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## A Long, Long Pull: Cummins Diesel's Early Years

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In 1939, the president of a Columbus, Indiana, manufacturing concern, in a memorandum addressed to five of his executives, set forth his understanding of the three aims for which his company had striven in its twenty years of existence: first, the building of the most nearly perfect product possible; second, the training of the manpower of the community, not only to be good mechanics, but also to be God-fearing and useful citizens; third, a non-paternal but very earnest interest in the welfare of the workers, with a management so concerned about men that the company would never thrust out upon society its broken and its aged.<sup>1</sup> The secondary aims relating to the size to be attained, quality of staff, and line of development to be pursued need not be considered here. His memorandum was submitted to the banker who had done more than anyone else to keep the company alive during its early struggles. The word came back that the sentiments expressed were exactly correct.<sup>2</sup>

The Cummins Diesel Engine was an outgrowth of the faith which these two men had in one another. One, William G. Irwin, was banker, industrialist, patron of a small university, and associate of the high and mighty within the national councils of the Republican Party, the United States Chamber of Commerce, and the National Association of Manufacturers. The other, Clessie L. Cummins, ingenious

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<sup>1</sup> Clessie L. Cummins memorandum, July 21, 1939, Irwin Estate General Files, microfilm, reel 75, vol. 188, no. 3.

<sup>2</sup> Clessie L. Cummins to W. G. Irwin, July 21, 1939, August 9, 1939, *ibid.*, reel 75, vol. 188, no. 3.

mechanic with a grade school education, rose to be a vice-president of the Society of Automotive Engineers, intimate friend of automotive magnates here and in Europe, and inventor of the distinctive features of the leading high-speed diesel engine in America.

As early as 1908, Clessie Cummins, then twenty years old, began to drive the Irwin automobiles during the seasons when the roads were good. He had an intense interest in anything mechanical, and by 1913 had determined to go into the automobile repair business. William Irwin entered into an agreement by which Cummins was to have the use of a part of the garage plus wages of \$30.00 per month. He was to keep the family cars in operating condition and to serve as chauffeur whenever asked by any member of the family. He also agreed to keep the elevator and other mechanical devices about the house in order. Clessie was to use the space allotted him in the garage for his repair work. Irwin agreed to buy the necessary tools.<sup>3</sup> The auto repair business flourished. By 1916, Clessie was making close to \$150.00 a week, and had four men working with him.

With the outbreak of war in Europe, Cummins secured orders for small parts for British munitions, thanks to the willingness of Irwin to write many letters soliciting business.<sup>4</sup> Then came the day of which Columbus folk still like to talk. In the fall of 1917, Irwin, his sister, Mrs. Linnie I. Sweeney, and Linnie's family returned from their summer home in Canada to find the family cars stored in a public garage and Clessie's shop running twenty-four hours a day, manufacturing hubs for American army wagons. The shop was promptly moved out into a larger building and the automobiles were returned to the home garage.<sup>5</sup>

Entry of the United States into the war temporarily halted the experimentation with gasoline and oil engines which had engaged much of Cummins' spare time since 1912 or 1913. In the spring of 1918, however, he heard of the Hvid engine.<sup>6</sup> This was a four cycle engine, developed in the

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<sup>3</sup> W. G. Irwin to Hugh Th. Miller, July 19, 1913, *ibid.*, reel 13, vol. 34, no. 1.

<sup>4</sup> *Ibid.*, reel 27, vol. 71, no. 9.

<sup>5</sup> W. G. Irwin memorandum, May 13, 1943, *ibid.*, reel 85, vol. 212, no. 11.

<sup>6</sup> Clessie L. Cummins, History of Cummins Engine Company, Inc., Cummins Engine Company, Inc., Files, 4.

Netherlands under the name of Brons. It had a cup or small cell adjoining the combustion chamber.<sup>7</sup> During the suction stroke of the piston the proper amount of fuel was delivered into the small cup. On the compression stroke, combustion occurred first in the cup and then continued in the main chamber. This engine represented an attempt to eliminate the air injection of fuel found in most diesels of that period. Since the Hvid engine provided a means of using a less expensive fuel than gasoline, Cummins became interested. He learned that the engine could be manufactured under a license plan. The license fee was \$2500.00 and the royalty was \$5.00 per engine.<sup>8</sup>

Later in 1918 Cummins' salesmanship won out over Irwin, who agreed to furnish support. The Cummins Engine Company was incorporated in February, 1919, and a license was obtained from the Hvid Company.<sup>9</sup> Some twenty of Cummins' friends signed the original stock subscription. By April of 1919 the first Cummins engine was finished. Of a single cylinder, it was rated six horsepower at 600 rpm. Leading diesel authorities in Germany had held for some time that 600 rpm was the maximum speed at which fuel oil could be injected and burned. Therefore, the Cummins Company was derided at the start of its operations for having built an extreme design.<sup>10</sup> Several hundreds of these one cylinder engines were made and sold, some going as far as India and Australia. The first model was, within the same year, followed by a 1½ h.p. and a 3 h.p. design. Both of these smaller engines ran at 900 rpm in defiance of the experts.

Before the end of 1919, big business seemed assured for Cummins and associates, though they scarcely realized that trouble lay ahead. A contract was signed with Sears, Roebuck and Company by which Cummins would manufacture 4500 engines of the three sizes.<sup>11</sup> Since no service was available, the engines had to be sold on Sears' rigid money-back

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<sup>7</sup> *Diesel Progress* (New York, 1935- ), XIV (May, 1948), 94. This entire issue is devoted to the history of diesels in the United States.

<sup>8</sup> Cummins Engine Company, Inc., Minutes of Stockholders' Meetings, 1919, in Cummins Engine Company, Inc., Files.

<sup>9</sup> Cummins, *History of Cummins Engine Company, Inc.*, 4; Cummins Engine Company, Inc., Minutes of Stockholders' Meetings, 1919.

<sup>10</sup> Cummins, *History of Cummins Engine Company, Inc.*, 4.

<sup>11</sup> W. G. Irwin to Q. G. Noblitt, October 14, 1919, October 16, 1919, Irwin Estate Files, reel 27, vol. 71, no. 9; *Diesel Progress*, XIV (May, 1948), 94.

guarantee. Production of engines was stepped up to a peak of fifteen per day. But they were poorly designed and contained some defective parts. Soon engines began to arrive at the freight station. On some days, fifteen new engines were shipped and ten to twelve were returned.<sup>12</sup> The company fell far behind in its orders. A Sears representative visited Columbus in September, 1920, and reported plenty of trouble: piston ring failures, inability to secure parts, and operational breakdowns. By then the company was able to average only slightly better than four engines per day. He wrote: "Mr. Cummins is gradually building up an organization, but I don't believe he realizes the importance of the position he is in as he is holding some 400 of our orders, the oldest of which dates back to the 14th of January and yet this condition does not seem to worry him in the least."<sup>13</sup> In spite of improved output and price reductions which practically wiped out the profit, the engines were not successful, and in 1922 the contract was cancelled, after some 3000 of the 4500 units had been delivered to Sears.<sup>14</sup> The future appeared to be dark. Several hundred thousand dollars were lost in the three years, and little was left. There were, however, two rays of light to comfort Clessie Cummins. In the first place, the experience was valuable from the standpoint of engineering, management, and production. Cummins later wrote: "We learned a great many of the things that must not be done or could not be done." Further, much had been learned about company organization and managerial policies from the great mail-order firm. When it was finally decided that the engine contract was hopeless, "both parties took the financial beating which naturally had resulted and called the whole deal off, and parted the best of friends."<sup>15</sup>

A second source of comfort to Cummins was the attitude taken by his principal supporter, Irwin. When Cummins, in 1921 or 1922, went to Irwin and told him that the engine was not a success and that it appeared that all the money invested was lost, Irwin asked if there were no hope of salvaging something from the wreck. Cummins replied that there

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<sup>12</sup> Cummins, *History of Cummins Engine Company, Inc.*, 5.

<sup>13</sup> B. F. Watson to W. M. Tippet, September 30, 1920, Irwin Estate Files, reel 34, vol. 88, no. 6.

<sup>14</sup> Cummins, *History of Cummins Engine Company, Inc.*, 6; *Diesel Progress*, VIX (May, 1948), 94.

<sup>15</sup> Cummins, *History of Cummins Engine Company, Inc.*, 6.

was nothing but an idea. As Irwin related it afterward, "He tried to explain the idea to me with the result that when he told me that it would cost \$10,000 to prove the idea, I told him I would furnish the money. The idea turned out to be an improvement, but it was not good enough; so he got another idea and another \$10,000 and these ideas and the 10,000s continued for quite a period until he made a discovery for which he was granted basic patent protection."<sup>16</sup>

As Cummins expressed it several years ago, "All down the line of developments, we were usually able to 'pull a rabbit out of the hat' about the time that we were out of money and offer him sufficient encouragement to carry on a little further."<sup>17</sup>

In 1922, with the cancellation of the Sears contract, Cummins also cancelled the Hvid agreement. It was not until 1926 that a settlement was reached with Hvid, and it cost the Cummins Company \$13,200.00.<sup>18</sup>

A comment is in order as to the method by which the company was kept alive during the trying days of the 1920's. Though personally willing to lend thousands of dollars, Irwin refused to do this in a way which would obligate the stockholders. Therefore he and Cummins, as joint stockholders, organized the Oil Engine Development Company, with a capitalization of but \$20,000.00. It was Cummins' hope that \$10,000.00 would suffice to pay for the development work. Actually, the Development Company alone absorbed approximately \$100,000.00. The Development Company paid the Engine Company in full, with cash, for all labor, material, and overhead expended for the Development Company by the Engine Company. The Development Company licensed the other company to build engines, without a license fee, but for a nominal royalty on each engine. All patents applied for by Clessie Cummins were to be the property of the Development Company. Thus a means was found by which the Irwin money could be poured into the development of the engine and the manufacturing company was able to survive.<sup>19</sup> The Oil

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<sup>16</sup> W. G. Irwin memorandum, May 13, 1943, Irwin Estate Files, reel 85, vol. 212, no. 11.

<sup>17</sup> Cummins, *History of Cummins Engine Company, Inc.*, 31.

<sup>18</sup> W. G. Irwin to Hugh Th. Miller, June 3, 1926, June 5, 1926, Irwin Manuscripts, Indiana University Library, Box 1, folder 17; Cummins Engine Company, Inc., Minutes for 1949.

<sup>19</sup> Cummins Engine Company, Inc., Minutes for 1925. No royalties were ever paid the Development Company.

Engine Development Company was not absorbed by the Engine Company until 1941.<sup>20</sup>

After the wreckage had been cleared away, following the Sears, Roebuck debacle, Irwin insisted that Clessie's engine company try to sell no more engines until they were proved commercially practical and sound. Therefore, there was no factory production worthy of the name for at least six years, though engines of great significance in the Cummins story were being developed and were being sold to widely scattered customers. Cummins was convinced by 1922 that better engines could be produced only by increasing speed and horsepower and at the same time decreasing the weight per horsepower.<sup>21</sup> Out of some of the parts of the Hvid 6 h.p. engine Cummins built a single cylinder engine in late 1922. He was able to sell an engine to a shrimp packer in New Orleans; rather, Clessie Cummins virtually pressured the customer into letting him install the unit on a trawler. After much opposition from the shrimp fishermen, the engine performed well and about half a dozen more engines were sold. Cummins spent about six months in the Louisiana and Mississippi fishing fleets. Finally, the engines began to fly apart, and by the end of 1923 Cummins had to stop and plan a new attack upon the problem of the high-speed diesel.<sup>22</sup>

This second set-back confirmed Clessie's belief in an idea that he had been nursing for many months: that the critical part of the diesel engine was the fuel injection apparatus. Differences in engine temperatures, in fuel volatility, and in compression caused ignition to occur at a point varying over many degrees of crankshaft rotation. The result of poor timing in the ignition was high pressures which caused broken parts and high cylinder wear. Furthermore, the individual measuring of the fuel to each cylinder was not desirable because of the difficulty of synchronizing perfectly. Cummins and his engineers began to hunt for a method of metering the fuel which would be absolutely fool-proof and would send an equal charge to every cylinder. The second major task which Cummins undertook was to find a means of heating

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<sup>20</sup> Cummins Engine Company, Inc., Minutes for 1941.

<sup>21</sup> Cummins Engine Company, Inc., *Thirty Years of Imagineering* (Columbus, Indiana, n.d., incorporated into Minutes for 1949).

<sup>22</sup> Cummins, History of Cummins Engine Company, Inc., 9; *Diesel Progress*, XIV (May, 1948), 133.

the fuel before injection into each cylinder. Between 1923 and 1927 some 3,000 separate injection methods were tried. Engines were being sold during this period, though until 1925 or 1926 every conceivable kind of difficulty was encountered. In 1926, practically all the engines being built were going for marine use: to private owners, to fishing fleets, the Shipping Board, the Lighthouse Service, and the Coast Guard.<sup>23</sup>

By 1925 it was clear to Irwin that Cummins' business would probably increase. He wrote a friend: "I am trying to plan now for a real plant for economical operation. Clessie approves the location I have chosen for it, but we are both agreed that there will be no moving until we are absolutely crowded out of where we now are. There is not going to be any money put into bricks and mortar until we just cannot get along without putting it in. We may not make quite so much in the beginning by following this plan, but I believe in the end we will be further along and then we will know better what we need."<sup>24</sup>

In the fall of 1925 the payroll at the plant was running \$1400.00 per week, and production averaged two 4-cylinder engines per week.<sup>25</sup>

That same year, Clessie had another idea. He began talking to Irwin about putting an engine into an automobile, for publicity purposes, and driving the car from Indianapolis to New York. He estimated at the time that the fuel cost would not exceed sixty cents. Irwin exulted: "We can have a bit of front page advertising free with that kind of a performance."<sup>26</sup>

With the very small capacity of the plant, however, and with a few orders coming in every week, Clessie was kept so busy that he could find no time to work on the automotive engine. But a time was soon to come when business declined and the work was taken up.<sup>27</sup>

In 1927 came what appeared to be a real opportunity.

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<sup>23</sup> Cummins, *History of Cummins Engine Company, Inc.*, 16.

<sup>24</sup> W. G. Irwin to John Niven, June 29, 1925, Irwin Estate Files, reel 41, vol. 105, no. 14.

<sup>25</sup> W. G. Irwin to Hugh Th. Miller, October 15, 1925, *ibid.*, reel 44, vol. 111, no. 19.

<sup>26</sup> W. G. Irwin to John Niven, July 6, 1925, *ibid.*, reel 41, vol. 105, no. 14.

<sup>27</sup> W. G. Irwin to I. D. Mackenzie, October 17, 1925, *ibid.*, reel 44, vol. 111, no. 18.

A contract was signed with a large concern manufacturing shovels and earth-moving equipment. Probably 100 4-cylinder engines were sold before it was discovered that the dirt and dust of shovel operations were too much for the engine, which had many of its moving parts outside the engine. The result was the introduction, in 1928, of the world's first completely enclosed diesel. Not a single moving part was exposed. Not a single part was hand lubricated. This was also the first diesel to be rated at 1000 rpm.

By 1929 the fuel injection problem was practically solved, but that of metering the fuel took a few years longer. The result of the research was the Cummins system, which is a distributor-type pump very similar in principle to the distributor mechanism in the electrical system of every gasoline automotive engine.<sup>28</sup>

When the depression struck, in 1929, the company's business was chiefly in the marine engine field. A large proportion of the engines were going into pleasure boats. The market suddenly disappeared.<sup>29</sup> Cummins, Irwin, and their engineers decided to enter the automotive and industrial fields. This necessitated the development of a new engine, lighter in weight and of a higher rpm.

The greater part of the American public was completely unaware that such a thing as a diesel existed. Clessie was the one who could wake them up. He launched upon what he has called the "Barnum and Bailey days." For about five years Cummins put on a three ring circus of racing, transcontinental runs, bus and truck records, and assorted stunts. Ringmaster was Clessie Cummins, though he was ably assisted by certain other genial daredevils. When the circus days ended, the American public was wide awake to the significance of the diesel.

In November, 1929, Clessie and his chief engineer purchased "a big old Packard limousine sedan" in Indianapolis and drove it back home. The work of installing the engine began. The men used the model U, the one developed in 1928, which has already been described as the first completely enclosed diesel. It was impossible to put the engine in place

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<sup>28</sup> Cummins, *History of Cummins Engine Company, Inc.*, 23; Cummins Engine Company, Inc., *Thirty Years of Imagineering*.

<sup>29</sup> Cummins, *History of Cummins Engine Company, Inc.*, 27.



without removing the steering gear, or to install the steering gear after the engine was in place. The Cummins crew finally hoisted the car and lowered it over the engine.<sup>30</sup> There were only three-eighths of an inch between the engine and the radiator, therefore no fan could be used. The axle gear ratio had to be changed because of the slower diesel speed. Otherwise, the Packard was not changed. Irwin was thoroughly surprised when Clessie drove the car to the Irwin home on Christmas, 1929. He was soon as excited as was Clessie.<sup>31</sup> Within a few days, Clessie left for New York City to attend the Auto Show. This was the famous run in which the fuel cost was \$1.38. From New York, Cummins drove to Detroit where the annual meeting of the Society of Automotive Engineers was held. Here he was invited out to the Ford shops. This was the first of several meetings with Henry Ford and his son Edsel. They must have enjoyed one another's company, for in 1930 Irwin was writing with great delight: "They undoubtedly got very well acquainted. Clessie, among other things, told him that 'with my money and your brains I think we can get pretty far.'"<sup>32</sup>

After the first automobile run to New York and Detroit, in early 1930, Irwin was sure that Clessie "had something." A competent engineer was brought in to survey the set-up and to make recommendations. As a result, design of a new automotive engine was begun. Meanwhile, the old engine was being put into a Packard roadster chassis. In March, 1930, Cummins and cronies set an official mark of better than 80 miles per hour at Daytona Beach. The old marine engine, built for 800 to 1000 rpm, was pushed as high as 1900 rpm, but it held together.<sup>33</sup> Fuel for the 2120-mile round trip cost \$3.50.<sup>34</sup>

In February, 1931, the same marine engine—now in a Duesenberg racer—set a mark of better than 100 mph.<sup>35</sup> After much discussion, the Speedway officials created a new classifi-

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<sup>30</sup> Clessie L. Cummins, "Diesel Engine in an Automobile," *S. A. E. Journal* (New York, 1917- ), XXVI (April, 1930), 512.

<sup>31</sup> Cummins, *History of Cummins Engine Company, Inc.*, 30.

<sup>32</sup> W. G. Irwin to John Niven, April 14, 1930, Irwin Estate Files, reel 51, vol. 128, no. 16.

<sup>33</sup> Cummins, *History of Cummins Engine Company, Inc.*, 44.

<sup>34</sup> W. G. Irwin to W. S. Athearn, March 24, 1930, Irwin Estate Files, reel 49, vol. 124, no. 2.

<sup>35</sup> *Diesel Progress*, XIV (May, 1948), 155.

cation by which a diesel car might enter if it could attain a speed of 70 mph in the trial runs. The Cummins entry accomplished what no other car had ever done before: it made the 500 miles nonstop, and this at an average speed of better than 86 mph.<sup>36</sup> Next test for the engine came in August, when, installed in an Indiana chassis, it went from New York to Los Angeles in a total elapsed time of 97½ hours and at a fuel cost of \$11.22.<sup>37</sup> This truck trip is the real beginning of interest in diesels as the motive power in the trucking industry.

In December, 1931, appeared the automotive diesel engine on which development had been in process for about two years. It was immediately placed in an Indiana truck and driven 14,600 miles nonstop in exactly two weeks. This new record was also hung up on the Speedway.<sup>38</sup>

Irwin and Cummins, in the spring of 1932, took the diesel-powered racer to Europe. They demonstrated the car to the diesel experts of France, Italy, Germany, and England. They drove 5,000 miles at a fuel cost of \$8.00.<sup>39</sup>

An old Mack bus equipped with the new automotive diesel made the coast-to-coast trip in November, 1932. The old vehicle grossed approximately eleven tons, but it made the run in 91 hours at a fuel cost of \$21.90.<sup>40</sup>

The dramatic tests of 1930, 1931, and 1932 aroused plenty of interest. Financiers offered assistance in enlarging the capital structure; manufacturers hinted that they were willing to buy out the company. Ford, Studebaker, Hupmobile, and others were clearly excited about the opportunity to use the Cummins diesel or a competitive product.<sup>41</sup> By now the Cummins people were convinced that the truck and bus field was wide open for them. And yet, it was one thing to interest the trucking lines and quite another thing to interest the manufacturers of trucks. When the automotive engine was brought out, in 1931, and commercially in 1932, it was impos-

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<sup>36</sup> *Ibid.*

<sup>37</sup> Cummins Engine Company, Inc., *Thirty Years of Imagineering*.

<sup>38</sup> Cummins, *History of Cummins Engine Company, Inc.*, 72.

<sup>39</sup> *Indianapolis Star*, July 7, 1932.

<sup>40</sup> J. Geschelin, "Cummins Diesel Test Bus Makes Coast-to-Coast Trip in 91 Hours," *Automotive Industries* (Philadelphia, 1899- ), LXVII (December 17, 1932), 773.

<sup>41</sup> W. G. Irwin to John Niven, April 15, 1930, Irwin Estate Files, reel 51, vol. 128, no. 16; W. G. Irwin to Linnie I. Sweeney, May 6, 1930, *ibid.*, reel 61, vol. 151, no. 2.

sible to find a single truck manufacturer who would consider using the Cummins product. In 1932, the first truck customer, a grocery chain on the Pacific Coast, managed to persuade a manufacturer to sell a truck minus the engine. A Cummins engine was installed, but the truck manufacturer refused to do the work. When the first diesel truck continued to roll smoothly and efficiently, other trucking firms became interested. They soon learned that the only practical way of getting Cummins engines was to remove worn-out gasoline engines from trucks and replace them with diesels.<sup>42</sup> Then, finally, a number of truck manufacturers arranged to install Cummins engines in new trucks.

The diesel engines in the heavy trucks on the Pacific Coast were so efficient that within a short time the engine company was bustling with activity. Incidentally, the diesel industry was one of the few industries that gained ground during the depression, especially from 1933 on. This is easily explained: diesel power provided an effective means of lowering costs.

Records of the Cummins Company show that from 1919 to 1937 no profit was made, though the company broke even from 1933 on. From 1919 to 1928 was a period of testing and trial, of experimentation and heavy losses. From 1928 to 1932 was a period of struggle to gain recognition, to establish a business, and to live down the failures of the past. From 1932 the company was concerned with the problems of growth, not all of them pleasant.

In September, 1933, William Irwin wrote his sister, Linnie. Clessie had been in to see him to get approval for the purchase of more machinery. They had called the bank, and to their surprise had discovered that the company had a balance of over \$9,000.00. Now, it appeared, Clessie was no longer losing money. Irwin continued: "It has been a long, long pull. During the past ten years, I have had to have constantly in my mind the thought that I would have to provide money for his use at almost any time. If business can continue as it is now, and grow gradually, it seems to me now that we may get through without having to put up more money. This does not mean that we are going to be getting any money out of

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<sup>42</sup> W. G. Irwin memorandum, May 13, 1943, *ibid.*, reel 85, vol. 212, no. 11.

the business for the reason that the increase in business will demand practically all the profits to take care of the additional requirements, but there will come a time later on when something can be taken out. I don't know that I have ever told you there has already been put into the proposition at least \$1,000,000. It is a tremendous amount to have risked and I hope there will never come a time when it will not be appreciated."<sup>43</sup>

As long as the human values for which William G. Irwin and Clessie L. Cummins stood are reflected in the hearts of those who guide the destinies of this concern, so long will Columbus appreciate the contributions made in those early years.

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<sup>43</sup> W. G. Irwin to Linnie I. Sweeney, September 25, 1933, *ibid.*, reel 61, vol. 151, no. 2.