

# John C. Hoadley's Engine Trials at the Cincinnati Industrial Exposition in 1881

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A careful reading of John Chipman Hoadley's report of the engine trials that he conducted at the Ninth Cincinnati Industrial Exposition of 1881 discloses a remarkable number of unfortunate incidents and inappropriate conditions that plagued the event. On page 96 of the Ohio Mechanics' Institute report, he makes reference to "all of the adventures and misadventures of each of the engines," but it appears that there were many more misadventures than what he acknowledged. The magnitude of the list detracts from the credibility of the trials and of the individuals who were involved in conducting them. Many of these conditions and incidents are serious enough to invalidate important elements of the trials, and collectively they discredit the results of the trials in their entirety. On page 67 Hoadley tellingly remarks, "Too much was attempted."

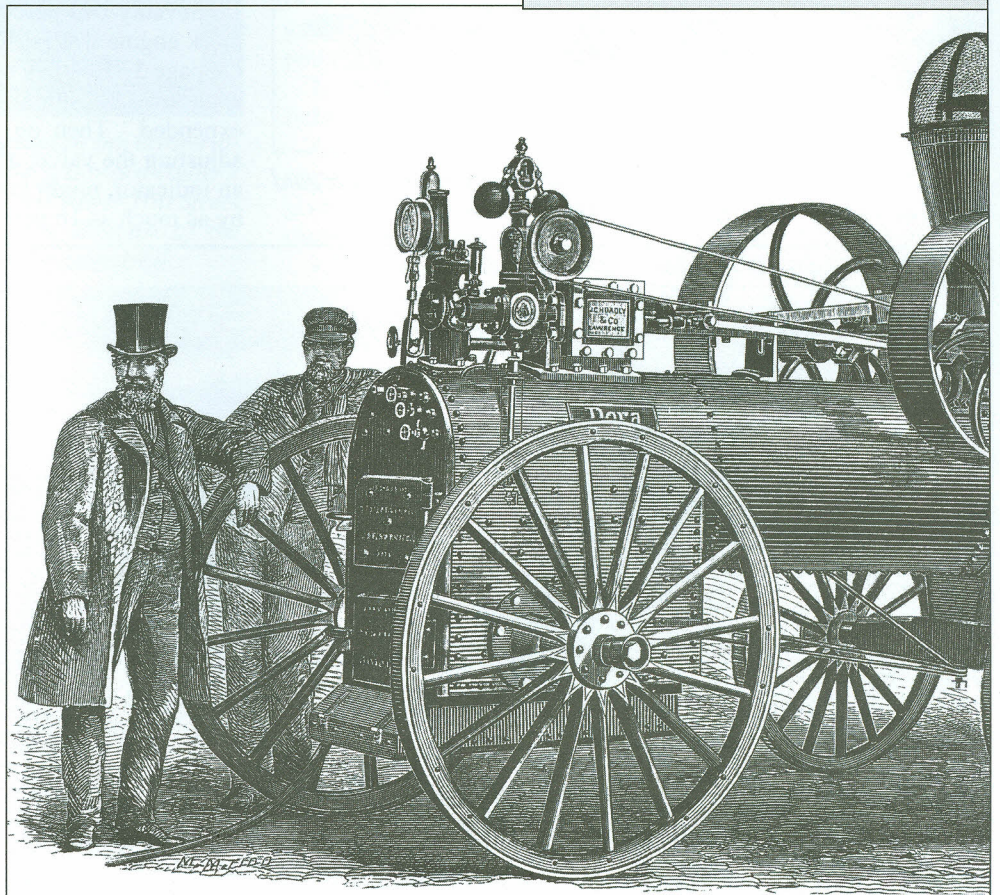
There are two versions of Hoadley's report: one published in January of 1882 in Volume 1, Number 1, of the scientific proceedings of the Ohio Mechanics' Institute; the other, under the title *The Report of the Board of Commissioners of the Ninth Cincinnati Industrial Exposition, 1881*. In most-but not all-respects, the documents are identical; the page numbers in this article refer to the Ohio Mechanics' Institute version. Both reports are available online.

The tests took essentially two forms: Prony brake competitions and field trials. The latter involved a ten-mile road trip beginning at Cincinnati's famed Music Hall, where the industrial expositions were headquartered, steaming up several hills to the Zoo, and returning to the starting point. The taking of indicator cards rounded out the events.

Hoadley arrived in Cincinnati prepared to judge engines fairly. After all, the fact that his sister Mary had married Cincinnati's Henry A. Johnson may have predisposed Hoadley to respect the Ohio

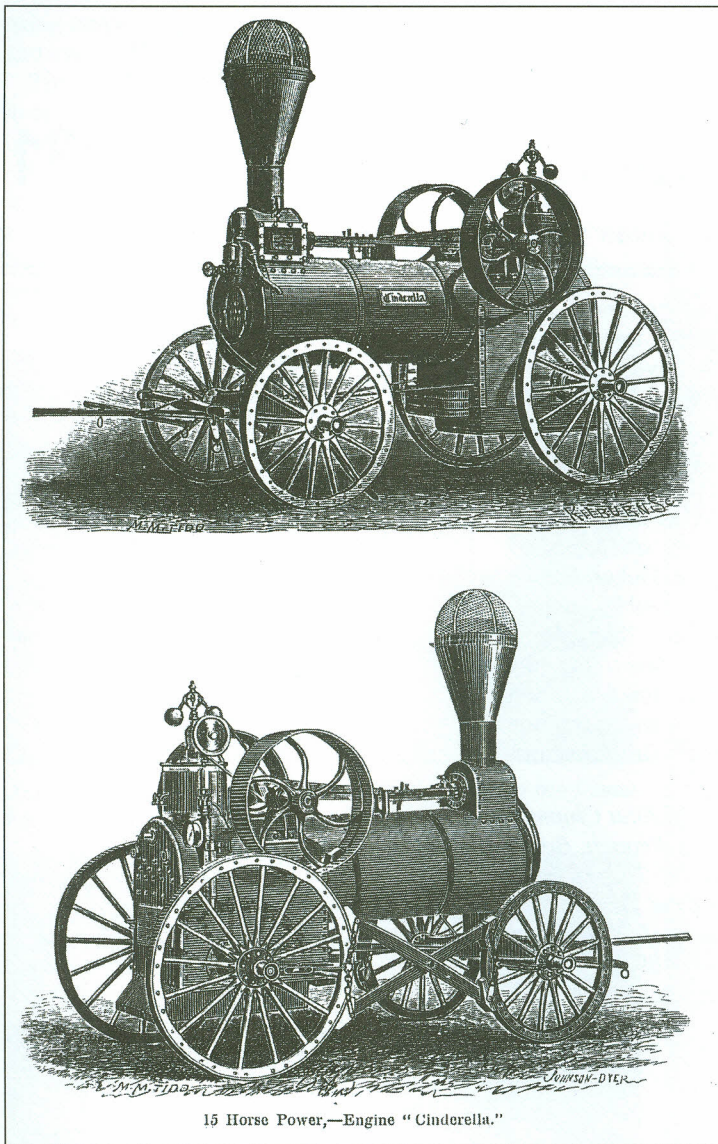
city. Hoadley's deadpan comment after the Geiser engine ran into a tree—"but for the tree the engine would have gone along without stopping"—provides a hint that the trials fell short of his expectations and contained elements appropriate for a slapstick comedy routine. Hoadley did nothing to enhance his image as a serious and impartial researcher when, on pages 65 and 66, he described the Huber engine using the words clumsy, chubby, unprepossessing, top-heavy, and hazardous: words better suited for describing the 1930s' Three Stooges than for describing the technical attributes of a steam traction engine. Hoadley's unfortunate characteri-

*Right: Here is a portrait of John Chipman Hoadley that appeared in Francis Bacon Trowbridge's book entitled *The Hoadley Genealogy: A History of the Descendants of William Hoadley of Branford, Connecticut* (New Haven: 1894).*



*For a cut that was included in his book entitled *The Portable Steam Engine* (1870), John C. Hoadley posed beside one of his engines.*





*John C. Hoadley's engine that was named Cinderella won a gold medal at a fair in Massachusetts in 1869.*

zation of the Huber engine can be contrasted with his generous treatment of the Frick engine on page 61: "This engine everywhere shows careful study, skilled adaptation of all parts to their office and to each other; and meritorious originality, conjoined with critical selection of approved forms and methods." There is a fine line between criticism and sarcasm. On page 96, Hoadley stayed close to that line in his description of the Huber engine's performance on the road: "The conspicuous defects of workmanship in the Huber engine proved their serious importance by the frequent 'accidents' which befell this engine." Why did Hoadley put accidents in quotation marks? He condemned the "peculiar form of corrugations" on the faces of the Huber's driving wheels and cited the engine's difficulty in crossing street railways. He then conceded that these corrugations "may answer well on some farming land." It is nearly satirical that Hoadley chose as his prime example of an engine's shortcomings its difficulty in crossing street railways when that engine was designed specifically to accomplish agricultural tasks.

Hoadley complimented the Huber's climbing ability and reported that the engine ascended Tower Hill "in 10 m., 15 s., over the route which detained the Geiser engine 42 m., 38 s, and the Frick engine no less than 1 hr., 22 m., 5 s." Edward Huber probably did not find Hoadley's sharp criticism and shallow compliment as amusing as they appear in the report. Like Rodney Dangerfield, he probably felt he got no respect.

While it is difficult to understand why Edward Huber, George Frick, and Franklin Landis allowed their engines to participate in Hoadley's trials, it is easy to see why the Gaar-Scott and Russell engines, which had been enrolled in the trials, declined the opportunity.

The list of unfortunate incidents and inappropriate conditions that paint an unflattering picture of Hoadley and his engine trials include these blunders:

1. Seventy-two percent (3 ½ hours) of the economy trial of the Frick engine was performed with no packing on the cylinder rod. On page 57 Hoadley acknowledged that the leakage explained the excessive consumption of water compared with the steam expended. Then on page 62 he suggested, "A week spent in adjusting the valve, and in equalizing its motion, with the aid of an indicator, might have reduced the quantity of steam expended by as much as 16 percent . . . ." On the same page he contradicted

himself when he stated, "This did not in the least affect the result of the trial . . . ." Was he admitting that things had already gone so terribly wrong that a major steam leak would not make any difference? It is difficult to imagine why George Frick would have allowed an economy trial of one of his engines to



*Left: Music Hall, a Cincinnati landmark, opened in 1878. The building's grandeur is evident in this Russell, Morgan and Company lithograph dated 1879. The edifice's outer wings were intended for the annual industrial expositions, as well as for exhibits of paintings and other fine art. In 1881, Frick, Geiser, and Huber traction engines were displayed at Music Hall and competed in trials, including a ten-mile field test up many of the hills for which Cincinnati is known.*



# "THE HUBER" FARM LOCOMOTIVE!

The perfection of Road and Farm Locomotives, climbed the Harrisburgh Hill near Dayton, O., grade  $1\frac{1}{2}$  inch to the foot, pulling water-tank, filled, and Separator with eight men, and



THE ONLY ENGINE MAKING THE ASCENT  
WITHOUT STICKING!

HUBER MANUFACTURING COMPANY,  
CINCINNATI, AT  
TOWER HILL,

— MANUFACTURERS OF —  
"THE HUBER" ENGINES,  
Separators, Scrapers and Rakes,  
Marion, . . . . Ohio.

*This is the Huber traction engine that competed in the error-riddled 1881 trials in Cincinnati. Of special note is Edward Huber's claim that his was the only engine that ascended Tower Hill Street "without sticking." Courtesy Gale E. Martin, director of the Marion County (Ohio) Historical Society at Heritage Hall*

continue-for even one minute-with steam blowing out of the packing gland on the piston rod.

2. On page 83, Hoadley mentioned that, during the field trial, "Although very accurately weighed to start with, an unknown quantity [of coal] was lost off from two of the engines, and in one case the fire, drawn from the fire-box at the end of the run, was not weighed." With this coal unaccounted for, no accurate measure of economy was possible, but a little discrepancy such as that did not deter Hoadley.

3. On page 83 Hoadley expressed confidence in the accuracy of the amount of water expended while, at the same time, questioning the accuracy of the method of measuring it during the field trials: "The quantity of the water used was satisfactorily ascertained, save the doubt that attaches to the suspiciously round numbers given by the city scales, on which the weighing was done."

4. On page 56 Hoadley reported that predetermined procedures were not followed when the water was measured. On page 69 Hoadley commented that the exhaust stack going from the engines to a chimney was not built as it was intended, and on pages 82 and 83 he recorded that the crew of the Huber engine did not comply with the load requirements that were set for the field trials. These examples may not have led to any great inaccuracies, but they demonstrate that Hoadley did not have control over these trials.

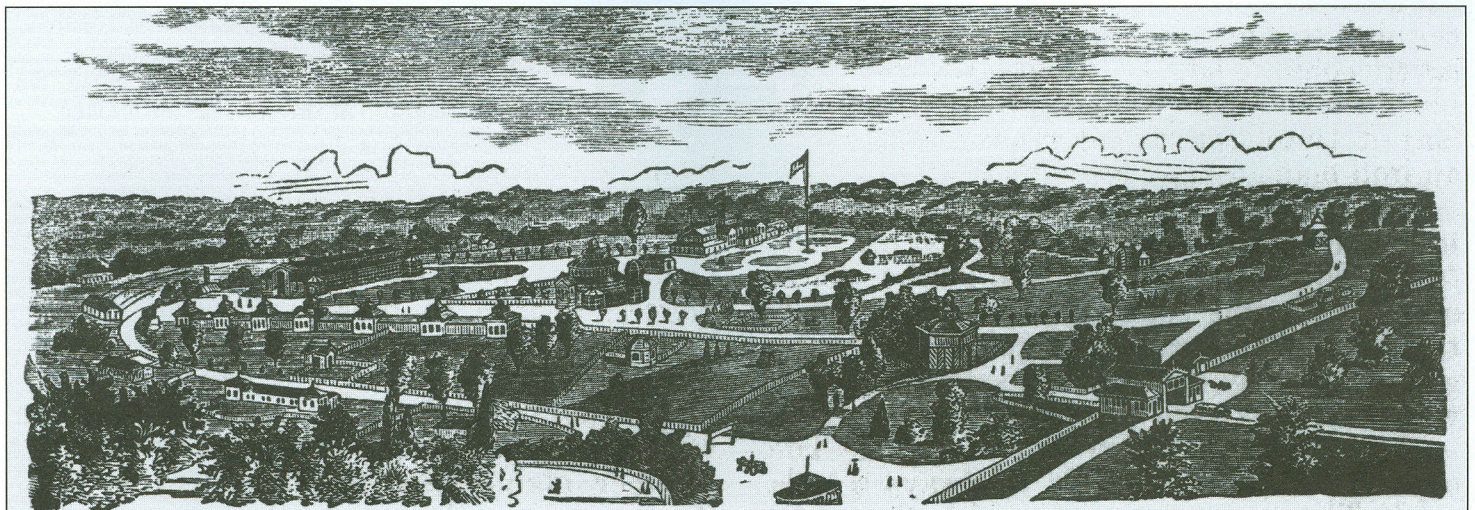
5. On page 67 Hoadley reported that no exact measurement was made of the circumference of the pulley on the Huber engine.

6. On page 60 Hoadley remarked that, during the economy trials, the steam gauges on the boilers did not agree with the precisely calibrated Crosby steam gauge (which had been ineptly dropped and possibly damaged), yet he neglects to say whether they were recalibrated. On page 98 Hoadley asserts that, after the field trials, he determined that the pressures indicated by the gauges on the boilers were probably subject to four or five pounds reduction.

7. Two of the traction engines got stuck in the mud during the field trials-one for over an hour.

8. On page 58 Hoadley announced that the plunger was removed from the crosshead pump on one of the engines. He gives no explanation for why this was done. This would have caused a small increase in the engine's steam consumption.

9. On page 56 Hoadley lamented how difficult it was to adjust



*This sketch of the Cincinnati Zoo appeared on page 783 of Henry Howe's Historical Collections of Ohio in Two Volumes, copyrighted in 1888, just seven years after steam traction engines ascended Tower Hill, which is a steep road just out of view at the extreme left of this drawing. Wild animals were within earshot of the engines' safety valves.*



the load on the Prony brake and how it would almost instantly arrest the engine, "which took place once with one engine and repeatedly with another." This was almost certainly the result of inadequate lubrication.

10. An item that is missing from Hoadley's report is any mention of the setting of the reverse lever. In Table I following the question "Can reverse-motion be used for expansion?" the Huber and Frick are marked "yes"; the Geiser, "no." The card on page 85 that was taken while

the Frick was "Struggling out of hole" on Tower Hill indicates that the cutoff was at 85 percent on one end and 63 percent at the other. Comparing this card with the one on page 80 indicates that the engine was run hooked up during the economy trials. (See the cards from the Frick engine.)

This is by no means a comprehensive listing of mishaps. Hoadley stated, "I have been thus explicit because this awkward stop [The Prony brake had abruptly stalled an engine.] has given rise to some

comment, and may give rise to more . . ." Was his tone a tad defensive?

Additional incidents recorded in Table II include:

1. The revolution counter on the Frick broke.
2. A pin fell out of the worm gear on the Huber steering.
3. The Huber gearing was out of order, and the engine ran too fast downhill.
4. The Huber lost a pin from the steering gear-again. (The concept of a traction engine running out of control down a hill with the steering gear flying apart has no comic appeal-unless or until it has coasted safely to a halt and maybe not even then.)
5. The Huber broke a tooth in the intermediate gear.
6. Six men tried to push the Frick out of the mud. (The image of six men attempting to push a traction engine out of a mud hole is mildly amusing. The image of six men attempting to push a traction engine out of a mud hole-while a seventh diligently continues to take indicator cards-raises things to a whole new level. Those on the engine likely were not laughing.)
7. The Frick on the 38th attempt, after 37 ineffectual attempts, started and went along with the engine's entire load. (Was Hoadley perhaps suggesting that the Huber crew lost part of their load [i.e., soiled their pants] when the steering gear came apart?)
8. The Frick reached the top of the hill and turned as Geiser did-but in the opposite (wrong) direction.
9. The Frick ran a front wheel into a gutter.

10. The Huber steam gauge was useless and the steam was low. (There is no other item that discredits the professionalism behind these trials more than does the open acknowledgement that an engine was allowed to continue to participate without the benefit of a viable steam gauge.)

11. The Huber stopped to repair the eccentric. The driver's seat was broken.

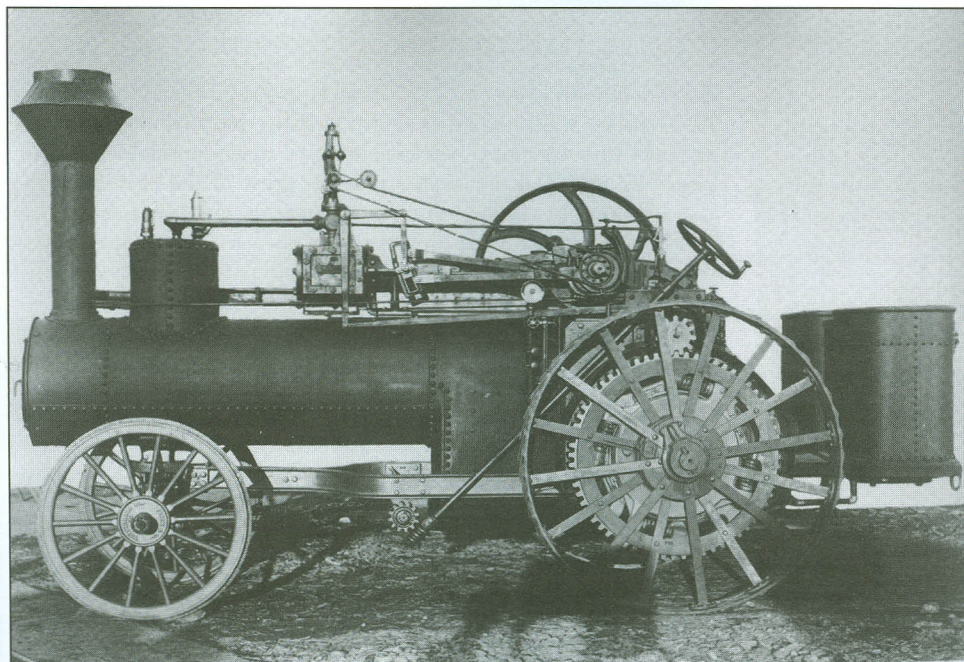
12. The Huber stopped to oil something.

13. The Huber stopped again to repair something.

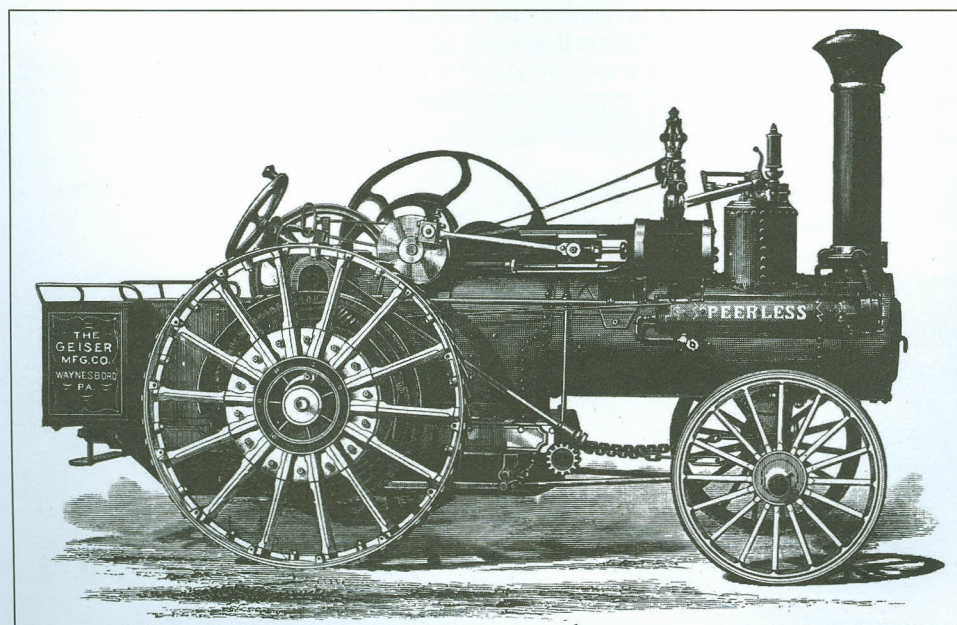
14. The Huber stopped. Its pulley fell off.

Hoadley's greatest contribution to the Ninth Cincinnati Industrial Exposition of 1881 may have been the entertainment that he provided.

*In the next issue of Engineers & Engines, we will continue with our look at Hoadley's Engine Trials and the instruments used to collect the data in Hoadley's Report.*



*Here is a factory photograph depicting a Frick engine from the early 1880s. Courtesy Brenda Stant*



*This Geiser engine resembles the machine that, in Hoadley's estimation, compared favorably with the Frick in 1881.*