, 1918.

Questions and Answers on Lightning Rods Information That is Always Sought by Prospective Users of Lightning Rods

OR the information of the public the United States Department of Agriculture have published a short article entitled "Ten Questions and Answers About Lightning Rods," which we reproduce herewith. estions are the ten most frequently asked by those inquiring about light asked by those inquiring about light-ning rods, and the answers are given by experts of the department who have made a special study of the value of lightning rods for farm buildings:

(1) Do lightning rods really protect buildings? Answer: Yes; but the rods must be of proper character, properly installed, and properly grounded in relatively moist earth. Periodical inspection and maintenance in good condition are indispensable to effi-

ent protection.
(2) Do lightning rods on a building increase the danger of its being struck? Answer: Opinion is divided but a properly rodded house may be struck several times without injury, whereas a single stroke without the protection afforded by the rods may cause disaster.

With Insulators or Without. (3) Should lightning rods be put up with or without insulators? Answer: Without. Buildings with metal roofs, wherein any metal construction or wherein any metal construction comployed is properly connected to carth, are already partly provided with lightning protection. If rods are added to such buildings the rods abould be put in direct metallic connection with the roof and other metal work about the building wherever when the roof and the root and the practicable. All down spouts should be led into metal pipes going into the earth to give the proper earth con-nection, or the spouts should other-wise be well grounded by use of wires or cables. Insulators are entirely unnecessary, and it is proper to have extended metal work in buildings, like heating and water pipes, all electricgrounded. This latter result is gained incidentally through conne made to water pipes, since the latter usually pass through the earth out-

(4) Are gilded or otherwise expen sive points of platinum or special metal or of fanciful construction necessary? Answer: No; not in the least. Sharp, needlelike points are effective in dissipating small sustaineffective in dissipating small sustain-ced electrical charges, but such elec-trical manifestations are perfectly harmless. The imagined superiority of such fanciful points is utterly valueless when the rod is struck by a real lightning flash. The useful quali-ties lightning real points. ties lightning rod points must possess are infusibility, mechanical strength and security of installation, and permanence and durability under proaged exposure to the weather. Stout bluntly pointed iron rods three-eighths or one-half inch in diameter rigidly and securely fastened so as to project 11/2 or 2 feet above the structure to which they are attached satisfy all the requirements.

Material for Conductors. (5) What material is best for conductors or rods?

This question can not be answered fairly in a single statement. Because of its availability and cheapness, as of its availability and cheapiness, iron well as its electrical properties, iron is one of the best materials for rods. Iron, however, rusts and deteriorates under prolonged exposure to the weather. This is only partly overcome by galvanizing; hence galvanized fron lightning rods should be of ample size (not less than one-quarter inch in diameter) carefully installed and subjected to systematic inspection and repair. Two-strand cable galvan-ized iron fence wire of substantial size of the same style as barbed wire, but without the barbs, furnishes a very good material for cheap iron lightning rods. The presence of the barbs constitutes, a rather serious in-

convenience in handling and installing such a conductor, and no material benefit is derived from their presence, Copper is better than iron not only on account of its indestructibility, but also because of its softness and pliability, which make it easy to install Scientists are not in accord in regard to the relative merits of the electrical properties of copper and iron, but in case questions of cost, durability, and the like far outweigh minor differ ences in electrical properties. inum is a competitor for iron and cop-per for lightning rods. Its durability under exposture to weather is in its favor, but its fusibility makes it in-ferior to iron for points. If low first favor, but its lusibility manual ferior to iron for points. If low first cost is the controlling factor, galvan. ized iron rods must be chosen, but subsequent inspections must be made repairs may become necessary. If higher first cost is not an obstacle

(6) Should lightning conductors be made in the form of solid rods, flat or bands, stranded twisted woven stranded ribbons, or hollow twisted cables. Answer: Any of the forms may properly be employed or two or more forms may be employed in combination. Conductors should be put up in long continuous pieces as far as possible. Solid round wires one quarter to one-half inch in diameter are best for this purpose. Conductors of a size larger than one-fourth inch, however, present difficulties in hand ling and installation if the rods are It then becomes better to use

the choice should go to copper first or

possibly aluminum.

stranded cables and other similar forms. Long continuous lengths, ample cross flexibility, and the ease of its installation over crooked courses render stranded cables, in general, better than any other form of conductor available. Substantial iron points in combination with copper cables from five-sixteenths inch in diameter, for small farm buildings, to one-half inch in diameter, for large important structures, form one of the best possible systems of conductors for lightning-rod construction. There is no good reason for purchasing other fanciful forms of cable at materially greater prices per pound than are asked for standard makes of cable of approxi-mately the same cross section.

Connections at the Base.

(7) Must lightning rods be connected to the earth? Answer: Yes; by all means, and most effectively. Just a few operators in the lightning-rod pro fession have sought to impose upon the uninformed a system of unground ed lightning rods. Such rods are a menace instead of a protection. menace instead of a protection. It is impracticable to fully discuss here methods of making connections to earth. In general terms the conduc-tor should be carried down into the earth and away from the building in a trench or other excavation, so as to reach and embed the conductor itself or plates attached thereto into permanently moist earth. Connections with water pipes or other metal work itself connected to earth constitute good grounds.

(8) Are government buildings provided with lightning rods? Answer: Yes; many of them.

(9) Does the government use the

material or the rods or the system of any particular agency? Answer: No; there is nothing mysterious or exceptional about lightning rods, the material of which they are composed, or their construction and installation, Suspicion may well be aroused as to reliability of those making extravagant claims of superiority for their particular wares to the exclusion of others

(10) What is the best arrangement rods on a building? Answer: A building completely screened and sur-rounded by and enclosed beneath a eage or network of substantial metallic conductors, all properly intercon-nected and joined to the earth, would be most effectively protected from lightning discharges. For ordinary lightning discharges. For ordinary purposes a far simpler system is adequate. For example, good protection is afforded by a conductor running along the ridge of a building and extending to the earth, either at the middle of the sides or, preferably, at each of the four corners. Points should rise above any prominent teachers of the building and the product of the contract of the product of the contract of the product of th tures of the building, such as chimneys or, in the absence of these fea tures, from the ridge of the roof at intervals of 25 feet or thereabouts.

Bacteria, or germs, are not all nemies. Some kinds of bacteria are our best friends. Others are deadly foes. Still others are merely a nuisance. D. H. Jones, Professor of Bacteriology at the Ontario Agricultural College, discusses all these three varieties of germs in their relationship to agriculture, in a bulletin of 100 pages, well illustrated, which may be ad on application to the Department



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