Few persons in dealing with air compressors make the necessary allowances and deductions for all the sources of loss and in consequence, the efficiencies of the air compressors are generally represented higher than they really are. The first deduction to be made is for the friction of the machine. This has been found to be from five to ten per cent. according to the class of machine. The second loss that is seldom recorded is the increase of temperature and therefore the reduction of weight of air admitted to the cylinder as the air cannot pass through heated passages and into a heated cylinder without being heated and increased in volume so that a less weight or actual quantity is sufficient to fill the cylinder. The loss from this heating has been estimated to about equal the friction loss of the compressor.

The third or principal loss is the heating of the air during compression. This is the one source of loss that is generally recognized and often treated as the only one.

The fourth source of loss is the clearance at each end of the stroke. It is customary for the air compressor people to say that this clearance does not mean a loss of power, but only of capacity. The clearance does practically represent a loss of power or an expenditure of power without any result. These four items of loss will leave the compressor with about 60 to 75 per cent. efficiency.

You will notice that I am not going very deeply into the technical side of this subject, neither do I intend to for I suppose that the great majority present are situated as I am and are more interested in the practical than the technical side of these questions.

But now as I have given a slight idea of the power cost of compressed air, what about the power value of it after compression. We have found the compression of it to be costly, if indeed we do not think it costs too much and yet we go on using it more and more and I think we find profit in doing so, but at this point, we have got to be careful what use we make of it or our cost will be much higher than it appears this far, for if we now take our compressed air and go to use it as we do steam, that is substitute it in a place where we have been using steam, we will find that our cubic foot of air that has cost two cubic feet of steam to compress it, is not worth as much as one cubic foot of steam at the same pressure.

We have here diagram No. 1, which illustrates this. Here we have one volume of air and one volume of steam, both at 100 pounds pressure, each expanded into several additional volumes until the pressure of each falls below that of the atmosphere. It is easily seen that these two expansion lines are very different and that the effective pressures of the steam is much higher than the air or one volume of steam at 100 pounds represented by the dotted line reaches atmospheric pres-