this condition its property as a gold-saver is gone, and its liability to be carried away by the muddy waters increased, as it will not then save on amalgamated copper-plates or in mercury-traps. Yet some millmen says that flouring is not always injurious but rather favourable to amalgamation, as it allows the globules to alloy themselves with the gold before being coated. Such an assertion is probably on a par with a statement made by a person grinding tailings in berdans who said, " Berdans save gold best when they are losing mercury and the more that is floured and lost the more gold is saved."

Inside Amalgamation is practised in almost every modern stamp mill, but there appear to be few arguments in its favour and many against it. My own opinion is that the above statement regarding berdans can be correctly applied to its use although it is carried out on a more scientific basis. In its simplest form no plates are used, the mercury being fed in at regular intervals and the quantity arrived at by guesswork. The churning of the stampers intimately mixes the mercury with the pulp, and the mercury coming in contact with the particles of gold, the two metals amalgamate more or less thoroughly. Part of the amalgam produced gradually coheres in small lumps and settles down in between the dies, while some is projected towards the screens, and passing through them is caught on the outside plates, or where inside plates are used a portion may adhere to these. The process is exactly the same with inside copper plates except that they facilitate the collection of the amalgam and help to retain it in the mortar. The condition of the escaping amalgam indicates the process of amalgamation, if hard, brittle, granular, or inclined to crumble, there is not enough mercury ; if thin, soft, and pasty, there is too much and the supply is regulated accordingly.

When inside amalgamation was first practised both front and back plates were used, but as the weight of the stampers increased the plate on the feed side was discarded, and the one below the screens curved away so that it cannot be struck directly by the splash of the stamp. This was necessary on account of the scouring action of the pulp which undoubtedly still takes place, but only to such an extent that it is not now noticed, because these plates are being constantly supplied with amalgam as it is formed. But let us ask the question " Do these plates even now, after becoming well coated with amalgam, ever lose almost the lot by scouring action ? " and the answer must be that such things happen too often. The running of the mill too fast, the varying depth of discharge, and improper or irregular feed all tend to produce severe scour, even allowing that the amalgam formed is kept in a proper condition, which at its best is highly improbable. Now supposing we allow that none of these variations occur, and the whole stamp mill is regulated to a nicety and worked in a perfect manner, then any observant person who understands amalgamation must admit that scouring still takes place, but with the amalgam constantly accumulating the extent of the evil is not noticed. Should any millman doubt the effects of this scouring action let him get his inside plates in good order and start crushing barren ore ; it will probably not take long to bring the plates into the same condition as the ore.

But so far, we have allowed that the ore contains no foreign matter to interfere with the action of the mercury—a condition almost impossible to obtain—for even those known as oxidized ores, must be only partially so, and acid sulphates must result. Where base metals exist in the ore sickening must take place, and more especially if the mercury is agitated with it in the mortar-box and brought into a floured state. It is probably one of the best methods of producing sickened mercury which cannot be saved by ordinary plate amalgamation or mercury-traps, and thus escapes to the concentrators if in use. On the concentrators with a plentiful supply of clean water a portion is saved, but the greater part is probably lost or some may enrich the concentrates saved on slime-tables. The mercury lost is simply amalgam containing varying percentages of gold, so it is evident that by attempting to force amalgamation both gold and mercury are lost.

The arguments used in favour of inside amalgamation are : First, save the gold as soon as possible after liberation as overstamping will probably make it non-amalgamable. Second, amalgam is less apt to be floured than gold and is three times as heavy as the gold it carries, and so only one-third the loss is entailed.

To save the gold as quickly as possible is a good idea, *providing it is likely to remain in the place it is saved*, but to amalgamate, and then subject the amalgam to scour, is simply ridiculous. Experience will prove to any man that mercury or amalgam in any condition is far easier broken up into small particles and floured by the action of a stamper than gold is. Gold, when once amalgamated, is reduced in specific gravity, and by continous pounding and amalgamation coarse pieces of gold that could not possibly escape are brought into such a condition that they may be lost. That overstamping prevents gold from amalgamating has never been proved in practice, but in any case overstamping is not necessary in a properly worked stamp mill where the ore is discharged almost as soon as it is crushed to the required size.

The arguments against the use and the ill effects of inside amalgamation have already been shown, but may be summarised as follows : First, it prevents the full efficiency of the stamp mill as a crusher being obtained, and causes the pulp to be either crushed much finer than is required or delivered in a very uneven grade. Second, it flours mercury by agitation and grinding, which, though sickening, is afterwards lost. Third, it amalgamates, and then granulates the amalgam formed by its scouring action, thus losing coarse gold which could not possibly be lost in ordinary crushing. Fourth, as the percentage of base metals in the ore increases, so it becomes less effective in saving, and more injurious to the mercury, until in some ores its use is impossible because no amalgam will remain in the box or on the plates and, lastly, the bulk of the gold saved by its use at any time is only that which would readily save itself.

Now surely when all the arguments for and against are carefully considered the verdict must be against attempting to crush and amalgamate in the one machine, and I am certain the time will come when the injurious practice, although now almost universal, will be abolished. In mills where inside amalgamation is practised the mercury-loss is highest, and floured mercury and amalgam may be found, not only in the concentrates, but in the tailings and slimy water which flows away.