

He was cross-examined respecting certain inventions to show that they did not work satisfactorily. He was then asked: "Since 1866, what machines have you conceived and perfected that have worked satisfactorily?" He answered: "To the best of my knowledge, I think they all have. The nail-machine gave satisfaction. I had it running in the works, but the nailers drove it out. The tram and red-staff was a good machine, and adopted by a number of millers. The magnetic clock I consider a good thing, but I am not through with experiments on it yet. I believe this last faucet to be a good thing." If his nail-machine had induced the workmen to drive it out of the shop, it ought to have commended itself to the capitalist. His magnetic clock had not been patented at this time, though it had been for a time the wonder and admiration of the community in which he lived; but when it was patented in 1879 it was as a "new article of manufacture," consisting of a galvanic battery for electrical clocks, which had two old elements united, instead of being disconnected, as in former devices. The history of this clock shows clearly that it was of no practical merit; and the clock had been substantially described in Tomlinson's Encyclopedia; and he had the book before he made his alleged invention. His other electric devices he never patented; and in his testimony in the interference proceedings he did not refer to them as among his perfected and successful inventions. One of these was his magneto-electric machine for short-line telegraphing and fire-alarms, sometimes mentioned as his "magneto key." It was not a new device, and the proofs show that it was a failure.

When the speaking telephone was first introduced to the attention of the scientific public it was pronounced by one of the most eminent electricians of the day "a result of transcendent scientific interest," and "the greatest by far of all the marvels of the electric telegraph." The inventions attributed to Drawbaugh include not only the conception of the principle of the unbroken undulatory electric current, and of the delicate and complex instrumentalities essential to its efficient application in transmitting and reproducing articulate speech, but also of many other devices involving a nice adjustment of forces and requiring sensitive mechanism. These were inventions of a peculiarly scientific order, which would seem to demand a special converseance with the principles of acoustics and electricity. Besides making the cardinal discovery of the theory of the unbroken undulatory current, Drawbaugh is assumed to have perfected a brilliant and extraordinary series of original discoveries, for which, to use the words of Mr. Benjamin, "there is no parallel instance in the whole history of invention." Mr. Benjamin, referring to the microphone, which was introduced to the public in 1878 by Mr. Blake, but which is one of the instruments asserted to have been invented by Drawbaugh at an earlier date, says: "It was looked upon as a great and original discovery."

It was said by Chief Justice TANEY, (*O'Reilly v. Morse*, 15 How. 111,) speaking of the invention of the telegraph:

"No invention can possibly be made consisting of a combination of different elements of power without a thorough knowledge of the property of each, and the mode in which they operate on each other. For no man ever made such an invention without having first obtained this information, unless it was discovered by some fortunate accident."

None of Drawbaugh's alleged discoveries were made by accident. His statement is, that, starting with the belief that speech could be transmitted by electricity, he made first one contrivance and then another, gradually obviating difficulties and making advances experimentally, until he finally perfected the several inventions. In view of Bell's special equipment for investigation and experiment in electrical and acoustic science it would not seem strange that his persistent efforts to effect the electrical transmission of speech were eventually successful, were it not that others as intelligent, as well equipped, as ingenious, and as persevering as he, had devoted years to the same object in vain. He had the assistance of Mr. Watson, an expert in electricity, and a skilled workman in electrical mechanism, in constructing the apparatus employed in his experiments, and who also aided him in his experiments. He had demonstrated his inventive proficiency by inventions in telegraphy for which patents were granted to him. And yet had it not been for an accidental discovery made by him in June, 1875, and which would probably have escaped one whose trained faculties were not centered on a careful study of the phenomena, he might have failed.

Drawbaugh, on the other hand, was not only untutored, but he was isolated by his associations and occupations from contact with men of advanced science; he had narrow opportunities for instruction, and few incentives for profound research. Among the multitude of his inventive conceptions was one that a talking-machine was a possibility. According to the testimony of Lory, a witness for defendants, before Drawbaugh began his practical experiments he exhibited a sketch of a machine that he was about to make that would talk a distance of 20 miles, and work something like a telegraph. If this is true, he commenced on his telephone as the architect plans a building, or the engineer makes a draught of his structure. His own testimony shows that he did not attempt to qualify himself for electrical inventions by any systematic study after he began experimenting with his talking-machine. Although he had undoubtedly acquired considerable desultory information about electricity, and especially about the mode of operation and detail of construction of electrical mechanism, it is obvious that when he commenced with his talking-machine he was a tyro in electrical science, essaying the most difficult work of the electrician. It is almost incredible that the subtle intellectual discoveries which were a closed book to the ablest electrician could have been reached by a smatterer in science, or by any series of empirical experiments. As has been remarked, he seems to have discovered nothing accidentally; yet from the beginning to the end of his narrative

there is nothing to indicate the conceptive origin or the mental growth of the alleged invention. He presents a number of devices in the chronological order of their production, and testifies that he made one, and then another and another as experiments led him to modifications and improvements. He cannot describe what receiver or other apparatus he used with his first transmitter, and testifies:

"I had a number of crude apparatuses, but can't remember exactly the shape of any of them. I had membranes stretched over hoops,—over a hoop, I remember that; and I had electro-magnets, and the arrangement was varied. I don't remember exactly the arrangement."

He testifies that when he used the cup-machine he used it in a continuous electric circuit, and thinks he used it as a receiver with Exhibit B as a transmitter. He states that he succeeded in transmitting speech with these two instruments, and, of course, he could only have done this by employing the unbroken undulatory current of electricity. He cannot state how he conceived the initial idea of the undulatory current and the continuous circuit, or, subsequently, the theory of any of the remarkable devices which he produces. His answers to questions intended to elicit such information may be illustrated by giving one of them:

"I don't remember how I came to it. I had been experimenting in that direction. I don't remember of getting at it by accident either. I don't remember of any one telling me of it. I don't suppose any one told me."

He produces sketches or models or originals of instruments which he says he made from time to time. He states that they were used to talk through on various occasions; and from these outlines of accomplished facts leaves the history of his inventions to be filled out by inference and conjecture. An inventor can hardly forget the process of thought by which a great intellectual conception germinates and matures into the consummate achievement; but Drawbaugh's memory is a blank. If the untutored mechanic educated himself into an accomplished electrician by his own experiments and observations, the incidents and phenomena which revealed new discoveries, and illumined the way for new advances, would be indelibly impressed upon his mind. It seems a little short of the miraculous that a man of his capacity and equipment should have produced these inventions at all; more marvelous still that he should have produced them without any intellectual perception of his discoveries.

Another group of important facts which are satisfactorily shown by the proofs are those which indicate Drawbaugh's own knowledge that he was not an original inventor of the telephone. Reference has been made to some of the evidence bearing upon his neglect to patent or *caveat* his invention in discussing the question of his credibility as a witness. If no honest and reasonable explanation can be given for his conduct, the inference is very strong that he knew he did not have a practical telephone to patent. He may have had a talking-machine which was well calculated to excite the curiosity of

the community in which he lived; he may have indulged in expectations that in time he could succeed in making a practical speaking telephone, and reap fame and profit from it; but his conduct is almost decisive against the supposition that he had even deluded himself with the belief that he had produced anything sufficiently practical and valuable to patent. He never attempted to exhibit it outside of his own shop to prove that it would transmit speech at a distance of even a quarter of a mile. The proofs show that during all the years from 1867 to 1878 he did not attempt to avail himself of opportunities for demonstrating his invention and bringing it to the notice of friends who were peculiarly qualified to appreciate, and were favorably circumstanced to assist him. One of these persons was Mr. Kiefer, who resided at Harrisburg from 1863 to 1881, and during that period had charge of the telegraphs of the Pennsylvania Railroad Company, and was a member of a firm whose business was the manufacturing of fine electrical machinery. In 1873 he put up a fire-alarm system for that city. Drawbaugh made his acquaintance in 1874 or 1875, and brought his magneto fire-alarm to Mr. Kiefer for examination. At another time he brought the works of his electric clock. He visited Mr. Kiefer on various occasions, obtained small supplies from him, and habitually conversed with him upon the subject of his electrical contrivances. The period of these visits begins just about the time when, according to the theory of the defendants, Drawbaugh had constructed Exhibits E and D, and the invention was complete. He never mentioned to Mr. Kiefer the fact that he had experimented with a telephone. Mr. Wilson was superintendent of telegraphs for the Northern Central Railway Company at Harrisburg from 1864 to 1875. He was also mayor of Harrisburg. The company had an electrical work-shop and supply establishment there for Mr. Wilson's department between 1871 and 1875. During this time Drawbaugh often came to the supply shop and talked with Mr. Wilson about electrical experiments, and obtained parts of batteries, coils, magnets, and other electrical material which the company had cast aside. He brought Mr. Wilson his electric clock and his magneto-electric key, and tried his machine for short-line telegraphing at Mr. Wilson's office. He talked with him frequently about his inventions, but he never mentioned the telephone. His relations with David A. Houck were such that the latter procured him an opportunity to test his magneto key at the telegraph office of the railroad company at Mechanicsburg. Mr. Stees was the superintendent of a car company at Harrisburg, having shops in different parts of the city connected by telegraph lines. He was the first person to employ Bell's telephone on these lines when they were introduced into Harrisburg, late in 1877 or early in 1878. He was a friend of Drawbaugh, and Drawbaugh would naturally have applied to him if he wanted to test his telephone publicly and practically. Isaac Lloyd was a school-teacher and an alderman at Harrisburg; had

known Drawbaugh long; was accustomed to visit his shop from time to time; saw many of Drawbaugh's inventions; was present on one occasion when Drawbaugh experimented with his magneto device for telegraphing at Mr. Wilson's telegraph office. Drawbaugh visited him frequently, and they were accustomed to converse about Drawbaugh's inventions. Drawbaugh showed him his dial telegraph, his electric fire-alarm apparatus, and numerous other inventions. Witness assisted him about the electric clock. He was an owner of patents, and a friend to whom Drawbaugh applied for loans, and was interested in mechanical subjects generally. The only mention ever made to him by Drawbaugh about a telephone was in 1878, when Drawbaugh told him he was experimenting with a telephone. From 1867 to July, 1873, Drawbaugh was intimately connected with the persons composing the Drawbaugh Manufacturing Company, which was engaged in manufacturing devices under Drawbaugh's patents. He was a stockholder and the master mechanic of this company. Among the officers and stockholders were many men of capital and enterprise. There came a time when the managers of the company wanted Drawbaugh to suggest new devices for the company to manufacture. He never suggested the telephone, nor attempted to induce the managers of that company to investigate or exhibit his talking-machine. A number of the managers and employes of this concern testify that they never heard of the existence of the talking-machine during the life of the company.

Without attempting to refer to other testimony to the same general effect, what has already been referred to shows that if Drawbaugh had seriously desired to bring his talking-machine into public notice, and secure the fruits of his invention, he had ample opportunity to do so. Who can doubt that if he had a practical telephone to exhibit he would have selected just such men as Kiefer, Wilson, and the others, to demonstrate it to them, and enlist them to demonstrate its utility and value to the public. Such an invention was of a kind well calculated to excite public interest, and to impress practical men with a quick appreciation of its commercial importance and its pecuniary value. It was so sufficiently perfected, according to the theory of the defense, that a patent could have been obtained prior to 1870 to secure the application of the principle, and to compel every subsequent inventor to pay tribute to the discoverer of a new art. For years it was mechanically perfect, and its efficiency and importance as a great factor in human intercourse could have been demonstrated to the public without appreciable inconvenience or expense. Drawbaugh fully appreciated its importance and value. He had the means to patent it himself, and friends to assist him in introducing it into public use. He had the talent to induce others to invest in his inventions. No explanation is possible why, under such circumstances, his efforts should have left no mark upon the annals of inventive progress, and given no evidence of life beyond the idle curiosity his

talking-machine excited in the circle of his admirers during all these years. His conduct is more persuasive to show that he did not have a practical, operative telephone, than the testimony of a multitude of witnesses who may have seen and heard talking-machines at his shop during this period. But the complainant has given evidence of his declarations made by him before he had any interest to pervert the truth, which afford a reasonable explanation of his conduct, and go far to explain how the testimony of the corroborative witnesses may be reconciled with the truth.

In 1874-76 Drawbaugh issued a business card advertising himself as "inventor, designer, and solicitor of patents." On the back of this card is printed a list of his inventions as follows: "Stave-heading and shingle cutter; barrel machinery; stave jointing-machine; tram and red-staff for leveling face of mill-stones; rine and driver for running mill-stone; nail machinery for feeding nail-plates; pumps, rotary and others; hydraulic ram; the Drawbaugh rotary measuring faucet; carpet-rag looper; electric clock; and magneto-electric machine for short-line telegraphing and fire-alarm, and propelling electric clocks." He takes pains to say of this magneto-machine on his card that it "can be applied to any form of electric movement, and dispenses with a galvanic battery." He had obtained patents for some of these inventions, but had not for others. He was then experimenting with his electric clock and with his magneto-machine for short-line telegraphing, fire-alarms, etc., and included them in the list of his inventions. The omission to mention the most important one of all of his inventions—one respecting which, according to his present testimony, there had not been a week from the time he made his first cup-machine that he had not been engaged with it—one which was complete before his electric clock was complete—is a significant statement by implication that he had no such invention to advertise. It is to be remembered that when he chronicled his achievements in the autobiographical sketch of 1878 the Bell telephone had been introduced into commercial use at Harrisburg, three miles from Drawbaugh's shop, and the local newspapers had been full of the subject. The cursory allusion in that autobiography to "several kinds of telephones" is in striking contrast with the eulogistic description of the electric clock, and wholly inconsistent with the theory that he deemed himself to be the originator of the telephone which at that particular time was a topic of universal interest.

In his testimony given in 1879, in the interference proceeding with Hauck, although he did not include the talking-machine in the category of his successful inventions, in the course of his testimony he produced a sketch of his faucet, and stated that he made it "about 1874 to 1876, when I was experimenting on telephones or phonographs." He represented himself, not as an inventor of that which he is now claimed to have perfected, but as an experimenter with a "telephone or phonograph." It is instructive to read this statement in

juxtaposition with a statement made by him to Mr. Matthews in the preceding year. Mr. Matthews was the managing editor of the *Baltimore American*, and in April, 1878, made a visit to Drawbaugh at his shop to see Drawbaugh's magnetic clock, in consequence of information received from a correspondent. He was a careful observer, who went there obviously for the purpose of writing an article for his paper. That his memory is unusually retentive and accurate, and that he is a careful and conscientious man, is apparent from a letter written by him in December, 1883, after the proofs in the case had been closed, and in which he manifests a desire to correct certain errors of detail in his deposition. Upon that visit his attention was chiefly directed to the clock; but he examined Drawbaugh's other inventions, and conversed with him about them, and, among other things, conversed about the telephone. Drawbaugh's statement to him on that occasion was that he had invented apparatus to send messages by means of an alphabet founded upon difference of sounds. He did not profess to be the inventor of the speaking telephone, or assert that he had ever transmitted speech successfully with his apparatus. He said that the idea of transmitting sounds in this manner was not new, and that he had read of it some years before in a publication translated from the French, and he denied Bell's right to claim the invention of the telephone, because of that publication. In the article founded on that interview, which Mr. Matthews subsequently wrote for publication in the *Baltimore American*, he adverts to the several useful agricultural and mechanical devices patented by Drawbaugh, and adds:

"It may be mentioned that Mr. Drawbaugh constructed a rude telephone long before Mr. Edison loomed up as the 'boss' inventor. He never expected to send articulate sounds over a magnetized wire, but he believed that an alphabet could be arranged after the manner of the musical scale, and that messages could be transmitted and understood by the variations of the tone and pitch. This unlettered mechanic came very near anticipating Edison and Bell in the invention of the telephone, and nothing but his poverty prevented him from conducting his experiments to a successful issue."

His advertising card, his testimony before the patent-office, his autobiography, and his statement to Matthews, authenticated in writing, were all made when he had no pecuniary interest to color the facts, and upon occasions when he was anxious to present himself in the most favorable light as an inventor; and they were all made after his talking-machine, according to the theory of the defendants, was a perfected invention, and known to be such by many of his friends and neighbors. These are declarations evidenced in writing, and one of them made under oath, which point in but one direction. They are consistent with his conduct. They show that he understood himself to be an experimenter with telephones or phonographs, but not the inventor of the speaking telephone. The complainant has supplemented this evidence by the testimony of other substantial witnesses

who had favorable opportunities to know what Drawbaugh had invented, and who describe what they saw and did not see at his shop, and narrate what he said about his talking-machines on various occasions. This testimony indicates that at as late a period as in 1878-79 Drawbaugh was an experimenter, but not the author of the parent invention, nor one who had perfected any valuable improvement upon it, and is in substantial accord with his statement to Mr. Matthews and his testimony in the interference proceedings. What gives point and force to this testimony, and parries the ordinary objections to the reliability of verbal declarations, is that these witnesses are persons who would have been forcibly impressed, because of their interest in the particular subject, by any assertion by Drawbaugh that he was an inventor of the telephone. During the time in question Drawbaugh had friendly relations with the newspapers of the vicinity, his friends were frequently communicating laudatory notices of his mechanical and inventive efforts to the press, and he himself visited one of the newspaper offices in the spring of 1878 to show a telephone he had made. These newspapers had published articles about the Bell telephone, but up to the spring of 1878, while many notices had been published in them about his electric clock and other inventions, describing him as a man of extraordinary genius, there had been no mention of the telephone, and when in the spring of 1878 the subject was mentioned, he was referred to as one who was "inventing a telephone on a different plan from that now occupying the attention of the scientists," and as about completing "the new telephone he is now constructing."

In this connection it is to be noted that soon after telephones were introduced in Harrisburg, late in 1877 or early in 1878, Drawbaugh visited the offices where they were used, examined the inside of the instruments, and borrowed one to take home, which he kept for several days; and the instrument which he borrowed bears a close resemblance in appearance to Exhibit A, which, it is asserted, he had made in 1873 or 1874.

No extended reference will be made to the testimony of other witnesses, such as Mr. Weaver and Mr. Grissinger, showing declarations of Drawbaugh, made after the Bell telephone was in commercial use, to the effect that although he had experimented on the telephone years before Bell he had obtained no satisfactory results. It remains to consider what effect is to be given to the testimony of the multitude of witnesses who have been produced to substantiate the defense. Disregarding the testimony which is merely hearsay, and therefore incompetent as evidence of the main fact, the testimony of many other witnesses is overthrown by the palpable improbability of their statements, or by the contradictions between their statements and those of other witnesses for the defendants upon substantive points, or by successful attacks upon their accuracy in the rebutting testimony of the complaint. There still remains a formidable number of witnesses

who testify to seeing or using Drawbaugh's talking-machine, and some of whom identify particular exhibits as the instruments which they saw or tried. No doubt is entertained that Drawbaugh was experimenting at an early period with telephones or phonographs. He knew about the phonograph or phonautograph of Scott as early as in 1863. The membrane diaphragm excited by sonorous waves, and the mechanism of the phonograph were not novelties, and, among the diversity of inventive possibilities, had probably attracted his interest. Prior to the issue of Bell's patent, Dr. Van De Weyde had made public experiments with the Reis telephone at the city of New York, and others had made like experiments elsewhere. In May, 1869, a full description of the instrument and of the experiments was published in the newspaper, *The Manufacturer and Builder*, treating it as a highly interesting curiosity which contained the germ of great practical purposes. Whether other newspapers noticed the experiments or not is not shown, nor is it shown that Drawbaugh saw the article in *The Manufacturer and Builder*. It would be difficult to prove the circumstances if he did see it. Some such publication probably stimulated him to experiment. If he made a sketch of the mechanism at the start the material for it was at hand. As is stated by Mr. Benjamin, it has been asserted of the Reis instrument that certain sounds of the human voice can be transmitted by it; but in truth these are merely fragmentary reproductions of vocal sounds, and the transmission of articulate speech could not be effected because it was constructed on the make and break principle, instead of on that of the undulatory unbroken current.

It is not strange to any reader of the autobiography that Drawbaugh should have taken up the telephone. That he and those about him should have treated it as a talking-machine is entirely natural. That his talking-machine, as late as in 1876, bore a striking resemblance to the Reis telephone is shown by Mr. Shapley's testimony, a witness who noticed the resemblance, and loaned Drawbaugh a copy of the *Scientific American* describing it.

There is enough here to explain Drawbaugh's declarations to his neighbors about the talking-machine he was inventing, and to excite the curiosity of the community. A careful reading of the proofs renders it easy of belief that the witnesses who testify about casual visits to his shop, which occurred many years before their testimony was delivered, and to cursory tests of his instruments on those occasions, have confused the fragmentary and incoherent articulation of such an apparatus, with the hearing of distinct words and sentences. When witnesses undertake—as many of them do—to give the exact words or sentence heard in the instrument five or ten years before, when their attention was not called to the subject afterwards, no hesitation is felt in rejecting such statements as utterly incredible. It may be charitably inferred that such a witness has confused his recollection with more recent impressions. As will hereafter be shown,