"You have to wonder whether there would even be a United States if this man had not made the sacrifice that he did. He gave everything he had."

The descendants say that they are willing to be flexible about the amount of settlement. But they also note that interest is accumulating at $190 a second.

"None of these people have any intention of bankrupting the Government," said Jo Beth Kloecker, a lawyer from Stafford, Texas. Fresh out of law school, Ms. Kloecker accepted the case for less than the customary 30 percent contingency.

It is unclear how many descendants there are. Ms. Kloecker estimates that based on 10 generations with four children in each generation, there could be as many as half a million.

The initial suit was dismissed on the ground that the statute of limitations is six years for a suit against the Federal Government. The family's appeal asserts that this violates Article 6 of the Constitution, which declares as valid all debts owed by the Government before the Constitution was adopted.

Mr. DeHaven died penniless in 1812. He had no children.

COMPOUND INTEREST

The idea of compound interest can be applied right away. Suppose you invest $1000 at a rate of 100% (hard to do). If this is the *annual rate*, the interest after a year is another $1000. You receive $2000 in all. But if the interest is *compounded* you receive more:

after six months: Interest of $500 is reinvested to give $1500

end of year: New interest of $750 (50% of 1500) gives $2250 total.

The bank multiplied twice by 1.5 (1000 to 1500 to 2250). Compounding *quarterly* multiplies *four times* by 1.25 (1 for principal, .25 for interest):

$$\text{after one quarter the total is } 1000 + (.25)(1000) = 1250$$

$$\text{after two quarters the total is } 1250 + (.25)(1250) = 1562.50$$

$$\text{after nine months the total is } 1562.50 + (.25)(1562.50) = 1953.12$$

$$\text{after a full year the total is } 1953.12 + (.25)(1953.12) = 2441.41$$

Each step multiplies by $1 + (1/n)$, to add one nth of a year's interest—still at 100%:

$$\text{quarterly conversion: } (1 + 1/4)^4 \times 1000 = 2441.41$$

$$\text{monthly conversion: } (1 + 1/12)^{12} \times 1000 = 2613.04$$

$$\text{daily conversion: } (1 + 1/365)^{365} \times 1000 = 2714.57.$$

Many banks use 360 days in a year, although computers have made that obsolete. Very few banks use minutes (525,600 per year). Nobody compounds every second ($n = 31{,}536{,}000$). But some banks offer ***continuous compounding***. This is the limiting case ($n \to \infty$) that produces e:

$$\left(1 + \frac{1}{n}\right)^n \times 1000 \textit{ approaches } e \times 1000 = 2718.28.$$

1. *Quick method for* $(1 + 1/n)^n$: ***Take its logarithm. Use*** $\ln(1 + x) \approx x$ ***with*** $x = \frac{1}{n}$: