Substituting Eq. (24) into the above, and integrating by parts one more time returns the unusual action

$$\frac{1}{2}\int \mathrm{d}^4x\sqrt{|c|}a^3\frac{\dot{\phi}^2}{H^2}\left\{\frac{1}{a^2}\mathcal{R}\mathcal{D}^2\mathcal{R}\right.$$
$$\left.+\left(\dot{\mathcal{R}}-\frac{K}{a^2}\frac{\mathcal{R}}{H}\right)\frac{\mathcal{D}^2}{\mathcal{D}^2-K\mathcal{E}}\left(\dot{\mathcal{R}}-\frac{K}{a^2}\frac{\mathcal{R}}{H}\right)\right\}. \quad (26)$$