

T H A D D E U S C A H I L L

(June 18, 1867---April 12, 1934.)

A P r e l i m i n a r y P a p e r .

By

George F. Cahill.

Thaddeus Cahill, lawyer, scientist and inventor, known to his friends as a man of wisdom, of consideration for others, of wide learning in law, history, science, electricity, music, thermo-dynamics, geography and government, and for his unusual breadth-of-view on many subjects, died suddenly at his residence, 316 West 84th Street, New York City, on Thursday, April 12, 1934. A few moments before, he had been in his usual good health and cheerful spirits, and had said nothing to anyone about feeling ill, suffering pain, or being in any way out of sorts.

Apparently he passed away without any warning, or, so far as anyone knows, without pain or consciousness that he was ill. The very able doctor who was called in immediately, was certain that death had been instantaneous, due probably to the passage of a tiny clot of blood into the Heart. And his face showed no sign of pain, fear or mental disturbance.

Then Death, which had not entered our home in thirty years, and but once in more than fifty years, entered it a second time within fifteen months, for our eldest sister, Mary, had passed from us on January 12, 1933, to that better world which must exist for such Spirits as hers.

Thaddeus was the eldest son of Dr. Timothy, and Ellen Harrington, Cahill.

From childhood he and Mary were marked as children entirely apart from the usual. Father, a descendant of vigorous and educated men, a Harvard Doctor and a loving parent, who daily associated with and studied his children, early perceived what "Golden Children" Mother had borne him. With high ideals and a fine sense of parental responsibility, he cultivated their minds, guided their reading, discussed and explained things to them.

Mary and Thaddeus were a remarkable pair. Even one such child is seldom granted to any family. They were born citizens of the higher world of thought, study and knowledge. Father opened the door for them and they breathed that air naturally. They studied and read, and discussed with him, the great

thoughts of the ages from their childhood. They never played games, read Mother Goose, or needed to go to school. If they had books, they could learn from them. Thaddeus was an official court stenographer before he attended school at all. In fact, he never went to school a day in his life until he entered the graduating class of the high school after the Christmas holidays. There he became the favorite alike of the boys, and of the Superintendent who put him forward to recite an oration in Latin at Commencement. Mary first and Thaddeus later learned the multiplication table up to 12 times 12 in a single day---and they learned it thoroughly and forever.

Mary's memory, the exactness of her knowledge, and the way her mind brought up whatever she needed at the moment, would have been famous in almost any circle if Thad had not been there---as would have been the range of her knowledge, for one who was not a writer, a teacher or a professional student. If the time she spent on mythology and the classics had been spent on music, her singing would have delighted multitudes. God gave her one of the richest and most musical singing voices I have ever heard, and preserved it almost to the day of her death. To have heard her singing at 70, without seeing her, was to suppose that you heard a full young voice of rare color, richness and beauty. She would have adorned a professorship or made a fine physician and a famous diagnostician. Yet it is only as I write this, that I more fully realize these facts myself.

The breadth and range of Thad's knowledge, the crystal clarity of his memory no matter how distant or unimportant the event; the effortless way that his mind correlated everything that he had ever seen or heard or read that bore on the subject at hand, the moment it was needed; all at the service of a judgment

which went very quickly if not instantly, to the correct final conclusion, which too often other men attain only ultimately, after weary years, experiments and failures--- those qualities were manifested from his childhood to such a degree that from his boyhood he was the companion of the finest and wisest elderly men and women of the community, and his opinions were listened to with respect by men old enough to be his grandfathers.

When but 14 years of age he served as official court stenographer, and although so young was invited by able lawyers on the Circuit to come into their offices and study law with them. Later in life, as many in Washington, Springfield, Holyoke and New York will remember, he impressed children and grown people of all classes of society as a good and wise man, very considerate of others. People just naturally came to him for information and advice. His views were treated with marked respect by all classes with whom he came into contact, and, strikingly so, even by able men who differed from him on some business matter, and by opposing lawyers.

Yet, probably, his inventive and constructive ability, guided by that judgment, wide knowledge and incomparable ability to do difficult and complex things correctly the first time, was the crowning proof of his genius.

Although educated for the law and a member of the Bar of the Supreme Court of the United States, and, although offered a partnership very soon after graduation in one of the foremost law firms of its kind in Washington, Thaddeus Cahill devoted most of his life to mechanical, electrical and scientific studies and inventions, for which he had early developed a striking talent. He built and put upon the

market the world's first Electrical Typewriter, which halved the nervous strain of typewriting, permitted an easy legato touch in place of the stilted staccato touch, doubled its manifolding power and raised the speed of the average operator greatly.

That electrical typewriter was exhibited at the World's Fair in Buffalo, in 1901, by, and at the expense of, the Government of the United States, and on its initiative, as an epoch making invention and as an outstanding proof of the value of the Patent System. Notwithstanding that start, notwithstanding the enthusiastic reception of the machine by operators wherever they saw it, and the fact that the first Cahill Electrical Typewriters which we sold stood up to their work beautifully for years, dissension and trickery ruined the company and wrecked the enterprise. In the opinion of my brother, Arthur, and myself, none of the electrical typewriters put out by the great Typewriting Companies in all the years since have at all compared with Dr. Cahill's first electrical typewriter, except for the fact that they are "visible writers", which was not the custom then.

Next, he invented the process of producing Music in the form of electrical vibrations at a central station, impressing those musical electrical vibrations upon wires and transforming them into audible music on the premises of a multitude of different subscribers simultaneously. No such thing had ever been heard of in the world before.

In the early summer of 1902, Dr. Cahill moved from Washington, D.C., to Holyoke, Mass. There he continued his studies and experiments, and built the great Electric-Music Plant, which was to astonish the scientific world, to charm the musi-

cal world, and to bring a stream of prominent and distinguished scientists, business men, bankers, writers and musicians from all parts of America, and even from Europe, to Holyoke to study his work and to hear the music which he had produced in so new and wonderful a way.

Not only was that music produced in new and wonderful ways. It was itself a new and wonderful music. Thus---

1st. The elements---ground tone and overtones---of each note were produced separately. Dr. Cahill enabled musicians not only to so combine those elements as to imitate many well-known instruments of the past but, also to produce many beautiful new tones, which were not imitations of other instruments at all. On this point, the New International Encyclopedia says, "The performer has absolute control over the notes, both as to expression and timbre; he can produce at will the notes of practically any instrument, and even notes of an entirely new quality. And the notes produced are of a remarkable purity, being surpassed only by that of a good string;"

2d. One might well have been satisfied had each note from such an instrument spoken with uniform power as does each reed or pipe in an organ. Musicians would have been delighted had each responded to the touch of the performer, as does a piano, whether it had then died away, or had held steadily thereafter like a pipe. But Dr. Cahill made the loudness of each note to respond at every instant to the pressure of the finger upon its key, as the violin responds to the pressure of the bow upon its string;

3d. Further, for the first time in the world, he not only produced a keyed musical instrument that

could not get out of tune, after it was once properly tuned (?), but

4th. He enabled such an instrument to be played in the just or natural temperament which is in the mind of man, and which makes the music of skilled string and vocal quartets, so much more beautiful, when they are freed from the equal or compromise temperament of keyed instruments, than when they are accompanied by such instruments---also, the singing of otherwise ignorant and untrained colored singers;

5th. To have produced music of such purity, of greater wealth of tone-quality than any instrument had ever formerly possessed, and with a perfection of tuning never before attained---to have done all those things in one place would have been wonderful enough. But Dr. Cahill put that music upon wires and enabled one musician, or set of musicians, playing at a Central Station, to be heard in a multitude of places at the same time. That may seem commonplace to young people now, but to the learned and the ignorant alike it seemed marvelous thirty years ago;

6th. Neither was that music spoken in that multitude of places in the whisper of the telephone, nor with the scraping and distortion then universal in the phonograph and graphophone. Thaddeus Cahill and Arthur T. Cahill made it sing in loud, clear, full tones in each place, as would an orchestra in the room. In a few years, as only one part of a great undertaking, and at not one per cent of the cost that others incurred almost without result, they made diaphragms speak as diaphragms had never spoken before---as the money of wealthy companies and the work and genius

of literally hundreds of inventors and experimenters had not been able to make them speak in thirty years before, and had not done for twenty-five years thereafter---if they have yet done so at all; and

7th. Music is far more primal, far more cosmic, than sculpture, poetry, painting or speech. Its foundations are laid more deeply in the nature of things---its rules are more imperious. Primarily, music is pitch, and the first rule is that you keep the pitch---the second, that you progress, by exactly the right step, to the next pitch. But pitch---the exact number of vibrations per second---is not easily kept, nor the right steps easily taken. Yet that pitch and those progressions are in the mind of man. He who knows not "that two and two make four," is positively displeased if a singer passes from a do of 256 vibrations per second, to a sol of anything but 384 vibrations per second. 383 or 385 will not satisfy him. But the progression from exactly 256 to exactly 384 delights him. So Dr. Cahill based his Electrical Music in mathematics and, for the first time in the world, compelled it to speak always and only in the exact number of vibrations per second (itches) that are in the mind of man. When men, whether ignorant or learned, heard music with those absolutely correct intervals and absolutely correct pitches in every tone and in every chord, and in every harmonic of every tone in every chord, they responded with extreme satisfaction and approval. And, as often happens when genius does something easily and very well, the warmest appreciation and applause came from the greatest masters in that line who had striven desperately to do that very thing themselves, but had

not quite been able to do it.  
(See quotations below.)

Within five years after he began to devote his entire time to Electrical Music, Thaddeus Cahill had successfully concluded several lengthy negotiations for the sale of territorial licenses; had himself written elaborate, comprehensive, and far-reaching license contracts; had continually helped his licensees in their financing by entertaining their guests and giving demonstrations for them; had moved his laboratory from Washington to Holyoke; had created the new science of Electrical Music; had solved a multitude of complex mechanical, electrical and musical problems; had invented and built 145 different electrical generators of new types, of many different sizes no two of which produced the same number of vibrations per second; had compelled those 145 different generators, with 145 different frequencies (itches), to produce perfect harmonies by a train of gearing, cut in his own shop by men who had never cut gears before, after the best gear experts of the greatest gear-cutting houses in America had refused to recommend that their houses undertake so complex and fast-running a set; had built the massive structural steel main frame; had assembled the 145 different generators and the unprecedented but unavoidable gear train upon it; had provided a water-cooling system for the generators and the gear train; had invented and constructed a whole family of different lesser machines; had made tone purifiers, tone blenders, chord combiners; keyboards for the musicians to play upon; expression mechanisms with remarkable artistic powers, etc. etc.;---literally carload after carload (not including the main frame, the generators, the gearing or the other heavy parts) of delicate electrical devices, such as man had never seen before; had made all that vast assemblage of whirring

machinery and electrical devices to produce, not a single thing, but a whole multitude of things simultaneously---not some coarse or simple product, but music---beautiful music---music so responsive to the touch of the performer that it was said one's ear could tell whether the musician had drunk coffee before playing or not. He had trained musicians to play upon it, and he and Arthur had taken the plant down, moved many carloads of it to New York, had set it all up again and had made it to sing once more.

And he had done all that, in those few years, single-handed and at the first attempt, one might almost say. There was, it is true, a little, partial, first plant in Washington, but---wonderful as it was---it bore not much more relation to the elaborate and complex plant than does a wheelbarrow to an automobile. Arthur and I assisted him, of course, as did Peter Lobben, our superintendent; Orvill Keeler, chief electrician; and Harold Craig, chief draftsman. But no one of us had ever studied electrical engineering, the mathematical science of music or anything bearing on the subject, or had any training for the work except that Mr. Lobben was a practical, although not a graduate, mechanical engineer. No one of us would have pretended that any part of the creative work or of the solving of the endless problems was his, except for Arthur's contributions to the speaking devices.

When I think of what Thaddeus accomplished in those few years---of the baffling variety of the problems---of the self-education---of the breadth of knowledge needed even to understand them---of the endless studying and figuring before solutions could be expressed in concrete form---I marvel at the grasp, at the comprehension, at the incomparable judgment and intuition which led him continually to a solution

that would work; at the creative genius that supplied the whole family of varied electrical and mechanical apparatuses that did work; and most of all at the brain that could carry and coordinate that multitude of problems and mechanisms without forgetting anything or falling down anywhere. At the end of that five years, there was practically no "junk pile"---all the way through them but one important disagreeable surprise---a little explosive effect at the beginning of a note, which he diagnosis as "static" and finally overcame. No one of the thousands of parts had failed to work or to produce its intended result. And but one unexpected guest---the dread of all experimenters---had arrived. The world knows a hundred times more about "static" now than it did then.

And the marvel grows, when one remembers that the man who did all those things never had a single day's schooling in electricity, in mechanics, in harmony, in acoustics, in the mathematics of music, in drafting, in designing, and practically none whatever in physics or mathematics.

Seldom, I believe, has the life work of even a dozen inventors encompassed more than he did in those five years, or produced a more perfect and finished product. We did not ourselves then realize the greatness of that accomplishment, or the superlative quality of the music. We knew the music was beautiful---that the perfection of the chords and the intervals lent a dignity and charm to even simple strains, which they had not possessed before. People said it was the most beautiful music they had ever heard. A learned musical Critic had called it "music of almost ethereal purity". People passing by would stand for considerable periods outside the window to listen to it. The famous "McClure's Magazine" (July, 1906), had published an im-

portant article on "New Music for an Old World," by Ray Stannard Baker. I had seen business men and lawyers stand, in the office of a machine shop, with heads bowed and eyes closed as if in prayer, during the rendition of Handel's Largo by Paul Fishbaugh, a young business man who was not a professional musician, although he might well have been one. But we were surprised at the praise the Electric Music --- Telharmony, as others frequently called it---was said to be winning from that galaxy of musicians which made the Metropolitan Opera House so famous thirty years ago. To quote but a few:

The greatest of all Tenors, Caruso, was quoted as saying:

I have listened to the Cahill Telharmonic Electric Music and I must declare that it will bring a revolution into the musical world, both through its artistic expression and by bringing really good music to all kinds of people.  
Enrico Caruso.

The famous and popular Gadski:  
The beauty and varieties of tone produced by the Telharmonic system were to me a revelation; and to think that what I heard, could be heard by thousands of others miles away. A veritable miracle.  
Johanna Gadski Tauscher.

Among the marvels I saw in North America, ranks first the Telharmonic system, a wonderful application of the most useful of natural agents to the most beautiful of arts.

A. Bonci.

The Telharmonic system does not only seem to me a scientific achievement of the first order, but an invention which seems to promise more for art than any other instrument ever did. The intonation is a real joy to the ear \* \* \* besides its

artistic possibilities.  
Anton Van Rooe.

\* \* to listen to the delicate tones of the flute or the clear tones of the French Horn, and to realize that \* \* all this music, in its wonderful mass of color and tone, can be transmitted to any desired point, almost passes comprehension.  
Marcel Journet.

I have been delightfully surprised at the wonderful results of the Telharmonic electric music. I really think that the marvelous purity of tone produced by electricity will certainly make a revolution in the musical world, and especially in orchestral productions.  
M. Ancona.

From the then Musical Director of the Metropolitan Opera House:  
I have listened to the Telharmonic Music and to my mind it is the greatest achievement artistically and commercially. \* \*  
Arturo Vigne.

From the then Leader of the Orchestra at the Metropolitan Opera House:  
My opinion of the Telharmonic system is that it opens up unlimited possibilities in the world of music. Being founded on scientific principles, it is capable of the widest development. \* \*  
Alfred Hertz.

From the then Leader of the Orchestra of the Manhattan Opera House:  
I am so deeply impressed with the Telharmonic system that I have no words except to say that it is marvelous. \* \* \*  
Cleofonte Campanini.

From the then Administrative Manager of the Metropolitan Opera House:  
To distribute really good music by electric wires, is to my mind one of the greatest benefits that

could be bestowed on a community.  
\* \* I was deeply impressed by the wonderful purity and variety of the tones produced.  
A. Dippel.

Remembering the gauntlet of criticism that almost every new invention has to run, and the chorus of condemnation from the art to which it pertains that it must endure, we were surprised and incredulous. Thaddeus himself could scarcely believe it. So Arthur called upon the Administrative Manager of the Metropolitan Opera House, Mr. A. Dippel, and asked him about the matter. Mr. Dippel assured Arthur that the signatures were genuine and that the singers had meant all that they said. He had heard them talking about it and said that Arthur could absolutely depend upon those statements. We knew that writers were praising the quality of the tones, the response of the instrument to the feelings of the musician, and the matchless goodness of the intonation. At a later date, I myself heard the famous Pianist and Conductor, Ossip Grabrilowitsch, say to Thad of the Electric Music, "I said to myself that will displace all other music."

Meanwhile prominent monthly magazines and scientific publications in America, England, France, Italy, Germany, Austria, etc., etc., were describing the new system and the wonderful apparatus for the production and distribution of music electrically, were praising the beauty of the music, and publishing pictures of the apparatus and of Dr. Cahill.

Even before that, it had attracted so much attention in informed circles in Europe that both the Kaiser Wilhelm, and the Emperor, Franz Joseph, had sent representatives to report to them upon it. They and the French Ambassador, M. Jules Cambon, had personally

visited Dr. Cahill's plant and reported upon his work to their governments.

And Lord Kelvin, then President of the world's most famous Scientific Society, generally recognized as its foremost scientist, and a distinguished inventor himself, than whom no man in the world was more fitted to judge, said of Dr. Cahill's work to Mr. and Mrs. George Westinghouse, who had brought Lord and Lady Kelvin to our laboratory, "One of the greatest accomplishments of the brain of man."

But the Managers of the Licensee Company in New York made two serious mistakes: 1st, they took on too heavy an expense account, which only a going and very successful business should carry. Probably, Electrical Music could have carried it when a going business. But the 2d. was one of those tactical mistakes which, having once been made, can never be corrected. They disregarded Thad's urging to get a franchise to put their own cables in the streets of New York, when Electrical Music was having no publicity and when they could have gotten it with the lowest possible franchise payments. Later, they sought a franchise. But then all the world knew of Electrical Music. Wise and experienced business men were predicting tremendous earnings for it. So the City demanded staggering franchise payments of them, which they felt it was dangerous for the New York Company to undertake.

Meanwhile, they had been depending wholly on telephone wires for the distribution of the music, although the electric-music vibrations were literally millions of times as powerful as the vibrations the telephone wires were then adapted to carry. The Telephone Company was willing to rent them those wires but, of course, on condition that the Electrical Music did not disturb

conversation on other wires. That, unfortunately, it did, when any quantity was put upon those tiny wires. So the Telephone Company, which was not then able to "boost" its feeble vibrations, as it does now, was forced to discontinue their use of its wires.

Suddenly, then, the New York Company which had such a wonderful product to sell, whose sky had just been so rosy, and whose safe was filled with contracts with the best Clubs, Hotels and Restaurants in New York City, at charges running as high as \$150 a week, found itself with a very heavy expense account, no wires and no means whatever of reaching those subscribers. The Hotel Plaza, possibly then the foremost New York hotel, which had wired every guest room in the house for Electrical Music, was even reported to have brought suit against it for non-fulfillment of contract.

Caught unexpectedly in those ways, and overtaken by the severe panic of 1907, the New York Company, in utter violation of its contract, ceased the payments it had contracted to make, closed its doors and walked away.

So again, after doing his part superlatively well, quickly and cheaply, the business men failed him, chiefly because they would not follow his advise. Looking back now, I am absolutely certain that a great success and a great fortune could have been made, if only they had followed his counsel to keep their expenses down, to put the big plant in an inexpensive building suitable for a central station, and to get a franchise to put suitable cables into the streets. Everything was right for it if only his advice had been followed. But that opportunity was lost, and as subsequent events over which he had no control, worked out, Electrical music was lost to the world forever unless someone

else of great talent takes up the work where he left it off.

With the most important territory in the world tied up; with the great plant tied up; with nothing but trouble, loss of time and heavy expense from it, Thaddeus Cahill did not even falter. He resolutely set himself the task of building a new and even better plant, of freeing the New York territory and of getting a franchise to lay cables in the streets of New York. It was during those years that the famous Orchestra Conductor, Ossip Gabrilowich, came to Holyoke to see him, and, after greeting him said: "Doctor! When I first heard your wonderful music in New York, I said to myself 'that will displace all other music.' And now I cannot even find it."

When, after further years of work, the territory had been freed and we were ready to move that plant to New York, I myself walked up one street and down another for weeks looking into empty and into occupied buildings to find one suitable for our purpose and at a low enough rental. One day I found one on West 56th Street that looked very good---a high, dry, pretty-well ventilated, basement; a very strong ground floor, heavy roof timbers and saw-tooth roof. The building, the nature of the ground, the danger of the basement ever being flooded, the proximity of ducts in the street running over to Broadway, etc., etc., were all carefully studied. Then we rented it, and paid the occupant to move out. If I remember correctly, it gave us more space than they had had on Broadway. Yet we paid slightly less per year than they had paid per month. And we had an option to buy the property at what seemed like a reasonable figure.

Then that new Electric-Music Plant was removed to New York by another licensee company, and a

cable run from it to a small hall for chamber music in Carnegie Hall, the most famous musical center in New York after the Metropolitan Opera House. For the distribution of that music, Thaddeus and Arthur had already obtained from the city of New York a franchise to put wires into its streets. I doubt whether any other one man, so nearly single-handed, and practically without expenditure for lawyers or entertaining ever obtained so valuable a franchise in New York before or since. The chief difficulty was the unreasonable franchise payments that had been demanded of the former company. They whittled them down greatly, yet they were still heavy. But we had a franchise.

Then again, although the musicians were playing over at West 56th Street, many distinguished visitors heard the music in Carnegie Hall and in other places in New York. What is believed to have been the first broadcast of music ever made by radio, without wires, was made by Dr. Lee DeForrest, from Dr. Cahill's Electric-Music plant, and picked up by a ship in the harbor.

But with even great economy---the three of us were not drawing a single dollar of salary---the making of those franchise payments, the running of the central station and the small factory in New York, the maintaining of a corps of musicians and of a Music Chamber in Carnegie Hall, the making of sets of instruments for subscribers' premises and cables for the streets took money and time. And time for the training of musicians, the giving of demonstrations frequently, the figuring out of cables for complex conditions that had never been met before, the getting of them made up and placed in the streets, required money, and considerable amounts of money.

Soon we learned that the former licensees had given Electrical Music

a blacker eye in New York than we had ever imagined. The music was even better than before, the expense account a trivial fraction of what it had been formerly and the Company had a very valuable franchise. But the bloom had been taken off the rose. Electrical Music was now an old story. And New Yorkers will consider nothing but "The ground floor." I had never tried to raise money before without accomplishing something. But none of us, nor the able and wealthy business men associated with us, although they were heavy investors themselves, could then do anything in New York.

Looking back now, I see several causes, some of which we scarcely perceived then at all:

1st. The irreparable injury done to every phase of the undertaking by the previous licensees. That was very definite and unsurmountable;

2d. The depression which the tariff policies of the Wilson Administration were forcing the country into and which was overcome only by the coming of the World War, as all older men will remember;

3d. The money stringency---almost panic---which existed before war broke out, and which was later understood to have been due to the preparations for war going on in Europe. That money stringency, that degree of depression, and the fear of greater depression, without more, would probably have stopped the financing of almost any new venture then;

4th. People outside New York generally suppose that it is easy to finance anything in New York. If you cannot do so quickly, many became alarmed, conclude that something must be

wrong and fear to go any further; and

5th. Although none of us realized it then, it seems probable now that the imaginings about what wireless would do---the prophetic publicity it was receiving, inspired in part at least by the Electrical Music itself---was undermining the wonder of the Electrical Music and dimming its actual accomplishments.

To put it into a word, as I see it now through the perspective of twenty years, and brushing aside all lesser things, even the mistakes of the former company: That second undertaking, into which Dr. Cahill had put his unmatched labors and genius; into which he and his family had put the best years of their lives and several hundred thousand dollars of their own money; and which others also had backed largely with their money---that undertaking was doomed to failure by an event which no brain could have foreseen, and no human power forestalled, the coming of the World War. When the most successful merchants could not borrow a dollar from their banks on prime stocks that were worth twice par, it was simply impossible to raise money for any new undertaking. We strained every resource. We sold our property. Noble souls made sacrifices to keep the ship afloat. But all to no avail! Mars was sucking the money of the world into his maw. The thoughts of men were on war. And the prosperity that later flowed from the war did not come until too late.

Baffled by Fate, stripped of his fortune, seeing his prodigious labors and achievements come to naught a third time, Thaddeus Cahill did not mourn or complain to others. The wound was too deep. The disappointment too great. He struggled manfully to avert the catastrophe, but

it could not be done. Then he wavered briefly and seemed, for the first time in his life, so far as I know, to lose faith in the worthwhileness of his work. He began to brush up on his law, and to talk of going into a law office. That was a change at least, after nearly twenty years of inventive and creative work, for a man who seldom slept five hours a night, who worked at least eighteen hours a day, and very, very seldom took even a half day off.

But our faith in his genius and our appreciation of his work were too great for that. So Margaret, Arthur and I told him that we would try to support the family (Eleanor and Mary kept the home) if he would take up the Electrical Music again; that it was too precious to be abandoned; and that if he did not do something with it, it might be lost to the world forever. I recalled to him what a very able lawyer in Massachusetts, after expressing great admiration for and surprise at a contract Thad had written, had said to him, "But Doctor, a man who can create that machine and produce that music has no right to waste his time writing contracts. If we cannot write as good contracts as that, we can write good enough contracts, but no one else can do your work."

As his spirit revived with time, nature and our urging turned his mind again, but ruefully and rather reluctantly, to the field in which he had accomplished such wonders and won such fame, his beloved Electrical Music. He sought to reduce the cost and the complexity of the mechanism. From time to time he said he could now build another machine for much less---for half its former cost, and later for a quarter. Later still he perceived that a toy-sized generating plant would serve instead of the enormous and costly generating plant required before, because its feeble vibrations could be raised to

any volume desired by Dr. deForrest's wonderful little tube. That would be a great help. And he struggled still, with a patience that never flagged, to further reduce one problem---the single problem on which he had spent more of the previous twenty years than on probably all others put together---the almost unsolvable problem of enabling players upon a keyed musical instrument to play in the just temperament, instead of in the equal temperament. That we all considered of the highest importance ---the greatest single merit musically of the Electrical Music---the one which had won for it the highest praise. No one but he had ever reached any solution of that problem at all, so far as I know.

And then arose over the horizon a cloud, more threatening, more discouraging, more devastating than anything that had happened before, that modern miracle, RADIO---Wireless and Radio, the work of thousands of men, in many lands, over many years ---Radio, which soon bankrupted the piano builders of the world and impoverished the music dealers and music teachers of earth. Radio, which added words to music, and speech to both, and flung the whole thing into space for nothing. Radio, which could be picked out of space free in the city, in the wilderness, at the Equator or at the South Pole. Radio, that carries the news, the market, the weather, the sermon, the prayer, the political speech and the prize fight, quite as well as music.

What field did that leave for Electrical Music, which required an elaborate central station, expensive wires in the streets, and a rather costly receiving set for each subscriber; which just had to make a charge therefor, and which was only music---instrumental music then---with neither song nor speech? What difference did it make that one was superlatively fine and the other sometimes terrible.

Here was not the fault of man, nor anything that could have been foreseen or prevented. To my mind, Radio is the superlative triumph of science---of applied science. To its accomplishment the world brought a greater capital of experience, technical knowledge, scientific training, money, machinery and business ability, and into it man put more enthusiasm, study, invention, and experiment, than had ever been brought to, or put into, a single field in so short a time before. But with all due respect to, and admiration for them and their accomplishments, I still doubt if the work of the best dozen men in radio, over twenty years, laid out together, would equal the work and accomplishments of Thaddeus Cahill alone in the five years above described. Nevertheless, to him and to us, then, Radio seemed to leave no place for Electrical Music, but to have written USELESS and FINIS over the labors and expenditures and achievements of those twenty years.

Making a new start in life when you are 50, when your property has been swept away, and when everything you have done in life lies in ashes around you, is not easy, even if you have a good conscience and have done your part well. To the sensitive soul of genius, it is a tragedy which is seldom survived. And possibly it might not have been survived by him, had it not been for the encouragement and solicitous care of his loving sisters. Arthur and I were too busy trying to get a new start ourselves to have quite perceived it all then. But as I look back at it now, I see that he was more deeply wounded than I then realized. The quiet, deep-seated confidence that had led him to contract to build all those multitudinous mechanisms, to produce saleable music from them, and to distribute it to many subscribers simultaneously, was stunned. The unapproachable salesmanship and negotiating ability

which had enabled him to induce bankers, business men and experienced negotiators, old enough to be his fathers and grandfathers, to pay him Ninety Two Thousand and Five Hundred Dollars (\$92,500) cash in advance, for a license to only New York and New England, with heavy continuing payments, and for the privilege of contracting to pay undetermined hundreds of thousands of dollars more for the first plant, when no such plant had ever been built in the world before, when only one man knew anything whatever about it, and when a hundred thousand dollars sounded as great as a million does now---impossible as it may seem today, I suppose the discouragement was so deep, and the futility of it all so overshadowing that even such talents seemed useless then.

Beyond the great majority of inventors, although he was so well qualified to work in many fields, Thaddeus had steadfastly closed his mind to other ideas, and concentrated his powers on the Electrical Typewriter first and his Electrical Music afterwards. During all those years, his actions had been continually saying with St. Paul, "This one thing I do."

Now, however, he began working on some other inventions, and we could see the same bold striking out beyond what others had thought of, the same creative insight and thoroughness. Worthwhile inventions! Important inventions! If Heaven grants us life and health, one or two of them will be upon the market to bless mankind in due time, I hope.

But we began saying to him, "What if you can double the speed of a typewriter, or treble the speed of a typesetting machine, or somewhat increase the efficiency of a heat engine? What are such things worth by the side of Electrical Music? The perfection of that tuning and those intervals are worth all of those

other things put together. And you're the only man who ever did anything in that field." Some time afterward he told us that he could make Electrical Music the basis of Radio. And we said that any Broadcasting Station that could send out music in that just intonation which had captivated even the leaders of the best string quartets, and the Conductors of the greatest Orchestras of the western world, would soon put all other Broadcasters out of business. Later he said that he could build a plant now for a sixth or an eighth of what it had cost formerly, and within the last year or two he said often that he could build one now for 5% or 10% as much as formerly. His Spirit had been rising gradually for several years although he was delayed, and his work greatly increased, by the Patent Office, which has become far more technical than formerly.

During 1932 and 1933 he had been much encouraged by the way he was weaving Electrical Music and Radio together, and during the last year, by the way his cases were coming through the Patent Office, by the even better-than-he-had-expected results that Arthur was getting from early embodiments of one of them, and, generally, by the way things were taking shape for him, after so many years of work. The Examiner, who had one of his cases, had twice said to him that it was going to be a very important patent in the art---an unusual compliment, indeed, from an examiner in the Patent Office, where inventions seem to be less thought of than anywhere else on earth---unless in some other Patent Office. We had all noticed that he was cheerful, more hopeful than he had been for a long time, and that he talked more of his work than he had done for fully 20 years.

Meeting Miss Elizabeth Mauthe, one of his former secretaries, on about April 1st, he told her that he was

well; that she would hear of his work again before long, and that, judging by the longevity of his ancestors, he had still a reasonable expectation of 20 years of life. But over that life, within two weeks and without any warning, the Grim Reaper had written F I N I S , as far as this world is concerned. That Providence which had given him so wonderful a brain, which had watched 50 years over his health while he worked, which had assigned to him tasks too complex for others to perform, must have seen something that we do not see---and suddenly called him home.

Thaddeus Cahill, like Daniel Webster, was one of the men who carry some greatness in their faces which makes others deem them larger men than they really are, until Death steals their Spirits away. Not noticeably thin, he seldom weighed more than 115 lbs. until about 30 years of age. When his Spirit had fled, he did not look like the same person. People who had known him for years, even those who had worked with him intimately---his draftsmen, his secretaries, our foreman, etc., spoke with surprise of how small he looked then. The light of that countenance had gone out, and with it the importance and the apparent size of the man. We had not remarked that about Mary. Although he was but two years older than I, even in boyhood I had noticed that glances on the street which took in both of us at first were soon concentrated on him. In places like street cars, the eyes of all classes and ages of people that were idly roving around, were arrested when they caught that face, and usually remained there for some time. That may explain why we were never pleased with any photograph of him, and are left without any satisfactory one now.

Never robust, caring nothing for,

and practically never playing, outdoor games; not liking or seeming to need any physical exercise beyond walking (where the real attraction was thinking or conversing), he was blessed with wonderful health---I can scarcely recall his ever having been really ill; with prodigious working power, and with an endurance that enabled him to work every day (Saturdays and Sundays included), for a dozen years on end, almost without taking a half day off, unless he had an occasional cold, which seemed the one weak spot in his physical armor. By conventional ideas, the product of such protracted efforts should have been stale and anaemic. On the contrary, it aroused surprise, admiration and respect.

He had a very slow pulse---not quite as slow as General Grant's---and was the most imperturbable and persuasive man in a negotiation I have ever seen. When about 33, with his only previous inventive business venture---the Electrical Typewriter---in ruins, with his capital sadly depleted, and without any backing whatever, he met the group of bankers, business men and negotiators spoken of on page 12, ante. Those negotiations were not consummated in any burst of impulsive enthusiasm. They occupied more than three months. There were many men on one side and practically only one on the other. And the writing of the contract occupied more than three months longer. At the end of all those months, those business men, who were to put up great sums of money, had yielded to the inventor at almost every point; had left the writing of the contract to him; had contracted to pay him well over \$100,000 in advance and to pay all the costs of every kind, of the building of a first vast machine, whatever they might be, but which they understood perfectly would probably reach several hundred thousand dollars more. And he retained the patents, while they got only a license to New York and New England.

Yet he had nothing to show them but that small, partial, first machine, which has already been mentioned.

He must have had a remarkable nervous system. He never wearied while working, if he thought the thing he was doing could be improved even slightly. Everyone was amazed at his unflagging patience. Although those 5 years showed such vast accomplishments and endless labors, while he did not average 4 hours of sleep a night, one might say he never seemed to hurry, never to be nervous, never to be flustered, never to be perturbed and never to worry. Rarely did even close observation detect the slightest sign of nervousness before a conference or a demonstration, although thousands of dollars hung on the result. He was more subdued by the loss of our sister, Mary, than by any of those sore disappointments, when everything seemed to have been swept away. The only explanation I have ever been able to perceive for it, is that his ability---his command of what he was doing---were so great that he was never perturbed at all. He was always the master; practically never the creature of circumstances. His patience with his men was very great. To few of them did he ever show anger or even impatience---a rare thing, indeed, where important work is being done for the first time.

His physical equipment included that prime support of health, of good spirits and of arduous labor, a digestion that never troubled him or failed him. Those who deem a good appetite a reward for toil, would have envied him. He enjoyed his food, and seemed actually to need twice as much as any other member of the family. Like Rossini who often ordered two dinners for himself alone; like Wagner and other geniuses, he strikingly illustrated the fact that the brain needs to be fed as well as the body.

Woman's intuition is famous and real. Women, practically all women, have so long been specialists in living, in the deep and important things of life, that they have acquired a sense in such things that cannot be attained by reason and calculation alone. That kind of a sense must have guided Thaddeus Cahill. His mind had encompassed so much; he began to master it so early in childhood; he had weighed it and compared it and correlated it so exhaustively that it had become an intuition, a part of his being, as it were---and not "a thing apart," as such things are to the rest of us. His work, I feel, could never have been done so calmly and certainly; he could never have avoided so continually the pitfalls into which the rest of us stumble blindly; nor so constantly have attained the results he achieved at the first attempt, had not something surer than mere reasoning and figuring guided his steps.

All my life, I have been discussing a great variety of things with him, and going to him for information and counsel on problems which I was studying, or with which I was actually contending. Almost always he threw new light upon them, told me something I had not yet learned myself, or turned up something so far beyond what I had encompassed that it actually surprised me. And often I had already discussed the point at length with others, no one of whom got as deeply into it after lengthy considerations, as he did in the first few moments. A thousand times, I have seen his mind go straight and almost instantly to a conclusion or a definite figure, which, then, thought and study proved to be correct.

10 hours a day, for 10 days now have I been writing this paper. At table and at night I have pondered

over that life, and the mystery of life itself. For all but 2 or 3 years of my life, I have lived in the same house and eaten at the same table with Thaddeus Cahill. We have discussed everything together from childhood. I have had a part in almost everything recited, until recently. But I had never before reviewed them in such ordered sequence. And I had never previously so fully realized how everything in that life had led up to DISAPPOINTMENT, or that the final falling of the curtain upon it was so consonant with the earlier acts. So I ask myself again the questions I have asked myself many times before, "Was there some shortcoming in the man himself that neutralized everything?"

No one who knew the man, or witnessed the marvels he achieved, or saw the admiration his work inspired in the best judges, or heard the President and Vice President of the Licensee Company, during the years when those hundreds of thousands of dollars were being raised, say openly and repeatedly that Dr. Cahill was their best argument and their ablest salesman, could answer anything but No! No! as to him, personally.

"Then, was there some great defect in the work or in the product?" They were good enough to win almost unbelievable praise from scientific writers, musical critics, the greatest singers and Opera Conductors, and from such men as George Westinghouse, Charles A. Coffin, Dr. Steinmetz, and Lord Kelvin. Could they possibly have been mistaken, when passing judgment not upon expectations, but upon actual and continuing performance?

The most concrete thing that I I have ever been able to discover is that I felt that Thaddeus was making too perfect an instrument---that a lesser one should have been good enough at first. But there was no

such thing as "Good enough" in Thad's mind or heart. In such a work, the best he could do was absolutely the only thing he could do. Up to his last day on earth he thought he had been right. Probably, if he could have done things "well enough" he could never have made Electrical Music sing so that any one would have cared to hear it at all.

Rather, in just a word: Trickery and dissension and failure to observe its contracts wrecked the Typewriter Company. To heavy an expense account, failure to get a franchise in advance, and the severe panic of 1907 ended the first New York Company. That failure and the War doomed the second New York Company in advance, no matter what foundations we laid, what economy we practiced, or what efforts we and others put forth. The later frustration by Radio and the final cutting of him down may both be called the "acts of God."

Before the final question then, "How could such endowments, such prodigious labors, such repeated achievements be denied even ordinary success?" I stand speechless, with bowed head.

Last night this paper seemed closed forever---that any further word save F I N I S would have been an intrusion. I tore up the notes of things I had hoped to include. My eyes were wet and my heart was sad. Just as I rose from my chair the clock tolled Twelve o'er another day. By dawn this morning a voice within me was saying, "Is that quite fair?" "Was that really all there was to it?" "Wasn't there another side to that life?" "Were not joy, and victory, and accomplishment in it, as well as sore disappointment?" and I was answering, "Yes, of course there were," before I was half awake.

Of course there was joy in it! The years were full of the joy of work, that greatest of all blessings which God has given to man. They were full of the acquisition of knowledge, which, to Thaddeus Cahill, was as pleasant as is the acquisition of money to some men. Study---the study of such things as law, science, the mathematics of music---was practically the only recreation he ever cared for or ever had. That pleasant acquisition of knowledge was his from youth to age.

The "delights of mental labor" were in it, which have long been considered among the highest rewards of life. There was the thrill of beautiful and benign conceptions in it, which everyone who has known both must rank as far beyond even the "delights of mental labor." And that serene satisfaction which suffuses one who has accomplished a difficult task well was granted to Thaddeus Cahill in large measure.

In a very true sense, he was a serene, happy, cheerful and successful man, although he did have to endure such great disappointments. Probably the dearest and most continuing desire of the human heart is to be able to do what it would like to do. Thaddeus Cahill did that beyond anyone else I have ever known. His work was his life. He chose his work from boyhood, was his own master, and had his own way in it at practically all times. He brushed completely aside that multitude of little things which enslave so many of us. He achieved the results he sought in masterly fashion. He heard them praised as wonderful by the very best judges.

He had a strong, deep-seated and, as I long since learned, justified confidence in his own powers and in the importance of his work. He felt that he was working for mankind. That the high-class Monthly Magazines and Scientific Journals of

Europe and America were carrying articles about his work, and pictures of him---when so few photographs were being published---did not elate him in the least. I cannot recall his ever showing or mentioning one of them to anybody outside his family and his office, and very seldom, indeed, even in those places, or his sending one to a friend. If Eleanor had not kept some, we would have none now. That confidence in the fundamental correctness and worthwhileness of his work, no doubt sustained him strongly in his disappointments and losses. The greatest scientists, especially if from other lands, feel honored to read papers before the Royal Society of London. But when Lord Kelvin, then President of that Society and universally recognized as the foremost scientist of the world, offered to read the paper himself, if Thad would send him one on the Electrical Music, Thad-deus, although deeply appreciative, considered it more important to press the work which he had contracted to do, than to be writing about it. So the paper was never written, and never read before that greatest of all Scientific Societies.

And from boyhood to manhood, from youth to his death, he was treated with respect and consideration by practically everyone he met, whether on first meeting or after long acquaintance. Men of learning and quality, no matter what their profession, or how casual the meeting, talked to him as if he understood their profession, commonly assumed he belonged to it and always treated him as an equal if not as an authority, although he had never had a day's schooling in it.

He had no need of company in the usual sense, although he enjoyed it thoroughly, and commonly became the center of the conversation, from whom others sought information and opinions. And, strange as it may seem, he generally started more mer-

itement at school and at table than anyone else, not by telling stories, which he seldom did, but by the comical character of the thoughts he brought out, and by the humorous light he threw on things that everybody already knew.

Imagination, creative imagination, has long been regarded as the highest gift of God to man. It soars to heights that others cannot attain. It does things that reason and knowledge never suggest to us---things that our knowledge and reasoning even keep us from seeing. But when genius sees them for us, we respond with surprise and delight. The stars on the little "service flag" during the World War were a fine illustration. When we saw those white stars, reason and experience said, "A red star would show that a soldier was wounded; a yellow star that he had fallen ill of the diseases that ravage camps. And black, the accustomed sign of mourning, a BLACK STAR would show that he had made the last great sacrifice. Those colors all would understand. That was logical and complete. But one day a G O L D S T A R caught my eye. When its symbolism was explained to me, a lump rose in my throat, as I said to myself, Oh, Oh---

Imagination! Imagination! Thou child of the Gods!  
How leapest thou from death to glory?  
How dull hast thou made my logic and precedents!

With creative imagination, Thad-deus Cahill was richly endowed. It was his imagination and sure intuition, working with the vast stores of his knowledge and his incomparable judgment, which supplied the solutions of those endless problems; the mechanisms in which the solutions were finally embodied; which surprised me a thousand times when I took problems to him for

counsel; which enriched his conversation, and which helped him mightily in his negotiations. A lifetime of living and talking together did not exhaust it or prevent me from being continually surprised afresh at its manifestations.

But his was never an airy or fantastic imagination---it always "had its feet on the ground." Its product was never regarded as ideal but impossible, as beautiful but impracticable. Its suggestions surprised and delighted practical men in every grade of business and profession. In argument, I have often heard someone striving earnestly to maintain a position against him, and a few days later, I have heard that same person advancing to someone else, not his own, but Thaddeus' arguments.

Yes, there was work and study, joy and living, imagination and accomplishment in that life. There was victory, achievement and sincere satisfaction in it. It was crowned with

some of the highest talents and the richest blessings God gives to man, even if disappointment, sore disappointment, also, was in it.

So runs the Life of Man---born to trouble as the sparks fly upward, if we look at its shadows, its failures, its disappointments---just a little lower than the Angels, if we look at its successes, its achievements, its aspirations. But always inscrutable to us, always beyond our understanding or our commanding---although it is ourselves.

Should I have stopped last night, or continued this morning? I scarcely know. But this I know: To have lived with MARY CAHILL and with THADDEUS CAHILL would have made anyone humble, and have lifted his life to a higher plane. To have to live afterward without them, is to descend to a lower plane.

F I N I S .