We give an essentially self-contained proof of the fact that a certain p-adic power series

$$\Psi = \Psi_p(T) \in T + T^{p-1}\mathbb{Z}[[T^{p-1}]] \ ,$$

which trivializes the addition law of the formal group of Witt p-covectors is p-adically entire and assumes values in $\mathbb{Z}_p$ all over $\mathbb{Q}_p$. We also carefully examine its valuation and Newton polygons. For any perfectoid field extension $(K, |\ |)$ of $(\mathbb{Q}_p, |\ |_p)$ contained in $(\mathbb{C}_p, |\ |_p)$, and any pseudo-uniformizer $\varpi = (\varpi^{(i)})_{i \geqslant 0}$ of $K^\flat$, we consider the element

$$\pi = \pi(\varpi) := \sum_{i \geqslant 0} \varpi^{(i)} p^i + \sum_{i<0} (\varpi^{(0)})^{p^{-i}} p^i \in K \ .$$

We use the isomorphism between the Witt and the Cartier (hyperexponential) group over $\mathbb{Z}_{(p)}$, which we extend to their p-divisible closures, and the properties of Ψ_p, to show that the map $x \mapsto \exp \pi x$, a priori only defined for $v_p(x) > \frac{1}{p-1} - v_p(\pi)$, extends to a continuous additive character

$$\Psi_\varpi : \mathbb{Q}_p \to 1 + K^{\circ\circ} \ .$$

A similar character for the cyclotomic p-extension of $\mathbb{Q}_p$ appears in Colmez' work. I will also give the numerical computation of the first coefficients of Ψ_p, for small p.