8.　$F\big(x,\, y(x),\, y(x^a)\big) = 0.$

The transformation $\xi = \ln x$, $u(\xi) = y(x)$ leads to the equation

$$F\big(e^{\xi},\, u(\xi),\, u(a\xi)\big) = 0.$$

See equation 3 in the current subsection.

Reference

Polyanin, A. D. and Manzhirov, A. V., *Handbook of Integral Equations: Exact Solutions (Supplement. Some Functional Equations)* [in Russian], Faktorial, Moscow, 1998.