

**On the decimalization of English money, and some
simplifications in long division.**

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[ABSTRACT.]

A method of expressing a sum of money as a decimal of a £ to 3 places has long been known.* When further decimals are necessary, they may be got by the following simple rule, which appears to be new: † multiply the last two decimals found at any stage of the process (after the first 3 have been obtained) by 4, take the digit in the ten's place of the product, append it to the decimals already found as the next decimal, and repeat the process; with the proviso that should the 4-product end with 48, 68, or 88 the digit in the ten's place is to be taken as 5, 7, or 9 respectively.

The origin of the rule is obvious. One farthing being $1/960$ of a £ shows the rule to be an application of the expansion of $(1 - \frac{4}{100})^{-1}$. Thus we might write $n/960$ as $\cdot 00n0n'0n''\dots$, where $n' = 4n$, $n'' = 4n'$, ... But while this satisfies all our algebraic requirements, the arithmetical necessities are not yet explained by it. Thus if n were 17, the decimal might be written (algebraically) $\cdot 00\overline{1706802720108804352}$, but arithmetically it takes the form $\cdot 0177083333\dots$, and a proof is still wanting ‡ to show that the process giving rise to the latter form is deducible from the algebraic result.

Mr Hamblin Smith's rule may be extended to the division of any number by 96(97,98...). The rule is in full:—Multiply the last two digits of the quotient found at any stage§ of the process by 4(3,2...), add the digits in the ten's and unit's places of the product to the next two following digits of the dividend, both pairs taken

* See *Proceedings*, Vol. XX., p. 58, 1902.

† „ „ „ „ XXI., p. 112, 1903.

‡ „ „ „ „ „ „ „ „

§ To make a beginning we may imagine the quotient to commence with two zeros.

as they stand, take the digit in the ten's place of this sum and append it to the part of the quotient already found, thus extending the quotient by one digit, then repeat the process: with the proviso that when the above sum ends in one of the numbers *under* the same line which the divisor (in the right-hand column) itself is *under*, the ten's place is to be increased by one, viz. :—

									94
								85	95
				66	76	86			96
		47	57	67	77	87			97
		38	48	58	68	78	88		98
19	29	39	49	59	69	79	89		99

The process might be extended to such numbers as 996, etc.; and also to 101, 102, etc.

On the Decimalization of Money.

By JOHN W. BUTTERS, M.A., B.Sc.

As stated in the preceding paper, the method of expressing, at sight, shillings, pence, and farthings as a decimal of a pound to 3 places has long been known. It is sometimes referred to as the actuaries' rule. According to De Morgan, it occurs for the first time in Kersey's edition of *Wingate's Arithmetic*, 1673 (p. 191). It is also to be found in *Cocker's Decimal Arithmetic*, 1685 (although in a form which is not quite accurate). In some of the earlier books the method of conversion at sight *from* the decimal form is