to see that the soil contains these materials, principally potash and phosphorus, in available forms. You must remember that although more than 99 per cent. of the material of the apple is a clear gain to us from the atmosphere, nevertheless the tree cannot appropriate that 99 per cent. if we do not supply it with the 3-10 of one per cent. of these materials which it takes from the soil.

After making an analysis of the apples and of the leaves, I calculated the quantities of these three essential constituents,—nitrogen, potash and phosphoric acid—which were taken from the soil per acre by crop of apples. The calculation was made on this basis: that in an orchard twenty-five years old of 40 trees to the acre, the yearly crop might be put down at 160 barrels, or four barrels to the tree. Of nitrogen, we found there were about, in round numbers, 9 pounds in the 160 barrels, five pounds of phosphoric acid and 33 pounds of potash. That is very little compared with what some of our crops take out per acre. Of course, these amounts are in addition to those contained in the wood and leaves of the trees. I cannot, therefore, speak of our fruit crops as exhaustive crops; nevertheless it is essential they should have these elements in available forms. You ask me is it necessary to furnish them in equal proportions or should one be in excess of the other. Well, chemistry shows that the apple uses these elements in these proportions:

9 of nitrogen.
5 of phosphoric acid.
33 of potash.

Our fertilizers for orchards do not as a rule contain sufficient potash. In the past many of us have been applying, season after season, superphosphate, when in all probability potash was most needed. I am convinced that there are many erroneous opinions, widely spread, held regarding the nature of commercial fertilizers. These are due to ignorance on this matter. Unfortunately the term "Phosphate" has been applied to commercial fertilizers in general. It should be restricted to these fertilizers which contain phosphoric acid in a soluble form, and that only; it should not be used in speaking of these materials which contain nitrogen and potash. The mistake many have made has been supplementing farm manure with superphosphate, and this in orchards that require, as I have indicated, potash and nitrogen.

We analyze the leaves and find that these elements do not exist in the leaves in the same proportion that they do in the apple. The leaves require more nitrogen than the fruit, but nevertheless they require a very large amount of potash. There is also a considerable amount of potash stored in the wood—the trunk and branches. This leads us to the conclusion that our orchard fertilizers should, in the first place, be rich in potash, and secondly should contain nitrogen in addition to phosphoric acid, unless we supply the nitrogen by turning under occasionally a crop of clover.

Now, I shall devote a very few minutes before closing to pointing out how I think these elements may be most advantageously and most profitably supplied. Upon this chart which hangs on the wall, I have depicted the composition