WOOD USE TRENDS IN EUROPE

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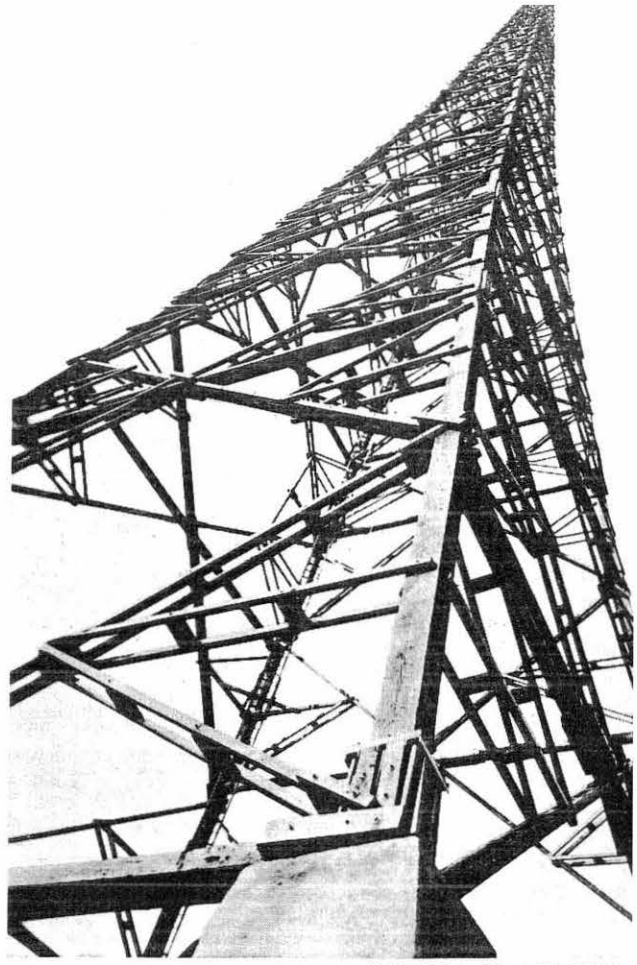


National Committee on Wood Utiliza

The radio tower at Stuttgart, Germany, constructed with modern connectors

MANY articles have appeared in the American press concerning European silviculture practices but little regarding their use of wood. It was therefore particularly gratifying to have the opportunity during the summer of 1937 to observe at first hand current wood use trends and activities in England and France and, as a "fellow" of the Oberlaender Trust, in Germany, Czechoslovakia, Austria, and Switzerland.

In all of these countries one is impressed with a recognition of the importance of efficient wood utilization to the general economic welfare, and with constructive measures being developed to encourage good practice and enlarge wood use. Broadly speaking, Europe's population is dense and increasing, while forest areas are limited and smaller than in the United States. Even with better forest practices their annual cut usually equals or exceeds annual growth. Generally, due to relative scarcity, wood costs are high and per capita wood use is low. Finally, other basic natural resources are much less plentiful within the European countries than here.

To illustrate, in Germany, where the economic situation is acute, the central form of government is distinctive from the other countries visited. Visualize a country of about one hundred million acres, or twenty per cent larger than California. The population of sixty-five to seventy millions is about one-half and the forest area of thirty million acres about one-twentieth of that in the United States. In other words, here is a country with a population density about ten times greater and a per capita forest scarcely one-tenth of that in our country. In addition, the supply of many other essential natural resources, with the exception of coal, is less than we are accustomed to in the United States. There is no gold, oil, gas, or cotton. The agricultural lands of Germany are reported to produce only eighty per cent of the necessary food supplies and there is a shortage of other resources such as iron and wool. Superimposed upon this situation, the government controls forest practices, quantity and quality of timber cut, allocation of wood to different uses, prices of new material and finished products, exports, imports, and wages and hours of employees.

Obviously, this leads to an intensity of forest utilization practices and developments practically and economically impossible under present conditions in the United States. Even Germany's great community forests, about which we have heard much in America, thrive primarily because of a shortage of wood and the nearness of forest supply to points of use. Yet under such favorable circumstances, all the people in a forest community do not get their sole livelihood from the management and cropping of forests. At one private estate, embracing some 50,000 acres of well-managed forested land, a sawmill, pulp mill, and lignite mine are operated within a five-mile radius of a population of 20,000, but only one-fourth of the population is directly or indirectly supported by the forest operations.

While the German situation is distinctive in detail from the other countries, the broad economic situation of population density and limited per capita forest production has its impact upon all European wood use practices. For example, Germany, striving to become self-sustained but still an importer of wood, is reported to be cutting from thirty to fifty per cent more than its annual forest growth. Recognizing wood as its second greatest natural resource, wood utilization is established as a major division of its Four-Year Plan. An active propaganda office disseminates information and encourages good practice, gives support to necessary research through its universities, technical institutions, and industrial concerns, and makes loans or subsidies for the industrialization of new products and processes.

In Czechoslovakia, a timber-exporting country, the

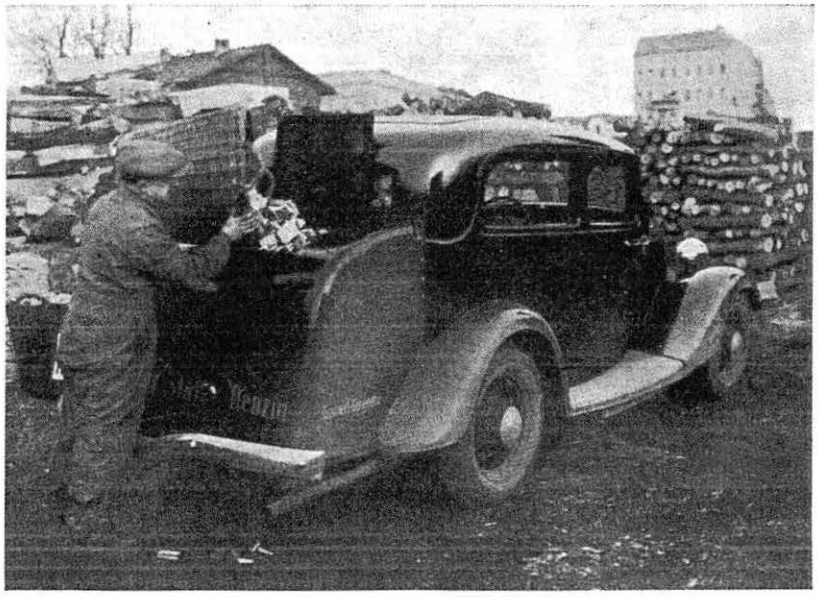
government aids associations of timber owners and timber producers. It actively encourages wider wood use and research for the development of new products.

Austria was similarly encouraging wood utilization, even to the extent of providing a partial subsidy to its rural people to help them install efficient wood-burning stoves for greater economy in the use of wood.

Switzerland, also a wood exporter, has its wood propaganda organization known as "Lignum," whose timberland owner members include the Swiss government. Not only does "Lignum" disseminate information and propaganda but certificates for good products and practices are furnished producers whose wood products meet specified standards of quality and performance. The costs of necessary tests and inspections in promoting this program are paid by the manufacturer.

France is also something of an importer. Yet through commercial organizations and with government contributions, the use of wood is encouraged and a special tax on the wood industries is devoted to education and research. With these funds a Forest Products Laboratory is now being built.

England imports ninety-five per cent of its wood supplies. The work of its well-known Forest Products Research Laboratory is supplemented by wood-use propaganda and development through the Timber Development Association.



Stopping to "fill up" with wood. In Europe, gas from solids is widely used in internal combustion engines. Wood-gas generators and engines are in common use in all sorts of vehicles, from private cars and busses to trucks and airplanes

In addition, the Department of Wood Utilization, with headquarters at Brussels, has been developed during the last three years. Affiliated as this is with the International Committee du Bois it is international in scope. Like the institutions of the several countries, it promotes wider and better markets for wood products and encourages research leading to better practices and new products.

The cumulative effect of such activities must necessarily benefit wood utilization. While specific problems and measures vary in the different countries there is a general recognition of the importance of using available wood supplies for products of high value, such as pulp, wood-wool, sugar, and alcohol, rather than for low-value products, such as fuel wood.

Because of food shortage in Germany and because of the high cost of crude oil and gasoline throughout Europe, attention is being given to the production of sugar and alcohol from wood. Raw wood sugar can be used for animal food, and with refinement for humans. It may be fermented with yeast to form ethyl, or "grain" alcohol to replace gasoline, or it may be used as a source primarily to grow yeast which may be used as cattle food when mixed with nitrogen compounds.

During the World War millions of gallons of ethyl alcohol were made from wood in the United States. At that time grain and sugar were scarce and prices high, but today our farm crops can supply all needs for food, and our oil wells can supply gas-engine fuel more cheaply than we can make it from wood. However, in Europe, improvements of techniques to increase yields and lower costs are impressive. In Germany, the Bergius and Schöller processes are receiving most attention. But even with improved technique, their relatively high wood costs make the cost of alcohol much higher than it can be produced from sugars and grains, and far beyond present gasoline costs in the United States.

A shortage of wool and the fact that Germany has no domestic cotton directs special emphasis to the production of wood-wool and wood-cotton. This is mixed with real wool and cotton in many textile materials and fabrics. By 1939 the production of wood-wool may equal one-fourth of the total consumption of textiles in Germany. Similar production and use is being encouraged in other countries. About one and one-fourth tons of wood pulp are required to make one ton of wood-wool.

The process, similar to that for making rayon, involves passing the dissolved cellulose through "diffusers" which make a thread smaller in diameter than usually used for rayon. This is followed by special treatment and the cutting of the final thread into fibers. At present wood-wool fibers are less flexible than real wool fibers, and their strength diminishes when wet. A mixture of sixteen to twenty per cent of wood-wool with real wool, however, is reported to make a satisfactory fabric. At present a certain percentage of wood-wool is required in all German uniforms.

With our abundance of cheap cotton and wool, this development is not so economically significant in the United States, but even here some wood-wool or staple fiber is being produced. Wood-wool is reported to have certain advantages in dyeing, among which are brighter color effects. Furthermore, it can be woven on existing cotton or wool textile machinery.

Lack of abundant supplies of gasoline has directed attention in Europe toward substituting gas from solids for that from liquid fuels in operating gas engines. Gas from wood, coal, peat, and other solid plant materials has been used for a generation. Prior to the World War,

the heavy equipment essential to remove tars limited its use to permanent rather than mobile installations. About twenty years ago the need of heavy auxiliary equipment was avoided by directing the combustion gases through the fire zone where heat is sufficient to crack or consume the tars. This discovery opened the possibility of using gas from solids in all internal combustion engines, a field of vital importance not only in Europe's domestic economy but in national defense as well. Italy, France, Switzerland, Czechoslovakia, and to a lesser degree Sweden and Great Britain, are fostering this development. In Germany, however, where gas-engine fuel by hydrogenation of coal is planned, and wood is needed for other purposes, it is not being so actively pushed.

Research work is bringing steady improvement in developing this combination of wood-gas generator and engine, so that it is being applied to busses, trucks, airplanes, pleasure cars, and stationary engines, but the wood must be of proper size and moisture content. Small blocks or fragments whose moisture content is under twenty per cent are commonly used, and some advantage is obtained by mixing

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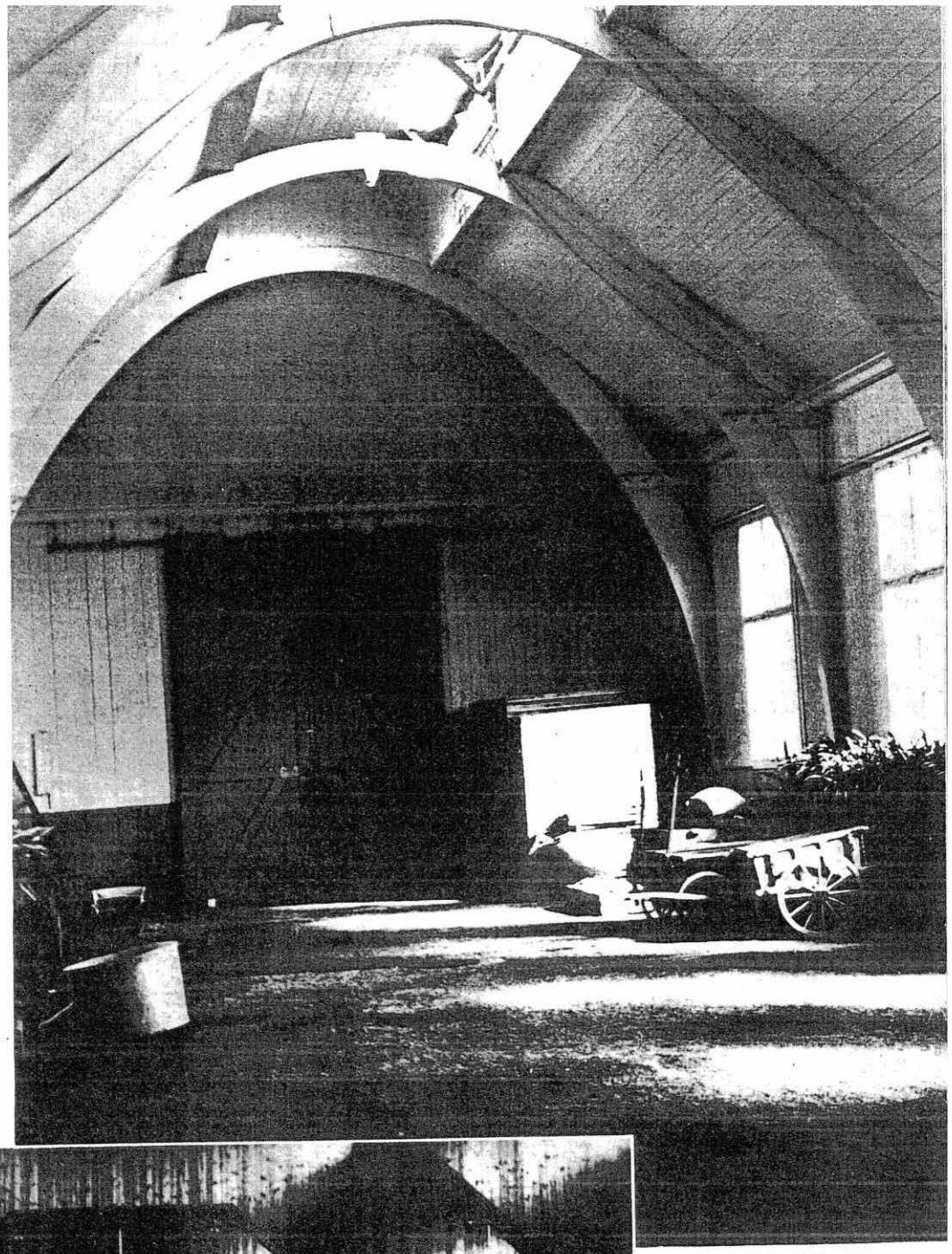
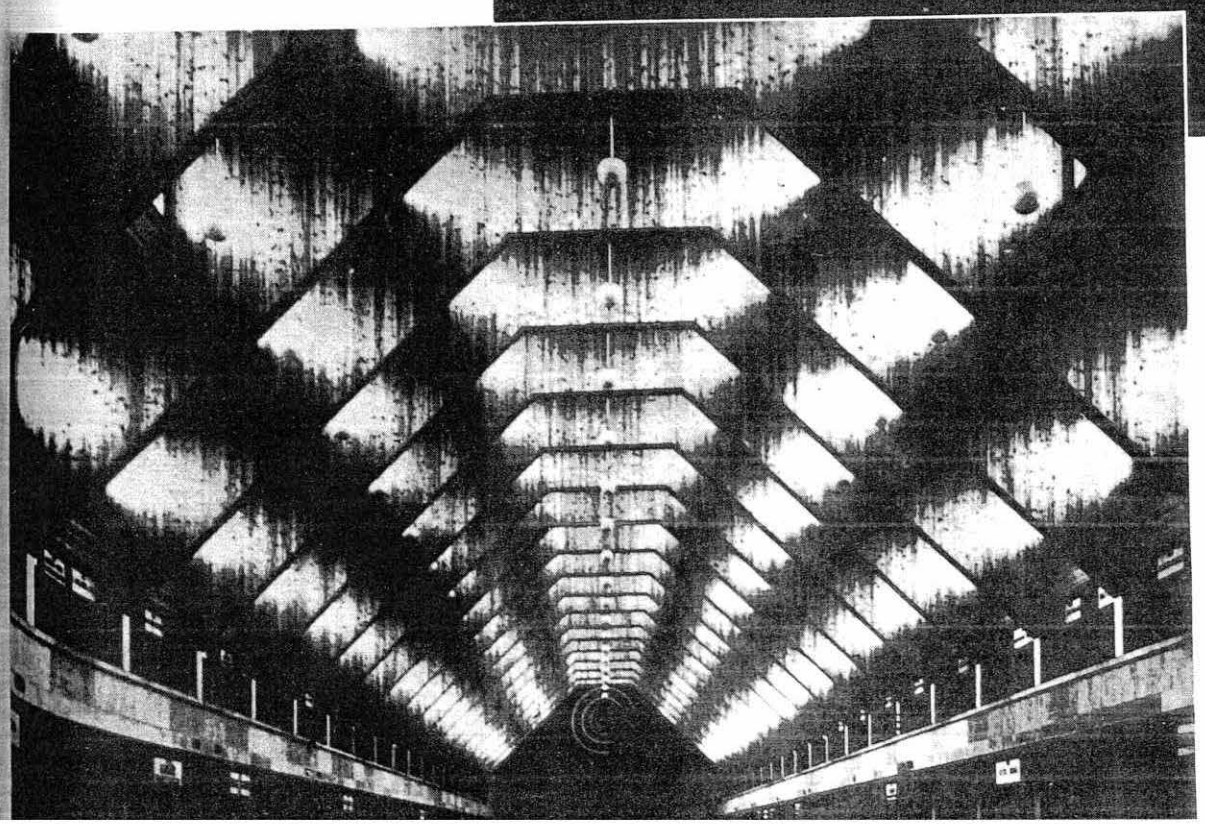


Forest Products Laboratory

Glued laminated arches used in an agricultural building at St. Gallen, Switzerland



Great exhibition hall at Berlin, Germany — constructed with modern connectors and showing the use of knotty spruce for covering structural timbers. (Courtesy Arbeitsgemeinschaft Holz.)

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softwoods with hardwoods. Allowing for the additional expense of equipment, a saving of sixty to seventy-five per cent in operating expenses is reported, as compared with gasoline costing forty-five to sixty-five cents a gallon.

An appraisal of this European development as applied to the United States must recognize that our present gasoline supplies and prices make it uneconomical except under very exceptional location where wood is plentiful and gasoline inaccessible. Further, the resulting displacement of the petroleum industry would have tremendous ramifications in our domestic economy. With gasoline taxes in 1936 approximating $800,000,000, any considerable decrease in gasoline consumption would necessitate adjustments in governmental expenditures or shifts of the tax burden. More than that, the loss to private capital invested in the oil industry would have to be considered. Obviously, this involves more than is included in the relative efficiencies of the two types of fuels.

In Central Europe wood is used less for exterior wall construction of residences and other small buildings than in America; on the other hand, it is more widely used for framing in industrial buildings, public auditoriums, radio towers, railway stations, and other large structures.

Glued laminated arches, trusses, and beams for larger structures were used in Germany until war-time food necessities left no milk available for casein glue. This stimulated the development of mechanical fastenings which we term modern connectors. The improved efficiency which resulted has stimulated use of timber in structures that formerly were only possible or economical when built of other materials. Radio towers near Munich, 525 feet in height, and near Stuttgart, 620 feet in height, are examples. Stuttgart has a civic auditorium, largely of wood, which is 165 feet wide, 330 feet long with a central height of some eighty feet, and a seating capacity of 10,000 people.

The lesser cost of connector-built structures, and the inability to afford the luxury of a possible superior appearance is probably responsible for the failure of glued laminated construction to regain its pre-war popularity in Germany.

Swiss architects and engineers have a high regard for timber construction. They use connectors for outdoor and industrial structures, and glued laminated construction for auditoriums, gymnasiums, and the like, where laminated arches afford a more pleasing appearance than do structures framed with connectors. The glued laminated construction has been continuously popular since its introduction in 1909, and members have proved highly resistant to chemical deterioration. Consequently, it is widely used in structures where steel or the metal in connector-built wooden structures would be subject to corrosion. Examples are chemical factories, barns, riding academies, locomotive shops, and storage buildings.

Under normal European conditions, timber is ten to fifteen per cent cheaper than steel. Native coniferous species are preferred for construction because of lesser cost. The Munich radio tower previously mentioned, however, is built of American longleaf, called locally "pitch pine," treated with a wood preservative. Each base section corner post consists of four pieces whose cross section is nine by nine inches, while the posts in the next higher section are seventeen inches on a side.

Apparently, about ninety per cent of the plywood gluing in Europe is by the hot-press method and ten per cent by cold pressing, presumably with casein glue. About half of the hot pressing is done with phenolic-resin glues, and about half with urea-resin glues. One company claims to have a glue that will give high water resistance in either hot or cold press gluing.

Use of wood in aircraft is finding considerable interest among European investigators. It has been reported that when airplanes require an engine of 3,000 horsepower, which is now deemed highly probable, the propeller, if made of metal and of present design, will weigh more than the engine. Thought is, therefore, again being directed toward wooden propellers. German and English propellers are being constructed with the outer portion of the blade of a light-

weight wood, and the inner, or hub section, of laminated wood impregnated with phenolic resin. In some propellers hardwoods and softwoods are combined. Each lamination is sawed about one-eighth inch thick but is pressed so hard in the lamination process that its thickness is reduced by one-half. The resulting propeller is very dense with an exceedingly great shear strength, which is important because the blades are detachable and are screwed into special strength steel hubs. Two American manufacturers are experimenting with the production of wooden propellers of this type.

Over-production and reduced exports of naval stores from the Landes region with resulting low prices has caused the French Government to reduce production some thirty to forty per cent. Even so, prices continued too high to allow French naval stores to compete for export. Accordingly, a trade agreement was arranged with England permitting mine props from turpentined trees to be exchanged for coal. France faces the problem of protecting the turpentine woods against forest fires much as we do in the United States, for during the summer of 1937 some 30,000 acres were destroyed by fire. French turpentine suffers from substitutes in paint production, as in the United States, but some advantages are held to exist in the use of varnishes containing turpentine as compared with cellulosic varnishes.

Desiring to be self-sufficient in naval stores production, Germany's investigations have led her to adopt innovations in chipping practices which differ from either French or American methods. At Eberswalde and Bernau, operations are planned on eight year workings. The chipping starts from above and proceeds downward each year. Also, the gum is directed along the smooth surface of the cut to a central groove leading into a clay cup.

Viewed broadly, and recognizing the changes from one decade to another, it seems that Europe is trending toward a timber cut in excess of timber growth. This, combined with an increasing population and the difficulty of improving the growth from forests already comparatively well managed, indicates why improved utilization is recognized as so important. There seems little possibility that our domestic market will ever be threatened with a continuous flood of cheap European wood. On the contrary, world needs for wood, and especially for softwoods, outside of the United States, are tending to increase and the world's softwood resources are tending to diminish. This gives reason to believe that the United States can increasingly use its forest resources to supply world demands. To do so, however, we must take comprehensive and constructive measures to turn our present and future wastes into economic products.

THOMOMYS THE ENGINEER

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stockmen dependent on this summer feed for their very existence are willing to contribute toward reducing the number of these animals.

Squirrels, prairie dogs, and pocket gophers are the animals most frequently concerned in those drives against destructive pests on the grazing lands. Squirrels and prairie dogs are comparatively easy, but Thomomys, the pocket gopher, is a different matter. He lives entirely underground and baits must be placed in his tunnels to be effective. This is a slow job for a man armed with a stout probe and a container of bait, who must tramp over the area seeking the active workings of individual gophers.

This Thomomys is an industrious rascal and he builds a complicated and interesting underground home, consisting of a nest cavity lined with soft grasses and rootlets in which he spends his sleeping and resting hours, and one or more feeding tunnels which may extend for many feet from the nest. They are often arranged more or less roughly as the spokes of a wheel, with the nest as hub. In digging out many of these tunnel systems an amazing amount of work has been uncovered. The total length of many runs is from 500 to 600 feet, while one was well over 900 feet. These feeding runways are marked on the surface by an irregular line of flattened fan-shaped mounds which indicate the dumps where Thomomys disposed of the surplus dirt when excavating. Each of these dumps is connected with the main tunnel by a short lateral, invariably plugged for at least part of its length by solidly packed earth.

Along this feeding runway are occasional small rooms used as food storehouses. They are filled with any storable material that is edible. In the mountains the bulbs of camas are so freely used that in some localities pocket gophers are known as "camas rats." The bulbs of the brodeaias, the Maripose tulips, the dog-toothed violets, and others are also stored by these animals against the time when the ground may be frozen and digging impossible.

Even in some of the mild valleys of the Pacific Coast country where the ground never freezes deep enough to interfere with his digging, Thomomys persists in these storage operations—a fact which indicates how deep rooted such instincts may be.

In the farming districts, Thomomys is more catholic in his tastes. Timothy bulblets and roots of alfalfa, or red clover cut into convenient lengths, roots of apple, filbert, prune and cherry treated in the same fashion, carrots, parsnips, potatoes, sweet potatoes—in fact, anything in the root crop line, tulips and other flowers—all these are eagerly accepted by him and carted to his storehouse.

He is so industrious in his work and so persistent in his efforts to fill these storehouses that many trees are root