SCIENCE NEWS

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THE PROPOSED RAILROAD FROM THE UNITED STATES TO ALASKA

A WARTIME railroad from the United States through Canada to Alaska, instead of the projected military highway, is an engineering possibility. A road of steel connecting industrial America with our northern strategic outposts in Alaska, on the face of it, has many advantages over the road for trucks that has been authorized.

First of all, it could probably be built almost as quickly. It would be able to carry about twenty times as much freight. It would need practically no rubber, prime strategic material of this war, whereas the highway would be only useful with a major expenditure of this precious material for truck tires.

Lying idle in this country are enough good, second-hand rails to build the U.S.–Alaska route. The ties would come right out of the forests along or near the route. Experience of rough-and-ready railroad engineers shows that low-speed freight service can be maintained over track laid with little ballast even over unstable ground such as would be encountered along part of the route. Just as in the case of older railroads, there would be crews of trackmen continually rebuilding the road, but this probably would be little more work than would be needed on a freight highway.

Whether there is a chance that the Government's plans can be revised rapidly enough to get such a strategic railroad underway at this crucial time is not known. There are experienced railroad engineers, many of them in other sorts of engineering, who would be eager to plunge into this new pioneering adventure. Within a matter of days, with red tape hacked away, the two bands of steel could be started northward. There would be a re-enactment of the scenes of America's westward ho! days when steel was laid across the continent. There would be the spirit of the construction gangs that even in these days push mining railroads into untapped country to haul out mineral riches.

Without burdening the Army with the task, an engineering staff could be swiftly organized, experienced trackmen requisitioned from railroads in the country and some of the CCC lads put to work on the job to supplement the labor already in the areas.

With fast action, tractors and other construction machinery could be borrowed from Alaskan and Canadian mines and taken to the line of the railroad over the still frozen ground, ready for a summer of intensive work.

One freight train would carry many times the burden of a whole convoy of trucks. The fuel of the railroad engines would be obtainable from Alaskan and other coal mines whereas the gasoline for trucks on the proposed highway would have to be hauled in tank cars from the south.

In the minds of engineers the sound of sledge on spike is heard already hammering a new road to victory—if railroading has a chance at building this essential link.—WATSON DAVIS.

CONSERVING POWER

THROUGH recent improvements, more power is being obtained from the same fuel and the same amount of metal, thus conserving both these needed materials in the war effort, was pointed out by Dr. Lionel S. Marks, emeritus professor of mechanical engineering at Harvard University, in a Sigma Xi lecture before the Polytechnic Institute of Brooklyn. As a representative of the Society of the Sigma Xi, he will lecture at several other universities and colleges in the next two weeks.

Professor Marks spoke only of the immediately and practically available sources of power. He described a large power windmill, a more efficient water turbine, new alloys that retain strength at higher temperatures than metals formerly employed—thus permitting higher temperatures on which higher efficiencies of steam and gas engines depend, a steam plant that holds the world's efficiency record for this type, a mercury-steam plant that is still more efficient, and the gas turbine which though not as efficient as the others has other advantages.

The first large power windmill, Professor Marks stated, is now being put into operation. Its capacity is over 1,300 horsepower. Its "wheel" has but two blades like an airplane propeller. But they are 16 feet in maximum width and sweep out a circle 175 feet in diameter.

A new water turbine, the Kaplan "wheel," is also built like an airplane propeller and maintains its high efficiency at both light and full loads, contrary to the usual turbine for which the efficiency falls off greatly at light loads.

New alloys that maintain strength at 1,000 degrees Fahrenheit have made possible a steam-turbine plant that takes superheated steam at this temperature and 2,300 pounds pressure per square inch. This plant develops a thermal efficiency of 33.5 per cent. from coal to electrical output, a record for a steam plant. With ordinary steels the strength diminishes rapidly as the temperature is raised above 700 degrees and since thermal efficiency depends on the top temperature, turbines using these steels are necessarily less efficient.

A still higher efficiency record of 37.5 per cent. has been made by the mercury-steam turbine. This is higher than that of any other engine, including the Diesel engine. The advantage of this dual system is that saturated mercury vapor at 1,000 degrees has a pressure of only 180 pounds per square inch. It is expanded in a turbine to 458 degrees and then used to raise steam to 460 pounds pressure which drives another turbine. In this way more work is obtained from a pound of fuel and the pressures to handle are much more manageable and permit of lighter construction.

The gas turbine, of which much has at times been expected, can not at present compete in the high efficiency field. The main difficulties are lack of materials strong enough at the required high temperatures and of a compact and efficient compressor. However, if the goal of high efficiency is abandoned, there is available now a gas

turbine of great compactness, simplicity and low cost and possessing other advantages, which is being considered for locomotives. Its efficiency of 16 per cent. puts it about midway between steam and Diesel locomotives.

AIRCRAFT FACTORIES IN BRITAIN

UNDERGROUND stone quarries begun 2,000 years ago in Roman times now are giving sanctuary to British aircraft and war industry factories under constant threat of Nazi air raids. The story of how two of these factories were set up underground is told in a recent issue of the British journal, *The Aeroplane.*

In the first site surveyors, guided by quarrymen who alone knew the planless cities of darkness, made their blueprints for a factory to be artificially heated, ventilated and lighted. One surveyor who strayed from his party was lost for two days. When the quarry was mapped, workmen and electricians swarmed through the cool, dark corridors and the ancient stone, once chipped by hand, now yielded to swift pneumatic drills. Except for adding another million cubic yards of space and strengthening supports, engineers made their factory comply to the quarry. It was unnecessary to widen or straighten the streets and avenues. Walls and roofs were painted yellow to bind the fine dust which could damage precision machinery. Elevators and escalators were built for factory workers and machinery, fluorescent lights installed, ventilators built and canteens and lavatories provided for.

This site is now nearly complete. Six hostels, each quartering 1,000 men or women, are planned, and married quarters for another thousand. The latter will be little bungalows, built in pairs. There will be front and back gardens, even lawns.

The second underground factory is now complete. It is entirely air-conditioned, and the temperature kept from 60 to 65 degrees Fahrenheit. The main canteen, or restaurant, is above ground, but a small room for making tea is underground, and tea is served on trolleys to men and women at work. A feature of this factory is the Control Room, built in an old seepage pit. It is linked to all parts of the factory by telephone, loudspeaker and microphone. Hourly production records are made, and by a glance at the charts the managing director can keep check on any section of the plant. In both underground factories, irreplaceable machines and skilled workmen are safe from the most severe bombing.

THE SHORTAGE OF DRUG AND RELATED PLANT SUPPLIES

WAR has caused an acute shortage in plants used for drugs, insecticides and cooking herbs, yet all that we are missing of the four most important vegetable drugs could be supplied from less than 1,000 intensively cultivated acres, according to a statement made by Professor William J. Bonisteel, of the department of botany of Fordham University, at a meeting in New York City of the Herb Conference.

The pre-war supply of these small but important quantities of pungent and potent plant products came from a large number of sources. The war cut off the supply from more than fifty countries, and reduced our total drug imports from overseas by over 55 per cent.

Amateurs were warned against plunging optimistically into the breach, despite the fact that all the missing drugs and related products can be raised somewhere or other in the Western Hemisphere. Finding congenial soils and climates is a job for skilled botanists rather than for inexperienced beginners.

The four drugs that could be raised in sufficient quantities to supply all U. S. needs on 1,000 acres are digitalis, belladonna, stramonium and henbane. Of digitalis, the standard heart remedy, we need only as much as can be raised on 100 acres; to meet the needs of all Western Hemisphere countries only 200 acres would be enough. A large number of growers are raising digitalis now, and will probably meet the demand adequately.

Belladonna was raised in quantity last year, but the quality was low. For the 1942 season a New York firm is undertaking a program of supervised cultivation by a number of growers. Henbane also seems to be on the way to successful domestic production.

Stramonium is a product of the common jimsonweed, that grows wild in great abundance. Professor Bonisteel suggested that Boy and Girl Scouts might perform a patriotic duty and at the same time raise funds for their troops by collecting it.

Some of the other drug plants that can be satisfactorily cultivated either in this country or elsewhere in the Hemisphere include castor oil beans, ginger, orris root, citronella, henna, ergot, and the numerous pungent seeds of the anise-dill-fennel group.

STEEL

THE toughness of the steel used in our best guns and best armor plate is due to the electric furnace. Stainless steel, so familiar now to the public, would be impossible without the electric furnace. These facts were brought out at the opening session of the Nashville meeting of the Electrochemical Society.

The electric furnace has brought about great changes in the steel industry during the past twenty-five years. Not only can far higher temperatures be attained but the atmosphere above the molten metal can be controlled to a nicety with the electric furnace, whereas in fuel-fired furnaces large quantities of heat are carried away by the thousands of cubic feet of air which are passed through the furnace.

Even in Australia and Brazil, modern methods and the electric furnace are used. Dr. Frank R. Kemmer, of Larchmont, New York, recently returned from Australia, discussed the electric steel industry in that country and described a new steel alloy plant recently erected in Newcastle. W. A. Darrah, of Chicago, discussed the electric steel industry in Brazil.

The use of electrical methods in the production of magnesium, of elemental phosphorus, and in the dewatering of clay were discussed by other speakers.

VITAMIN A CONSUMPTION LIMITED

ALL vitamin A preparations for human use were limited to 5,000 units per person per day by the War Pro-

duction Board in a new order which replaces that issued last February 10. The order does not apply to preparations containing 25,000 units or more per gram. The new order is designed to prevent any shortage due to hoarding or to real lack of fish oils. It increases the amount of vitamin A available for poultry raisers and breeders as an aid to stepped-up egg and meat production. Under the old order, multi-vitamin pills, tablets, capsules and liquids only were limited to the 5,000 units—the amount deemed advisable by medical consultants. The new order applies to all products containing vitamin A, including fortified foods.

Concerning poultry feeds, the old order permitted use only of oils containing 12,000 A units per gram or less. This restriction is now removed. In addition feeds used for breeding are permitted 2,000 A units instead of 1,000.

The purpose of the order was to direct vitamin A consumption into channels where it would do the most good. Domestic poultry must depend largely on artificial provision of vitamin A, since it does not have access to natural foods. Poultry which does not get sufficient vitamin A produces fewer eggs, and chicks have less chance to live. On the other hand, multi-vitamin preparations for human use contained as much as 15,000 A units for daily consumption before the WPB restriction, an amount far in excess of human need. Since the first order applied only to these preparations, and not to fortified foods and candies, it was believed to be unfair and partially ineffective. The purpose of the restriction on human consumption is to prevent a shortage of this vitamin needed by infants and young children for growth and by them and adults as an aid to health and good eyesight.

While no one in Washington is certain, it is believed here that the rumored vitamin A shortage of last fall and winter was artificial, created by commercial vitamin producers to spiral prices. A current survey of vitamin A stocks by the Office of Price Administration, while not conclusive, indicates there will be no vitamin A shortage this year if supply and demand continue as they have in recent months. The most important factor in continued vitamin A production, in the absence of foreign fish oil exports to this country, is the soupfin shark of the Pacific Coast. An additional supply is available in Mexican fish oils. Both sources are uncertain. Continuation of vitamin A taken from the soupfin shark is dependent upon three factors, whether the supply of sharks will hold out, whether prices for shark liver, where the vitamin is stored, will remain high enough to stimulate fishermen, and whether Japanese submarine activity will keep Pacific Coast fishermen ashore. Mexican fish oil supplies are uncertain for similar reasons.

ITEMS

AIR over desert mountains is often as arid as the land beneath it. Studies by Dr. Charles G. Abbot, secretary of the Smithsonian Institution, show that if all the moisture in the air above Montezuma, Chile, were to be brought down in a sudden shower, the rain-gauges there would show a precipitation of less than a hundredth of an inch. Precipitable water in the atmosphere over Washington, D. C., during summer may amount to the equivalent of an inch of rain. The Smithsonian Institution maintains observatories in many parts of the world. Information on amounts of water in the air is obtained as a byproduct of research on total solar radiation reaching the earth. Instruments at the observatories, read several times a day, yield the moisture data because water vapor in the air cuts off certain parts of the solar spectrum. Studies of these radiation data, as they vary before and after storms, indicate that the water that falls as rain or snow is not imported from long distances, but is gathered up in immediately surrounding regions. Also, the indications are that a rain or snow storm is not long in "gathering"; the moisture that is precipitated in a relatively short time, often leaving the air over a given region considerably drier than it was before the storm.

PORTABLE pumps designed primarily for fighting forest and grass fires have been found excellently adapted for combating incendiary bombs, according to *The Journal of Forestry*. They are built to throw a fine spray to a considerable distance, wetting down a maximum area—and this is exactly the treatment required for thermit-magnesium incendiaries. Manufacturers of the most successful forest-fire pumps are working day and night, for they must keep up the usual supply for the protection of our forests, and at the same time take care of a sudden large demand from government and war-industries purchasers.

MUCH-NEEDED vitamin A can be traced in fish tissue by means of ultraviolet light, is stated in the annual report of the Canadian Fisheries Research Board. Because vitamin A is fluorescent it picks up the invisible ultraviolet light and translates the rays into visible light. The problem of discovering which of various tissues is richest in A, and its extraction and concentration, is greatly aided by this technique. Both Canada and the United States are anxious to discover and extract every possible unit of this vitamin which not only aids pilots and navigators to see better at night, but also protects the body against colds and other infections. The United States exports about ten trillion units annually to Great Britain under lend-lease terms.

DR. LELAND R. JOHNSON, in an address at the seventy-eighth annual midwinter meeting of the Chicago Dental Society, reported that boxing gloves, celluloid mouth bits, even golf balls, may be useful in preventing the common dental condition in children known as malocclusion or faulty meeting of the upper and lower teeth. Boxing gloves may be tied on a youngster's hands at night to prevent thumbsucking, a frequent cause of malocclusion, according to Dr. Johnson, while to prevent "mouth breathing," another cause, a small celluloid mouthpiece can be held between the lips while the child is reading or studying. The habit of many children of sleeping with their faces on their hands or fists may cause malformed jaws. It can be prevented, Dr. Johnson said, by preventing children from sleeping on their stomachs. The cure consists of sewing a row of golf balls in the front of the child's pajamas, thus keeping the child sleeping on his back to avoid discomfort.