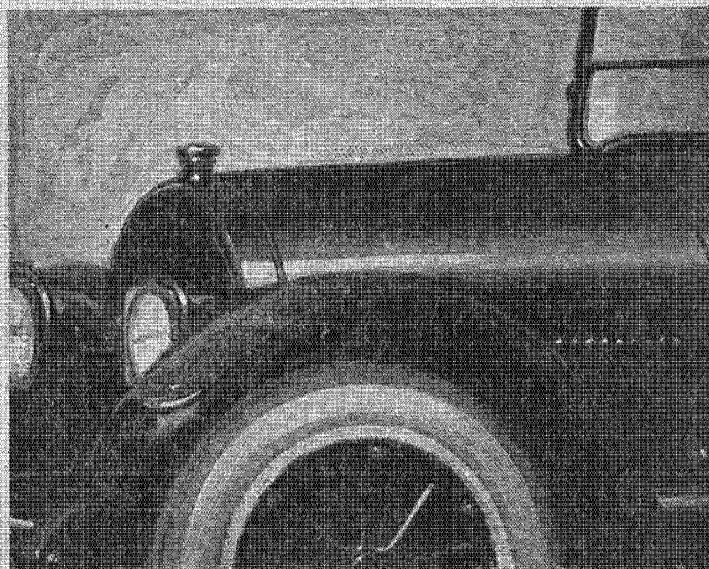
The above corporations, because of similarity of names adopted for some of them, are frequently confused with the DU PONT AMERICAN INDUSTRIES and the E. I. DU PONT DE NEMOURS EXPORT COMPANY, which are subsidiaries of E. I. du Pont de Nemours & Company, Inc., of Wilmington, Delaware.

The sale of the products of E. I. du Pont de Nemours & Company, Inc., and its subsidiary companies—outside of the United States and Canada—is handled by its subsidiary corporation, the E. I. DU PONT DE NEMOURS EXPORT COMPANY, with headquarters at 120 Broadway, New York, U. S. A.

All advertisements of the subsidiaries of the E. I. du Pont de Nemours & Company, Inc., bear its trademark—

Wilmington, Del., November 30, 1919





Guess work and uncertainty about arriving are gone from motoring, insofar as the Cadillac is concerned.

One characteristic that charms its owners, is the train-like regularity with which it can be depended upon to keep up with a pre-arranged schedule, on short, or long distance tours.

Arrival at destination, at a specified time, is almost entirely and exclusively, a matter of the speed at which the Cadillac owner cares to drive.

It will reel off the miles with clock-like certainty—with the same never varying, smooth, steadiness—at any rate he chooses, from the lowest to the highest.

It will keep on doing this, not merely hour after hour, but day after day, and if need be, week after week.

It will do it without balking or flinching—arriving at its destination, the

same cool, quiet, unflustered, and unflurried Cadillac, as when it started.

And, better still, the passengers arrive, not harassed, but rested—not worn with weariness, but freshened and exhilarated, by the buoyant, floating, quality, of Cadillac travel.

These things are not our testimony.

They are the every-day common-places of Cadillac experience.

They are the things that make the Cadillac stand out distinct and luminous among a multitude of motor cars.

They are the things that impel people to ask if any other car could possibly be so depended upon—and invariably inspire the answer:—"No—This is a joy peculiar to the Cadillac."

They are the natural, logical, result of a thoroughness that is not satisfied with ordinary criterions, but makes its own standards and constantly raises them higher and higher.

CADILLAC MOTOR CAR COMPANY / DETROIT, MICH.

DU PONT AMERICAN INDUSTRIES

Makes Luggage New



DU PONT

LEATHER RENEWER

The Ideal Dressing for Leather

Renews worn, discolored or shabby luggage, hand bags, and all articles of leather or leather substitutes with a glossy black finish that will not crack, chip or rub off.

Prices

½ pint, 65c 1 pint, \$1.10 1 quart, \$2.00

For Brighter Homes



DU PONT

GOLD ENAMEL

Permanently Brilliant

For bronzing radiators, picture and mirror frames, fixtures and all household ornaments. Preserves its original brilliancy much longer than other preparations.

Prices

⅓ pint, 50c ¼ pint, 65c ½ pint, 90c

Takes Off Tar



DU PONT

PONTOKLENE

The Tar Remover Without a Rival

Removes tar, grease, road oil, dust and scum quickly and easily. Not only cleans but restores the finest finish to its original lustre.

Price—\$1.00 a quart can

For Breaks & Tears



DU PONT

HOUSEHOLD CEMENT

Makes Permanent Joints

A waterproof, transparent cement for the thousand and one household needs. Mends perfectly bric-a-brac, china, wood, leather, Pyralin and all ordinary materials.

Price—30c a large tube

DU PONT CHEMICAL WORKS

WILMINGTON, DELAWARE.

DU PONT

DU PONT AMERICAN INDUSTRIES

For the convenience of buyers considering the purchase of any Du Pont product, and desiring specific information, this coupon is printed. Upon receipt, it will be forwarded immediately to the proper office for attention

Fill In, Cut Out and Mail This Coupon

(Du Pont Magazine, December, '10)

Advertising Division
E. I. du Pont de Nemours & Co., Inc.
Wilmington, Delaware

Date

EXPLOSIVES

- ☐ Blasting Powder
- ☐ Blasting Supplies
- ☐ Charcoal
- ☐ Clay Mining
- ☐ Farm Explosives
- ☐ Industrial Dynamites
- ☐ Land Clearing
- ☐ Permissible Explosives
- ☐ Refined Nitrate of Soda
- ☐ Road Building
- ☐ Saltpetre
- ☐ Tree Planting
- ☐ Wood Pulp

SPORTING POWDERS

- ☐ Black Sporting Powder
- ☐ Hand Trap
- ☐ Hunting
- ☐ Pistol Smokeless Powder
- ☐ Resort Shooting
- ☐ Rifle Smokeless Powder
- ☐ Shooting in Colleges
- ☐ Shooting on Boats
- ☐ Smokeless Powder
- ☐ Trapshooting

PAINTS

- ☐ Automobile Finishes
- ☐ Barn and Roof Paint
- ☐ Colors in Oil
- ☐ Concrete Floor Paint
- ☐ Concrete Paint
- ☐ Enamels
- ☐ Flat Wall Finishes
- ☐ Floor Paints
- ☐ Floor Varnishes
- ☐ Floor Wax
- ☐ House
- ☐ Industrial Paints
- ☐ Japans
- ☐ Marine Paints
- ☐ Metal Preservative Paint
- ☐ Mill White
- ☐ Railway Paints
- ☐ Red Lead
- ☐ Shellac

- ☐ Shingle Stain
- ☐ Smokestack Paint
- ☐ Structural
- ☐ Varnishes
- ☐ Varnish Stain Finishes
- ☐ Wagon and Implement Paints
- ☐ White Lead in Oil
- ☐ Wire Screen Paint
- ☐ Wood Filler
- ☐ Wood Finishes
- ☐ Wood Stains

PIGMENTS

- ☐ Artificial Vermilion
- ☐ Dry Colors
- ☐ Litharge
- ☐ Lithopone
- ☐ Pulp Colors
- ☐ Rubber Makers White
- ☐ Toluidine Toner
- ☐ White Lead
- ☐ Zinc Chromate

CHEMICALS

- ☐ Acids
- ☐ Alums
- ☐ Barium Chloride
- ☐ Belt Cement
- ☐ Bronze Powder
- ☐ Bronzing Liquids
- ☐ Carpolene (Wood Preservative)
- ☐ Carpo (Metal Paint)
- ☐ Coke
- ☐ Creosote
- ☐ Dead Oil
- ☐ Distilled Water
- ☐ Ether
- ☐ Heavy Chemicals
- ☐ Household Cement
- ☐ Leather Renewer
- ☐ Leather Substitute Solutions
- ☐ Mantle Dips
- ☐ Metal Lacquer
- ☐ Nitre Cake
- ☐ Parlodion
- ☐ Patent Leather Solutions
- ☐ Pegamoid Aluminum Paint

- ☐ Pitch
- ☐ Pontar
- ☐ Pontoklene
- ☐ Pyralin Enamels
- ☐ Pyrcxylin Solutions
- ☐ Salt Cake
- ☐ Shingle Oil
- ☐ Solvents
- ☐ Split Leather Solutions
- ☐ Waterproof Cement
- ☐ Wood Lacquer

PYRALIN

- ☐ Brushes
- ☐ Challenge Cleanable Collars
- ☐ Colored Sheeting
- ☐ Combs
- ☐ Desk Sets
- ☐ Manicure Sets
- ☐ Mirrors
- ☐ Novelty Sheeting
- ☐ Pyralin Rods and Tubes
- ☐ Pyralin Specialties
- ☐ Pyralin Toilet Goods
- ☐ Toilet Sets
- ☐ Transparent Sheeting

COATED TEXTILES

- ☐ Auto Truck Special Fabrikoid
- ☐ Book-Finish Fabrikoid
- ☐ Buggy Aprons
- ☐ Craftsman Fabrikoid
- ☐ Fabrikoid for Baggage
- ☐ Fabrikoid for Home Uses
- ☐ Fabrikoid for Railroad Upholstery and Vestibule Curtains
- ☐ Fabrikoid for Upholstering
- ☐ Fabrikoid Sheeting
- ☐ Fairfield Rubber Coated Cloth
- ☐ Hat Sweat Material
- ☐ Marine Special (U. S. Standard) Fabrikoid
- ☐ Motor Fabrikoid
- ☐ Rayttite Fabrikoid Auto Top Material
- ☐ Rug Anchor
- ☐ Shoe Fabrikoid

Name Position

Your Address (If Personal)

Name of Concern (If Company)

Address of Company

BUSINESS: ☐ Manufacturer; ☐ Producer; ☐ Jobber; ☐ Dealer;
☐ Consumer. (Check which)

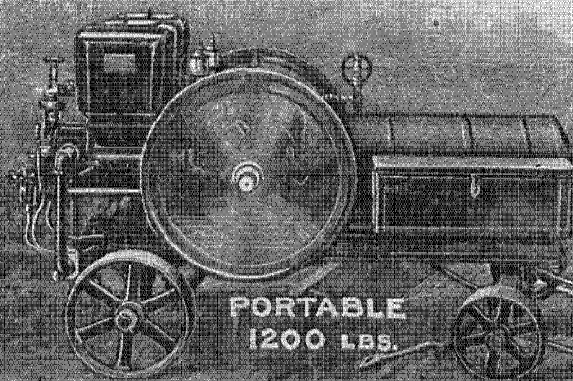
What Du Pont Products do you sell?

If a user, for what purpose does the product checked, or that which you now use, interest you?

SPECIFIC QUESTIONS SHOULD BE ASKED IN AN ACCOMPANYING LETTER

DU PONT

ROCK DRILLING AT 1/10 COST



CHRIS D. SCHRAMM and SON, Inc. HOME OFFICE: 709 ARCH STREET, PHILADELPHIA

Transparent Pyralin Sheeting in the Air

(Continued from page 24)

troops that a fleet of these transport aeroplanes could deliver to the battle line on short notice.

The necessity of protecting these aerial troops en route suggested the enclosed passenger compartment as a substitute for furnishing to each man an additional supply of clothing and equipment that would be unnecessary and in the way after the troops landed. Obviously, the pilot of such a plane, too, should be able to see and direct his course behind some protective transparent shield. The designers and manufacturers gave much thought to this problem. The use of ordinary glass was considered impracticable because it might be shattered by the impact of machine gun bullets or by the jar of landing, in either case involving the hazard of serious injury to some of the occupants.

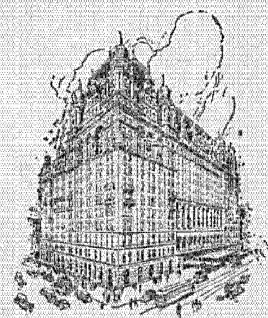
The problem was finally solved by the use of Transparent Pyralin Sheeting, 85/1000 inch thick. This sheeting is tough, strong, non-shatterable and so transparent as to give the pilot and his passengers a clear view.

Although the army transport plane was developed too late to see service in France, the manufacturers went forward with its construction according to the plans made. Recently the first plane was completed, and the method of construction is shown in the illustration on page 24. This plane, which is the first army transport plane in the world, has its nose completely

covered with the Pyralin sheeting through which the pilot can always see clearly, no matter how high the altitude or at what speed the plane may be traveling.

Delivery of this machine to the government was recently made by aerial flight with four passengers, a pilot, a mechanic, a government representative and one of the officials of the aeroplane company. The 200 pounds of baggage carried is scarcely worth mentioning except as it suggests the freight-carrying possibilities of a machine of this type. The plane flew from Cleveland to McCook Field, Dayton, Ohio, a distance of 215 miles in 110 minutes, or at an average speed of 117.2 miles per hour. The big machine cut through the clouds and maintained an altitude of 10,000 feet throughout the greater part of the trip. As the plane descended toward the earth the air-speed meter registered 150 miles per hour, but neither the changes in temperature nor the extreme speed had any effect on the Pyralin covering of the nose through which the pilot was looking.

The pilot had never before flown in a plane completely enclosed and protected; nevertheless, from the take-off to the perfect landing made at the end of the trip, he guided the plane with perfect ease. Few people realize the nicety of judgment required to negotiate a safe landing with a plane traveling 75 miles an hour at the landing, and



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weighing about four and one-half tons. The fact that so perfect a flight was made under such conditions is a tribute to the pilot's skill. And the fact that the Transparent Pyralin Sheeting so completely met the service test on the pioneer army transport plane, augurs well for its continued popularity as a product of proved worth for aeroplane builders.

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