weight of mercurialized ore will therefore equal that of the ore originally used, *plus* that of the mercury carried along with it, *minus* a small quantity of ore, estimated at about 10 per cent., which floats away from the chamber in finest dust, like smoke. Some of this was collected, and found to contain neither mercury nor gold.

"The total weight of mercury used was 1,166·5lb. On completing the operation the mercury left in the amalgamator was drawn off, and found to weigh 646lb.; 520·5lb. had been carried over with the 1,099lb. of ore, the 473lb. carrying over 210lb. of mercury, and the 626lb. of ore carrying over 310·5lb. of mercury. Deducting 10 per cent. (the amount estimated to float away as fine dust) from the total of 1,099lb. of ore leaves 989lb. of ore mixed with the 520·5lb. of mercury, giving a total of 1,509·5lb. of mercurialized ore, containing 34·5 per cent. of mercury. This mercurialized ore is in the form of a heavy impalpable powder. It is difficult to imagine that any particle of gold which it may contain can have escaped amalgamation after so complete a saturation with mercury.

"Knowing the remarkable effect of sodium in reducing floured mercury to a bright liquid state —an action discovered and patented by myself in its application to gold-mining twenty years ago—I prepared a 3-per-cent. sodium amalgam (with sodium which the inventors of the machinery had already provided themselves with), and added a small quantity of this to the mercury-separator when in action. The effect was instantaneous. The isolated globules of mercury at once coalesced, and the separation, which without sodium was tedious and incomplete, became with its assistance rapid and almost perfect in the reduction of mercury.

"On the large scale the mercury-separator would be placed near the amalgamator, and the mercurialized ore, instead of passing into the storage-chamber, would be carried direct with a little water into the mercury-separator, from the upper tap of which the exhausted tailings would flow away to the waste-pit, whilst from the lower tap would run a continuous stream of mercury. The apparatus could be made as purely automatic as the pulverizer and amalgamator now are, and could equally well be kept under lock and key.

"It is important to save every pound of mercury possible, for not only have we to consider the value of the mercury, but it must be borne in mind that waste of mercury in the form of flour means also loss of gold which the mercury carries away with it.

"The weight of mercury obtained in this way from the mercurialized ore was 498·5lb. To this must be added 12·5lb., which was taken away at various times in the samples required for assay, making a total of mercury from the mercurialized ore of 511lb. This, added to the 646lb. left in the amalgamator, gives a total of 1,157lb. I give this in a tabular form below:—

	Lb.
"Mercury from the mercurialized ore	498·5
Mercury left in the amalgamator	646·0
Mercury taken in samples	12·5
Total mercury recovered	1,157·0

"There will be noticed a difference of 9·5lb. between the weight of mercury originally taken and that remaining at the end of the operation. The only scales available were very rough ones, used for weighing the ore, and they would not turn within half a pound. The mercury originally taken was weighed in a few large bulks, and the weight may therefore be considered fairly accurate. The final weighings were, however, performed as the mercury was being collected and bottled, and only comparatively small quantities were weighed at a time, as the retort required to be filled. The 'turn of the scale,' therefore, required an excess of mercury over its true weight to be taken each time, and this in the aggregate would be quite sufficient to account for much of the apparent loss. Moreover, some mercury got accidentally spilt in the numerous transfers from basin to bottle and from bottle to retort, and some was lost during retorting owing to imperfect condensation. When all these sources of error are allowed for, it will be apparent that very little of the 9·5lb. deficiency can be fairly ascribed to actual loss in working the process.

"The auriferous mercury was not squeezed through chamois-leather, as is the custom in gold-amalgamation on the large scale. In the latter case squeezing through leather is advisable, because there is sufficient gold in the mercury to form a solid amalgam, which sinks to the bottom. This solid amalgam, after straining through leather, remains behind in a lump, containing from 30 to 50 per cent. of gold. The liquid mercury squeezed through the leather will still contain ¾oz. of gold per 112lb. of mercury. As the whole quantity of gold which could possibly be present in the mercury would not amount to 2½oz., it is evident that this quantity would easily remain in solution.

"Samples of each lot of mercury were taken, and submitted to assay for gold. The 646lb. of mercury from the amalgamator were found to contain 62·2gr. of gold per 112lb. of mercury, equivalent to 14dwt. 22·7gr. of gold on the whole 646lb. of mercury.

"The 210lb. of mercury from the first lot of 473lb. of ore, and the 310·5lb. of mercury from the second lot of 626lb. of ore, were mixed and sampled, and the whole lot was found to contain 145gr. of gold per 112lb. of mercury, equivalent to 27dwt. 21·2gr. on the whole 502·5lb. of mercury. The gross yield of gold from the whole 1,099lb. of ore was 2oz. 2dwt. 19·9gr. But the mercury originally used was not quite pure, as it contained 5dwt. 1gr. of gold; so this amount must be deducted from the gross yield, leaving 1oz. 17dwt. 18·9gr. as the actual yield from the ore taken, equivalent to 3oz. 17dwt. of gold per ton of 2,240lb. of ore. These results will be better seen if I arrange them in a tabular form.