tion of cylinders with a comparatively small limit of possible error, and this error may be reduced toward zero just in the proportion that the truth regarding cylinder condensation is known. To illustrate the manner of applying this knowledge with the use of the diagrams of Figs. 1, 2, and 3, various amounts of cylinder condensation will be assumed and the problem worked out for each case. Before doing this it may be interesting to note the relatively greater wastefulness of free expansion in the low-pressure cylinder than in the others. Referring to Fig. 3, the removal of the point of cut-off from "B" to "B_4," adds to the useful diagram the area of "$B.\ B_4.\ C_4.C.\ B.$" equal to 2.90 inches. The free expansion of 4 lbs. at "C_4." results in a loss of useful work represented by the area of "$C_4.\ E_4.\ C.$" equal to 1.18 inches, or about 41% of the former. Referring to Fig. 1, representing the high-pressure cylinder, and repeating the same calculation, the area of useful work of "$B.\ B_4.\ C_4.\ C.\ B.$" equals 1.78 inches, and the drop at "$C.$" of 40 lbs. causes a loss represented by "$C_4.\ E_4.\ C.$" equal to .78 inches area, or about 41% of the useful work in this case also, so that by comparing the two we see that in both cases the useful areas of "$B.\ B_4.\ C_4.\ C.\ B.$" are accompanied by a free expansion loss of about 41%, but in the low-pressure cylinder the terminal drop is only 4 lbs. as against 40 lbs in the high cylinder.

The foregoing ought to furnish food for thought to the engineer who is chiefly concerned about preventing drop in the high and intermediate cylinders. Referring again to Fig. 3, and resuming the consideration of cylinder condensation, let us assume certain quantities to represent this cylinder condensation, and thus illustrate the manner of applying more exact knowledge on this subject. It is evident that the conditions which make late cut-off desirable are large condensation and a constant quantity at every point of cut-off, and the reverse conditions, viz: small condensation, varying for each point of cut-off, would call for early cut-off. In illustrating this subject two rather extreme conditions have been chosen, one where the cylinder condensation is assumed to be 25% of the steam accounted for by the indicator at latest point of cut-off, and this amount to remain undiminished at the earlier points of cut-off, and the other condition where cylinder condensation is assumed to be only 15% instead of 25% as above, and to decrease at each of the earlier points of cut-off in the following manner: