23. $xy''_{xx} = ny'_x + x^{2n+1}f(y)$.

1°. Solution for $n \neq -1$:

$$\int \left[C_1 + 2\int f(y)\,dy\right]^{-1/2} dy = \pm\frac{x^{n+1}}{n+1} + C_2,$$

where C_1 and C_2 are arbitrary constants.

2°. Solution for $n = -1$:

$$\int \left[C_1 + 2\int f(y)\,dy\right]^{-1/2} dy = \pm\ln|x| + C_2.$$

Reference

Polyanin, A. D. and Zaitsev, V. F., *Handbook of Exact Solutions for Ordinary Differential Equations, 2nd Edition*, Chapman & Hall/CRC, Boca Raton, 2003.

