

changes are brought about more rapidly. Heat returns the filings to their normal condition so that they require less mercury to amalgamate them, the setting is less rapid, and the shrinkage-expansion property is changed. If when fresh cut the amalgam did not change its bulk in setting; after annealing or tempering (as Dr. Black calls the effect of heat on the filings) the amalgam will shrink; if when fresh cut the amalgam expanded greatly, after annealing it will not expand so much or may even shrink. This change may be accomplished at the temperature of boiling water (220 F.) but it goes on slowly at the ordinary temperatures so that in a year or two the same change in the action of the amalgam will be brought about. This is beautifully illustrated in the four fillings reported near the end of the table Nos. 39, 40, 41, 42. When once fully annealed the alloy does not change at ordinary temperatures.

Dr. Black showed that silver-tin amalgams present peculiarities in shrinkage and expansion with various proportions of silver and tin. In alloys of 45% silver, 55% tin, there is a strong double movement; that is, in setting they first shrink, then expand. If the filings are fresh cut, the shrinkage is small, the expansion great; if the filings are old or have been annealed, the shrinkage is great, the expansion small. In alloys of 65% silver, 35% tin, the double movement is small. Fresh cut they expand but slightly; annealed, they shrink about 9 or 10 points. Alloys containing more than 73 or 74% of silver expand very much when fresh cut; annealing reduces the expansion, but they cannot be made to shrink.

Dr. Black showed that the addition of a small per cent. of certain metals to a silver-tin amalgam will make it expand in spite of annealing, and, unlike the expansion of the silver-tin amalgams, it is not completed in a day or so, but will continue to do so for weeks or months. Both aluminum and zinc act in this way; refer to tube X No. 29 in the table, which contains 5% of zinc and had made an expansion of 7 points in ten days and was still expanding when the filling was removed on the 25th inst.

If you will notice the four fillings of Dr. Black's 65-35 at the end of the table, you will see that one ingot was cast in July of 1896, half of the ingot was filed and the stub kept. From this stub filings were cut and a filling made fresh (tube I), which expanded $3\frac{1}{4}$ points; from the filings that had been simply kept in a bottle since 1896, a filling was made (tube J) which shows a shrinkage of 9 points. A new ingot of the same proportions was cast and half of it filed; the filings were divided into two portions; from the first a filling was made fresh (tube Z), which expanded $2\frac{1}{4}$ points; from the second point a filling was made after the filings had been exposed to the temperature of boiling water for seventeen minutes (tube O); this filling shows a shrinkage of $9\frac{1}{4}$ points, so