$x, \quad x' = Q^{-1}Q'x$, and $x'' = (Q^{-1}Q')^2 x$
would then likewise be collinear in $\mathbb{P}^5$; since all three lie on G, the line L they span would lie on G.

$\ulcorner$ Since Qx, Qx' and Qx'' are collinear, x, x'' and x'' are collinear.

① $x' = Q^{-1}Q'x \in G$.

For, $(Qx', \; x') = (QQ^{-1}Q'x, \; Q^{-1}Q'x) = (Q'x, Q^{-1}Q'x)$
$= {}^t(Q'x)\, Q^{-1}Q'x = {}^t x\, Q'Q^{-1}Q'x = (x, Q'Q^{-1}Q'x)$
$= 0$ since $x \in H$.

② $x'' \in G$.

$L \cap G = \{x, x', x''\} \Rightarrow \#(L \cdot G) = 3 \Rightarrow$ Since $\deg G = 2$, $L \subset G$. $\lrcorner$

But now the linear transformaton
$$M: x \longmapsto Q^{-1}Q'x$$
taking G into G takes x and x' (distinct, since by hypothesis $Qx \neq Q'x$ for any $x \in F \cap G$) into L, and so takes L into itself; thus $L \subset F \cap G$.

$\ulcorner$ ② $x'' \in G$.
$\Rightarrow x'' = ax + bx'$
$\Rightarrow (Qx'', x'') = 0$, for $(Qx'', x'') = (a\,{}^t x + b\,{}^t x')Q(ax + bx') = a^2\,{}^t xQx + b^2\,{}^t x'Qx' + ba\,{}^t xQx' + ba\,{}^t x'Qx$