Potter's proof of disjunction's symmetry

Dr. Walter M. Potter of Southwestern University, Georgetown, TX 78626, taught me that the symmetry of the disjunction can be derived from my other axioms:

$$
\begin{aligned}
& P \equiv Q \\
= & \quad \{\text{idempotence of } \vee\} \\
& (P \equiv Q) \vee (P \equiv Q) \\
= & \quad \{\vee \text{ distributes forwards over } \equiv\} \\
& (P \equiv Q) \vee P \equiv (P \equiv Q) \vee Q \\
= & \quad \{\vee \text{ distributes backwards over } \equiv, \text{ twice}\} \\
& P \vee P \equiv Q \vee P \equiv P \vee Q \equiv Q \vee Q \\
= & \quad \{\text{idempotence of } \vee, \text{ twice}\} \\
& P \equiv Q \vee P \equiv P \vee Q \equiv Q \quad ;
\end{aligned}
$$

From the first and the last line (and the properties of $\equiv$) follows

$$[Q \vee P \equiv P \vee Q] \quad .$$

Q.E.D.

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