

John Ernst Worrel Keely Genius or Fraud?

By Hans von Lieven

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A bit about myself.

I was born in 1939 in a small rural town in Germany. My family was not wealthy, though we were not poor by any stretch of the imagination. I hold a degree in mechanical engineering, majoring in physics. I do not want to give my credentials here, judge me by my work, not by what you think my professional status might be.

Now retired, I live in Sydney, Australia, where I have been for many years

In the early 1970's I read Clara Bloomfield Moore's book about Keely. I was instantly intrigued. The various accounts of Keely and his achievements seemed to be full of contradictions.

On one hand he appears to be some metaphysical dreamer, yet the machines he built and the methodical thoroughness with which he conducted his experiments belie this.

Having read much of Clara Bloomfield Moore's writings she strikes me as a silly woman with too much education and too much money, incapable of having an original thought of her own, the type that Helena Blavatsky cultivated and filled with her peculiar brand of metaphysical crap.

To get to know Keely as a man and technician meant I had to bypass much of her account and rely on things he said and on the evidence provided by a number of photographs of his devices, as well as contemporary newspaper articles.

Having a reasonable grounding in technical and scientific subjects as well as musical theory I judged the man as an honest researcher trying to come to grips with problems and phenomena well outside the scientific understanding of his time and having to work with comparatively primitive research instruments barely suitable for the task he had set himself.

That he achieved something at all is staggering.

But did he?

Keely built a bewildering array of massive machines with almost unbelievable precision. He demonstrated his devices in his laboratory and on exhibitions repeatedly. No-one understood how they worked, and his explanations, couched in an obscure terminology, only helped to spread the confusion.

History has labelled him a fraud, though he was never caught doing anything fraudulent.

I have endeavoured to look at his machines in the light of today's understanding of science, paying scant attention to his theories and his metaphysical model.

Working mainly with photographs and descriptions of his machines, his stated observations of unexplained phenomena and his account of technical difficulties met on the way, I have come up with some startling revelations that seem to indicate that Keely's technology is real.

I leave it for you to judge.

The following paper is still very much work in progress and there is much to be done yet. Any comments, criticisms and suggestions are welcome.

But no more talk.

Here it is.

Introduction.

This paper is an attempt to explain the discoveries of John Ernst Worrell Keely (1827-1898), a 19th century experimenter. I will not go into the life and achievements of Keely to any extent, such subjects are covered elsewhere. There is however a short biography included in the appendix. This paper assumes that the reader has a grasp of what Keely was about and what he was trying to do.

I shall confine myself to examining Keely's theories and experiments in the light of today's scientific knowledge and attempt to explain what Keely did in plain modern English, as far as that is possible.

I first found out about Keely in the early 1970's when I came across Clara Bloomfield Moore's book. I found it both fascinating and cumbersome. Keely's comments appeared at first inspection as pseudo scientific gibberish intended to cull huge funds from gullible investors. On closer inspection though a pattern emerged, that in its logic and order is equal to any scientific treatise, especially when one considers that the man was endeavoring to impart a sophisticated body of knowledge to a world that was still trying to come to grips with the steam engine.

I was taken aback by one of Keely's comments when asked about his 'secrets'. He said: "...as to secrets, I don't have any". I believed him. I proceeded to look at his writings (what little there is left) in the light of seeing him as a man honestly trying to elucidate a monumental discovery to a world that simply wasn't ready for it.

Modern science essentially holds that matter is held together by enormous electrical forces that can be interrupted by bombardment with particles, thus liberating energy. This is certainly true for certain highly unstable elements such as plutonium, but try doing it with lead.

Based on his experiments in vibratory physics Keely thought otherwise. Keely found that pure matter is highly unstable and that stability is the result of interference patterns set up by the interaction of different molecular groupings vibrating at incompatible frequencies.

Fundamentally, Keely's approach was simple.

We know we can cancel a waveform by levelling against it the same waveform that has been inverted.

So Keely set about doing just that. He identified the incompatible waveforms that interfered with the pure fundamental waveform of the body under study and proceeded to cancel them out by tuning the mass he operated upon to as pure a note he could manage and an arrangement of acoustic resonators of opposite value to the incompatible frequencies that were left.

He called this his 'system of graduation'. There is more to it than that, but for the moment it will suffice. The subject of graduation will be covered in greater detail in a later chapter.

In his view this created a state where ALL FORCES were held in perfect balance.

On a finely balanced scale, no matter how heavy the load on each side, it takes only a minuscule amount of change on either side to disturb equilibrium.

Keely reasoned that disturbance of equilibrium in the body under study could be influenced by changing the amplitude of selected sections in the fundamental pure frequency pattern.

We know that a resonant body will accept energy at its own level of resonance but reject energy at frequencies far removed from its own level of resonance. This is also true for the harmonics of that fundamental frequency.

By an arrangement of acoustic resonators, carefully tuned to the precise frequency of the harmonic he wanted to stimulate, he managed to achieve this.

So far we are still on safe ground as far as contemporary science is concerned. Though very much simplified here for the sake of readability this is essentially what Keely did.

What follows is extraordinary and not documented in any accepted scientific study I am aware of.

Keely claims that by changing the amplitude of certain segments of the wavepattern he could influence the cohesive forces between particles from an incredible denseness to complete disintegration. In other words he believed he had found a way to manipulate gravity.

Keely, vehemently claimed that bodies of 'pure concordant harmony' did not exist in nature, in fact could not exist in nature, and that such pure states had to be induced by artifice. He further claimed that this state had to be created before any manipulation could take place.

The rest of his writings concern themselves with technical difficulties encountered and identifying effective frequencies and ratios of amplitude in order to achieve specific effects.

For our purpose it is not necessary to examine these aspects here.

Keely's Difficulty.

To appreciate Keely's problem try seeing yourself in this scenario. Let us assume you live in ancient Rome, say around the time of Augustus. You have a scientific bend of mind and you are investigating the properties of water. You have read Heron's experiments with steam and you have vision. You know all there is to know (for that period) about metallurgy, engineering and heat. Suddenly you have an idea. You conceive the steam train. All the principles of creating such a train are clear to you. You know exactly how it will work.

Now try building one. How do you make steel track, how do you make pistons, wheels, valves etc. etc. And most of all how do you get people to give you the resources to build one, if you can even get them to understand the usefulness of building a train.

This is where Keely was at!

In one way Keely was lucky. He lived in a time where there were many backers of newly invented technology that hardly anyone understood. That the scientific community would oppose him was clear from the onset. That lot rarely accepts anything unless it is so obvious that it can't be ignored, especially when a new idea comes from someone outside that illustrious fraternity as it almost invariably does.

But this was not Keely's biggest problem. His main difficulty was that he was trying to build a helicopter with a stone axe.

In this lies the explanation why no-one we know of has been able to duplicate Keely's experiments to date.

Hopefully after this paper becomes known this will change.

In Keely's time there were no oscilloscopes, computers, frequency generators etc. etc. and since he essentially worked with sound he had to rely principally on his ear, a few instruments and his knowledge of harmonics, mainly understood by organ builders and musicians of his time.

We know that Keely was a gifted musician. That he had an intimate understanding of harmonic interreactions encountered in the building and tuning of organs is beyond dispute. His own writings and contemporary records show ample evidence of that.

In the absence of waveform generators, transducers, loud speakers, amplifiers etc. the only way he had to transmit acoustic waveforms to a body was through the medium of harmonic resonance.

This requires apart from perfect hearing, an extraordinary amount of skill in building the required structure. Few people possess this to the degree Keely did.

That he managed at all to build working machines is astounding, but, to me at least, it is not surprising that no-one to date has been able to duplicate what he did.

But is all of this necessary? In my view it is not, not anymore that is. We have far better ways of creating the conditions Keely sought than were available to him. But first we must understand what it was that Keely actually built.

I believe I know what he did and I will try to impart my analysis, as best I can, on the following pages.

Keely's Machines.

Few photographs of Keely's machines exist and there are only scant descriptions. But there is enough.

One of the things that tells us more than perhaps anything else is that all Keely's machines, regardless of what they are, Motor, Disintegrator, Air Ships etc, follow the same pattern of construction.

There invariably is some sort of a hollow body that has an INTERNAL as well as an EXTERNAL arrangement of resonators.

There is also a tiny opening through which a connection can be established, often by means of a tube or a wire made of silver, gold and platinum. In later designs he dispenses with this. It will become clear in a moment why.

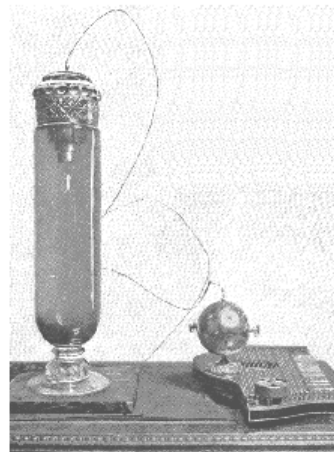
At the heart of Keely's system is what he called in his earlier years his 'Compound Disintegrator'. I would like to stress here that this 'Compound Disintegrator' is part of each and every machine he built that I have knowledge of with the exception of his 'Hydro-Vacuo Motor' which appears to be an oddity that has little in common with all his other designs. Even his so called 'Musical Sphere' contains the device internally, albeit in much modified form. This dispensed with the need of connecting the 'Disintegrator' with the motor by means of a graduated wire of silver, gold and platinum or by some other means, what we today would call a waveguide.

The description of his "Compound Disintegrator" gives us essentially the blueprint to all of his machines, at least as far as the construction is concerned.

So what then was this "Compound Disintegrator" ?

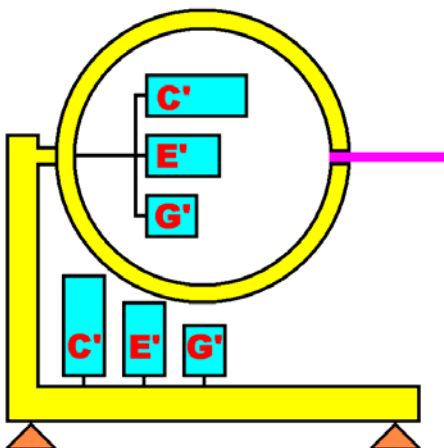


The 'Compound Disintegrator' here depicted opened up to show the arrangements of the interior components. Notice at the top the wire waveguide.



Here we see Keely's 'Compound Disintegrator' in a levitation experiment. Notice the instrument sits on a zither that has been carefully insulated from the table it is sitting on by high feet to prevent the transmission of unwanted exterior vibrations through the table into the device. The Strings of the zither act here as external resonators. Seen clearly in the photograph is the wire waveguide.

Stripping away most of the resonators and all the parts that existed only to improve performance and make the device more reliable we have this:



So, what does it do?

According to Keely ALL parts of the structure had to be tuned to a single note.

Let us assume we build this structure and by filing etc. manage to tune it to a pure middle C. On tapping this structure, say with a wooden mallet, we would hear the note C.

Let us also assume we have mounted 3 resonators inside and 3 outside, one of each tuned to C', E' and G' (all of them being harmonics of C).

What happens now when we strike, say the E' resonator on the outside?

Since, E' is a harmonic of C the vibration would be carried, virtually without loss, throughout the structure and the INSIDE resonator tuned to E' would resonate in unison with the outside resonator.

In other words what Keely did was to induce a specific frequency inside a hollow structure (cavity) by using the structure itself as the conductor and an external resonator as stimulant.

In the light of knowledge of his day there was really no other way of doing this.

To achieve this effect ALL parts of the structure had to be in PERFECT harmonic relationship to each other in order to work. A major scratch on the sphere for instance would change the resonant characteristics and make the whole thing useless. Everything would have to be graduated again in order to harmonise with the altered fundamental note. This was the biggest problem with Keely's machines. In my view he could, with a lot of effort, make his machines work, but a commercial exploitation with the tools of his day was out of reach. Keely knew this.

But Keely went further.

He managed to find notes in the spectrum where he could not only transmit harmonics of the fundamental but also the discordant notes that were required without disturbing the fundamental frequency of the structure and still carry them to the inside of the cavity. I believe he found that the scale of B-flat was most suitable for his purposes, since he constantly uses this scale for illustration.

Keely in essence created a specific, complex waveform INSIDE a resonant cavity using the entire structure as a conductor for the waveform, relying on resonance alone!

I seriously doubt that there are two people in the world today that can build such a device and make it work to the degree Keely did, even if given a set of blueprints.

We know today about the power of cavity resonators, the entire microwave industry is relying on it. WE ARE COOKING WITH IT, but hardly anyone notices the similarity with Keely's machines. But the question remains,

"WHAT, IF ANYTHING, DID KEELY INVENT?"

To answer this we must look at the basic diagram again. What do we know happens inside that magic sphere of his after the internal resonators are excited?

Well, they emit a sound of some sort.

Now what?

Well, the sound would travel, bounce of the confining sphere until it eventually escaped through a hole or a waveguide.

Sound familiar? Is there a modern device that does something like this?

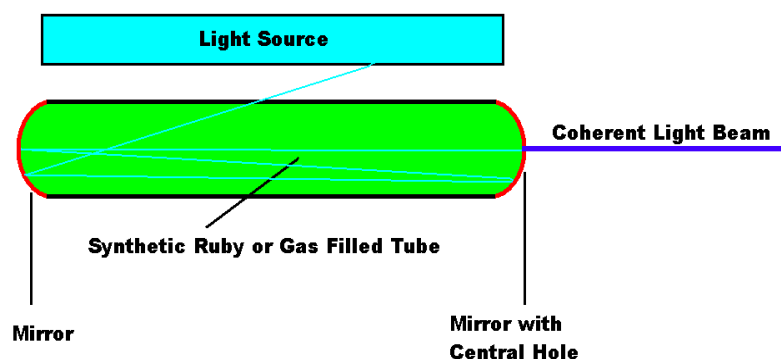
YOU BET THERE IS!

IT IS CALLED A LASER!!!

Those of you that know all about lasers can skip this chapter.

For those that don't I'll quickly run through the principle.

When you look at it, though it may sound very sophisticated, the technology involved is quite crude. It is a cylinder of some sort fitted at each end with a parabolic mirror, one of which has a tiny hole in the centre. The cylinder may be a solid piece of synthetic ruby or a glass tube filled with some gas such as helium or a mixture of gases. There is a source of light mounted above or wrapped around the cylinder for efficiency. It looks like this:



Laser Principle

So far nothing exciting.
Now what happens?

Some of the light strikes one of the mirrors and gets deflected. Since the cylinder is filled with gas, or the thing is a solid piece of artificial ruby the kind of light that strikes the mirror is of a specific frequency.

What happens now is interesting.

As I said light strikes the mirrors and is deflected, some straight into the other mirror. It starts to bounce back and forth until it eventually strikes the hole which is in one of the mirrors and escapes.

OK. Now we have a beam of light coming out of a hole, a bit like a torch. SO WHAT??

Well, the interesting thing is that the light coming out of the hole has properties that normal light just doesn't have. Like melting metal for instance.

NOW DO YOU SEE WHAT I AM DRIVING AT ??

If you want to you can look up all that stuff about coherent light and what it does at certain frequencies. It's fascinating stuff but I don't want to get into it any further because it is not helpful here.

The interesting thing is that by bouncing certain pure lightwaves in an enclosed cavity (as far as light is concerned anyway) back and forth it eventually emerges as a new form of energy capable of influencing matter.

Now, nearly all scientists today would question my use of the term "new form of energy", and argue that it is just good old light that has been aligned and thereby acquired new properties. Personally I would argue against that. I would argue that their 'coherent light beam' somehow influenced what Keely called the 'Triune Stream' and that the effects are due to this.

But, be that as it may. I don't care what my colleagues would say, as far as I am concerned what Keely invented was:

THE ACOUSTIC LASER!!

It's not all that much of a mental jump. If we can get selected light bouncing back and forth and the resultant beam has different properties why should it not work with sound. After all both are just waves in their specific spectrum.

It is my theory that like the 'coherent light' of the laser; that is capable of inducing rapid molecular motion (heat etc.) the 'coherent sound' of Keely was capable of inducing gravitic changes.

Keely's problem was that apart from resonance, he had no other way of inducing specific waveforms inside a cavity and that imposed restrictions that dogged him all his life.

Keely's Secret.

Two major questions remain. Did Keely have a 'secret' and did he commit fraud.

In spite of what I have said earlier the answer to both questions unfortunately is yes.

Let me reiterate that there is no doubt in my mind that Keely's machines did work. Over a million people saw over the years his motor run on a number of trade shows, exhibitions and demonstrations. He was never caught in a fraud and his machines were carefully examined by a number of experts on many occasions. To say that his motors were operated by compressed air, secret springs and so forth is ludicrous. Such an arrangement would have been obvious to even a casual observer.

The secret and the fraud lies elsewhere.

It must have been obvious to Keely fairly early on that even though he could get his motor to RUN it would never be able to perform any actual WORK. Keely's motor, the way it was designed will never be more than an EXPENSIVE TOY!

Let me tell you why.

Because his system relies on resonance alone all the component parts of his equipment have to be in perfect harmonic relationship to each other for it to work.

Even the most carefully tuned musical instrument will detune after a while, whether it is played or not. This is true even for pipe organs. Changing conditions like temperature, humidity,

external vibrations, dirt, minor structural damage etc. etc. bring about a rapid deterioration of the carefully arranged harmonic relationships and render the structure discordant, a fatal flaw in Keely's machines.

Keely had no feedback system that could compensate for these changes. The technology of his day did not allow for it. Only careful manual re-tuning would render the apparatus operable again.

Outside vibration and wear were Keely's biggest enemies. That is why we see in Keely's demonstrations evidence of the infinite care that Keely took to avoid the accidental introduction of discordant vibrations through for instance the engine mounts etc. etc.

If for instance a jackhammer had been working in the vicinity of his machines his motor would at once have come to a standstill.

It had to.

Keely demonstrated the starting and stopping of his motor by producing a single chord on a violin, harmonica or zither.

It absolutely amazes me that no-one in his time noticed that this was a fatal flaw in his design.

Real work situations are always filled with uncontrollable sounds and noises.

Many of these noises, like hammer blows, grinding noises, bumps and so forth are rich in harmonics, some of which would have been picked up by Keely's ultra sensitive equipment throwing the carefully arranged harmonic relationships out of balance and stopping the mechanism or sending it into an uncontrollable spin, perhaps even exploding it. I feel that many of the explosions that dogged Keely all his life were due to the influence of uncontrollable extraneous vibrations.

Even the addition of a drive shaft , gearbox or pulley to one of his motors would have introduced waveforms that made his equipment inoperable.

Keely HAD to know this.

That is why his later researches concentrated on airships, such structures not being so susceptible to the influence of extraneous vibrations.

THAT was Keely's secret, and at the same time his fraud.

Had he admitted that, his funds would have dried up immediately, possibly landing him in goal.

Many of his frustrations and disappointment can now be understood and even his victories and monumental discoveries must have been tainted by the knowledge that his superb machines, even at best, would be little more than an interesting scientific experiment that could only be demonstrated in a carefully controlled environment.

Keely was once asked what he wanted for an epitaph.

His answer truthfully and accurately described the way he felt about himself. He said: "Keely, the greatest humbug of the 19th century".

So, where does all this lead? Does that mean that Keely's discoveries and inventions are doomed forever to be nothing further than a scientific curiosity, if that? No, it does not. In time, Keely will be vindicated. His findings will eventually be the foundation of a new way of looking at the universe.

Translating Keely.

Keely always maintained that his system was truly wonderful in its simplicity. Few people ever saw anything simple in what he said. But then few people ever looked up the obscure words Keely used as a matter of habit.

I remember sitting as a young boy over a copy of Caesar's 'De bello gallico' and with the aid of a dictionary trying to extract some meaning from the jumble of alien words that confronted me.

It was not until years later, when I was considerably better



at it, that I sat down and read the book in the original Latin just for fun. Suddenly something magical happened. I had studied Ceasar's exploits in Galle and all his other deeds at length, as was required in those days, but it was not until I read his words in his own language without having to translate that the man became real to me as a person, not as some historical figure I had to study to obtain my grades.

I had to do much the same with Keely.

Keely spoke in the language of an 18th century organ builder. If you don't believe me, find a book on organ building of that period and you'll be in for a treat. 400 pages of pure unadulterated Keelyspeak.

He must have been a dreadful bore to those around him, for much of his bombastic language was totally unnecessary. True he had to invent a technical language to explain his findings, but much of it was simply the character of the man. He was not a good communicator. Often he was his own worst enemy by the way he spoke. He would try to explain something and people did not understand. Keely then would lose patience and could be quite rude to honest people that were genuinely trying to comprehend what he was saying.

This made him many enemies. And it made him enemies where it counted, for often the recipients of his rudeness were the scientists and reporters of his day, people he should have been on amicable terms with.

Many of Keely's difficulties in life were simply a result of how he spoke to those around him.

Much of what Keely said dealt with harmonic relationships and the difficulties he had graduating his machines in order to establish the wavepatterns he needed.

Since we are first trying to establish the underlying principle we ignore all that for the moment as it is not helpful here.

What is left falls into two categories.

1) What Keely OBSERVED.

2) How he tried to EXPLAIN what he observed.

I do not doubt any of his observations. Keely was a meticulous and brilliant experimenter and I do not think he ever spoke an untrue word about his observations, that being sacred to him.

His theories are something else.

Keely had massive problems with his contemporaries. He had made certain discoveries in relation to resonance that enabled him to create phenomena that could not be explained with orthodox scientific concepts of the day.

People wanted an explanation. The pressures to present a coherent theory that covered all aspects of his findings were enormous.

In the end, to satisfy these demands, he tried to squeeze his observations into some metaphysical model that simply is inadequate. His 'triune stream' for instance, that he sees as "the cerebral emanations of the Creator" (his words, not mine) is not a helpful analogy.

Keely tells us everything. There is nothing estoric in what he did.

The reason no-one to date has been able to duplicate Keely's machines is the almost unbelievable precision with which he built his devices!

No-one today can raise the funds required to duplicate what he achieved by mechanical means. In today's money Keely spent many millions of dollars building and perfecting his machines. The cost of duplicating his devices with the precision Keely did is nowadays prohibitive.

But there is hope. By using electronics for much that Keely had to do with mechanics we can and will duplicate his motor!

Unlimited Energy.

Keely observed that huge forces held particles together in 'corpuscular embraces'. He knew this because he had been able to disrupt these 'embraces' and liberated extraordinary amounts of energy whose origin could not be explained in any other way. We know today that this is true. Hiroshima and Nagasaki are stark reminders of that fact.

It is interesting to note that this was unknown to science in Keely's time. That Keely knew this gives his observations and experiments more credit than anything else he did.

He was one of the first to state categorically that there were enormous amounts of energy locked up in atomic and sub-atomic particles that could be liberated.

Ironically, that was also the statement that discredited him most with the scientists of his day.

The only point where contemporary science and Keely differ is that science maintains that the only way to disrupt these 'embraces' is by bombardment with particles, in other words levelling a big gun at it and start shooting it to pieces.

This approach would have seemed crude and brutal to Keely, had he known about it.

Interestingly enough the idea of liberating energy by 'corpuscular bombardment' was something that Keely, at least at some stage in his experimentation, seriously considered.

From memory he once said something like this: "The ringing of a bell in vacuo liberates as many corpuscles"

Clear evidence that Keely did think along these lines. He later discarded that idea in favour of other explanations.

In his later writings Keely obviously thinks that the effects he created were due to the incredibly high frequencies he achieved with his apparatus. To my knowledge no-one has been able to create frequencies anywhere near the ones Keely claims to have produced using mechanical resonators alone. How then did he do it and why can no-one duplicate it?

This puzzled me greatly. You will notice that up to here the copyright notice says 1999.

It is now 2007!

This might give you an idea how much work has gone into what follows, since I had not abandoned my research back then.

The next chapter is a turning point in this project.

What I have found out takes much in relation to Keely's work out of the realm of the speculative and brings it into verifiable reality.

Following the Footsteps of Keely.

I decided to try a different approach and suddenly things started to pay off.

Having studied Keely in great detail from available literature I believe I have a fair measure of him, both as a man and as a researcher. Keely did not chase rainbows. He had solid reasons for dedicating his life to his researches and his machines in spite of massive hardships along the way. I reasoned that the only thing that would set him on this path was that he had very early on a workable device (i.e. a functioning motor), albeit in a crude form and of low power. The fact that he continually spoke of "perfecting" his motor seems to indicate this.

I started off with the following assumptions:

- 1). Keely had a working motor early in life.
- 2). The motor was of low power, just enough to move, but not enough to do actual work.
- 3). No man creates something in total isolation. There had to be parallels in research to be found in the work of contemporary experimenters in the field.
- 4). Someone, somewhere had invented a similar device, only to be brushed aside with a convenient explanation why it could not be developed to do actual work. Such device could possibly still be found tucked away as a scientific curiosity in some museum somewhere. (Like the Crook's tube)
- 5). The device induced rotation in a tangible body through the medium of sound waves.

All my assumptions proved to be true and verifiable.

The device exists, it works and at least one such device is in the collection of early scientific research instruments in a Toronto museum, though there must be others, as they were used during

Keely's time in universities all over the world in scientific demonstrations and were in fact manufactured by at least one scientific instrument maker for sale to universities and other research establishments.

But back to my research.

I started researching the work of Chladni and Helmholtz, knowing that Keely's devices relied heavily on principles discovered by those two eminent scientists.

While researching Helmholtz I came across Rudolph Koenig, a German violin builder who had turned scientific instrument maker and had built a number of Helmholtz devices in conjunction with Helmholtz that were sold to universities and other establishments who were conducting research into acoustics.

I became very excited when I read Koenig's biography and found that he was a contemporary of Keely and that the two must have known each other since Koenig had an exhibit at the 1876 World Exhibition in Philadelphia where Keely was demonstrating his motor.

Koenig manufactured exclusively apparatus used in acoustic research in his workshop in Paris and is, amongst other things, the inventor of the manometric flame (called sensitive flame nowadays), an instrument where a stream of gas is passed through a chamber containing a diaphragm that regulates the flame by regulating the amount of gas feeding it on being excited by acoustic vibrations. These vibrations become visible in the behaviour of the flame and this instrument was invaluable in the research of sound. Undoubtedly Keely had one of the instruments in his workshop.

It is reasonable to assume that both men had visited each other's exhibits and talked at length about their areas of research.

Here was a link worth following up in detail.

Luckily most, if not all, of Koenig's instruments are in excellent condition in collections all over the world. Many are in American institutions having been purchased at the Philadelphia exhibition. Among the instruments are tuning forks, organ pipes, flutes, the above mentioned manometric flame, vibration microscopes and an instrument for Fourier analysis and synthesis which, though stationary and not designed to do any work, exhibits curious parallels to Keely's motor.

All except one.

Amongst his machines is a small device called an acoustic turbine, which is listed in his 1889 catalogue as item No 75 and sold for 60 Franks. (about \$15).

The Acoustic Turbine

Alfred M. Mayer (1836-1897) was a faculty member at Lehigh University from 1867 to 1871, and then spent the remainder of his life as a professor of physics at Stephens Institute of Technology in Hoboken, New Jersey. "He invented the sound-wheel in 1876, but very graciously yielded precedence to the Austrian, V. Dvorak, who, it was found later, had quite independently made the same device a few months earlier. This little instrument consists of four small tuned resonators attached to a small cross and balanced on a pivot. When placed near a source of



continuous sound of the pitch to which the resonators are tuned, such as an electrically driven tuning fork, the reaction against the closed end by the stationary wave formed inside of each resonator causes the wheel to rotate "backwards." From Dayton Clarence Miller, *Anecdotal History of the Science of Sound*, (The MacMillan Company, New York, 1935), pg 73.

Acoustic Turbine

The example at the left is at the University of Toronto, and is almost surely some of the

apparatus that Koenig brought to Philadelphia for the 1876 Centennial Exposition. Photo:

Thomas B. Greenslade, Jr. Professor Emeritus of Physics Kenyon College, Gambier, Ohio 43022 O.K. here is a device that confirms some of Keely's claims. But what has that to do with Keely since he would have seen the device at the 1876 exhibition when he was already demonstrating his motor.

Here I will quote Dan A. Davidson, who in his book "A Breakthrough to New Free Energy Resources" writes:

One interesting (but unverified) story about Keely concerns the time he built his first free-energy motor--while still a young boy. It was a series of 17 conch shells, 8 affixed to a small wheel forming the rotor. The stator consisted of 9 conches affixed around the outer periphery of the wheel but not attached to the rotating wheel. John had ground the shells so that they were all attuned to the same frequency. When the "motor" was put together the wheel slowly rotated on its axis, clunking and clicking because of imbalances, but nevertheless self-operative. John's enterprising nature led him to the idea of putting the entire assembly into a box and charging his neighbour friends a penny to look inside to see the wheel turning. Impossible you say?--well a research scientist in Los Angeles, Dr. Ruth Drown, has claimed that a special log spiral (the same curve in a conch shell) gives off a strange energy emanation.

Here we have a detailed and accurate description of a working acoustic turbine. The outside resonators are simply an arrangement to excite the resonators mounted on the wheel. Needless to say they would have required excitation themselves by means of a tuning fork, a musical instrument or some other sound of the correct pitch. The wheel would have had to turn.

In other words the boy's motor worked. Nothing esoteric about its *modus operandi*. As to the use of the conch shells, they were simply an available source of cavity resonator, easily ground on a sheet of sand paper to the correct pitch. Beer bottles suitably ground would have worked equally well. As to Dr. Ruth Drown (of Radionics fame) who allegedly discovered some mysterious force in log spirals by using her trusty pendulum, that is utter nonsense of course.

What is noteworthy here is the time when Keely built his device. Keely was born in 1827. Assuming he was about 13 when he built this thing, that would make it about 1840, some 36 years earlier than the first description of the device! If that does not give credibility to Keely's integrity and honest pursuit of an, in his eyes, achievable goal nothing will. All other things followed from there in a methodical and organised manner.

Keely had no secrets.

Keely explained his devices and his researches in great detail. He built and demonstrated his machines. He opened them up for inspection to anyone who was interested, he even allowed people to photograph the equipment in assembled and disassembled states.

How much more open and less secretive can you possibly be?

But the world did not understand.

All Keely ever did was to work on ways to improve his original acoustic turbine by experimenting with different resonators and resonator arrangements. He used media other than air in his resonators, i.e. Water vapour, Hydrogen etc, all in an effort to improve the performance of the device. He even repeatedly talked about this. In his pursuits he discovered a number of phenomena as unknown to science as was his first acoustic turbine at the time he invented it.

Much of what he discovered is still unknown today because the science of acoustics had taken a different road from the one that Keely was following and never came across the phenomena Keely did.

Keely was an inventor and by the look of his machines a superb craftsman. A theoretical physicist he was not! He tried to squeeze his discoveries into a metaphysical model of the world as proposed by theosophists. That put a lot of people off and attracted an audience that was more interested in finding in Keely's work credibility for their own fanciful ideas of how the universe works.

That is still the case today. Serious researchers with adequate scientific knowledge unencumbered by offbeat religious ideas are rare and hard to find.

The key to unravelling Keely, in my view, is to find out how his machines worked , not in philosophical pontifications as to why! We can do this by studying without preconceptions, metaphysical or otherwise, his machines and descriptions of their construction and the underlying researches that led to it. The rest will follow.

The young Keely.

One of the things that had puzzled me for a very long time was the question what would possess a young boy to conceive and build a conch shell motor (acoustic turbine) in the first place. The inspiration had to come from somewhere.

I believe I can even re-construct that.

Keely got his inspiration in church. Not from reading the bible or something equally esoteric, no, the inspiration was far more mundane.

To illustrate why I am thinking what I am thinking I must tell you a little of my own early years, so please bear with me.

I was born in 1939 in a small country town in Germany (about 6000 inhabitants at the time, not much more today). The town evolved around an old Roman outpost and observation tower that, though in ruins, still stands. It sports a post-medieval castle and two magnificent churches.

The town has been for centuries an important administration centre for the surrounding villages and an equally important market town. The older one of the two churches was usurped by the protestant rulers of the time, forcing the catholic community to build another one.

There was much wealth in that town and even today there still is.

Some extremely wealthy patron, perhaps to secure a place in heaven, donated the organ for the new church.

The organ is a superb example of late 17th century craftsmanship, a time when organ building was probably at its peak. It is certainly far beyond anything that one would expect in a place of that size. It was carefully designed with the acoustics of the building in mind (the church holds about 500 people). To listen to the instrument when played by a virtuoso organist it is a moving and overwhelming experience.

Having an intense interest in music and being confined to experimentation with a mouth organ, a recorder and the occasional tinkering on the school piano between classes I longed to learn how to play a real instrument.

There was one instrument that was accessible to me, albeit at a price.

The church and the organ had survived the war virtually unscathed. The air to the organ was supplied by foot operated bellows. Hanging on to a handrail one had to stand on pedals and push them down with one's bodyweight. It was an unpopular job, but someone had to do it or the thing could not be played. It was hard work and physically demanding.

To encourage us kids to operate the bellows the organist promised to teach us how to play if we pumped the bellows for him on a regular basis. There were a number of takers, me included, who spent countless hours pumping the bellows in exchange for a lesson here and there.

The most telling experience though did not come from playing the instrument but from pumping it.

Since few people today would have had that experience I need to go here into a little bit more detail.

In a pipe organ there is a reservoir of compressed air called the wind chest which has to be replenished by pumping the bellows. Each key has a series of pipes connected to it and when the key is depressed air flows through those pipes generating sound. Organ pipes either go at full blast or they are silent there is no way to alter the volume in a single pipe. The number of pipes in a given note to be engaged is controlled by a stop, a wooden slider that stops air flowing to some of the pipes varying the sound quality and volume. When the stop is pulled all pipes of that pitch are engaged requiring a lot more air than if only one or two of them are engaged.

Whoever is pumping the bellows should be familiar with the music that is being played in order to provide the right quantity of air to enable the organist to play the piece properly. When all

the stops are pulled and the very large pipes engaged whoever is pumping is working very hard to keep the airflow up, a bit like riding a bicycle at speed.

It was during one of those times when it hit me.

I was pumping like crazy, all the stops were out, the diapasons and the large foot pedal operated bass pipes were in full bloom, the whole building and everything inside it vibrated and I realised I alone was doing that. Not the organist, he was only pressing the keys, I was the motive power. My then still scrawny legs had caused a building to shake.

If I could unleash that kind of power on my bicycle I could surely fly!

These days Rock Bands use tons and tons of speakers, amplifiers, mixers etc to get the same effect, even in comparatively small auditoriums.

After that I kept an eye on the phenomenon and realised that only certain chords would cause that. I left it at that and went onto other things. I did not investigate it any further. Keely did!

It was not until recently, while studying Keely that the significance of these events struck me.

What else is a church with an organ playing inside than a gigantic Helmholtz resonator with an inbuilt sound generator? The prototype of Keely's liberators!

But, did Keely have a similar experience that inspired his conch shell motor and is there evidence that he might have?

I am convinced of it.

Keely's grandfather had to be an outstanding musician. To be the leader of an orchestra in Baden-Baden in the 18th century was one of the most prestigious positions a musician could hold anywhere in the world.

Baden-Baden at that time was a famous playground for the rich and super-rich. They went for the therapeutic waters that gave the town its name and existence since Roman times. Baden in German means "to bathe". The waters were said to have curative powers especially against diseases caused by easy living and too rich a diet, such as gout. These people demanded the best, they paid for it and, by God, they got it.

So we know something about the calibre of the man.

It is my guess that old Ernst came to prominence through one of the traditional routes, starting his musical career as an a church organist somewhere in a small town and from then on progressed in his career. It is a familiar story for many of his famous contemporaries. Any good and dedicated musician has an intense interest in all facets of his most favoured instrument including its construction. Each organist I have ever met, and I have met a few, had a very thorough knowledge of organ building and tuning.

Why am I telling you this? Sounds like a bit of small talk included to liven up an otherwise dry subject. It is not.

There was no profession at the time in the world that had a more intimate knowledge of acoustics than the old organ builders. They knew about harmonies, eddy currents, vortex formations etc in intimate detail. They had over the centuries built a database that documented every phenomenon they encountered and had published it from time to time. They also had developed a technical language that was very difficult to understand for anyone outside the craft.

Old Ernst, talking about acoustics would have spoken like that. He would have had reference books that spoke in that language and young Keely would have thought it normal to talk about these matters in that way.

It was something that irritated Keely's contemporaries no end. Comments like "these tiresome phrases", "incomprehensible gibberish", "wearisome terminology" etc turn up over and over again in the contemporary press.

It did not make him any friends.

The world had moved on and Keely still spoke the way his grandfather had done in his day.

I think that Keely's grandfather played the organ in some church and that young Keely had to tread the bellows for him, there being no other to make it work at that time. I further think that young Keely noticed much the same thing about acoustics as I did, but where I only dreamed about flying on my bicycle he went out and built a motor.

That Keely knew much about organ pipes of that there is no doubt. His writings are full of references. The above scenario also explains much about the man and his religious convictions.

I believe that Keely was a deeply religious person, though not perhaps in the accepted sense of the term. Today we would probably call him an intensely spiritual person.

He had made his initial discovery in a church, the bellows in the service of the Lord, being overwhelmed by the power he had unleashed by allowing the creator's might to flow through him. What more did he need to arrive at the attitude he displayed throughout his life.

Alright, I buy the organ bit and the religious stuff, but how do you know he was treading bellows, I hear some of you say.

O.K. fair comment. however, when you play an organ you are very, very busy. One hand on the upper manual, one on the lower, your feet on the pedals, pulling and pushing stops when required, reading music and having your fingers and feet in the correct place at the correct time and listening to what you are playing is quite a feat and requires intense concentration. It doesn't leave much for observation.

On the bellows, though you must still follow the music to do it properly. You are engaged in a repetitive physical act that requires little concentration. At the same time you are involved. You are far more at liberty to feel and observe while yet still being an intimate part of the whole. You can feel much more intensely the power of the music flowing through you than if you were playing it.

Needless to say, much depends on the organist, a good one is a joy, a bad one torture.

The first one you want to stay with (assimilation), the other one you want to run away from (repulsion), the music being the dominant, to put it in Keely's terms.

The intervening Years.

Following the same train of reasoning let us see where this will lead us.

The next thing we hear from Keely is this passage.

"While yet a young man, Keely learned carpentry and used his income to pursue his experiments in sound vibrations. About 1866 while he was pursuing a line of experimentation in sonic vibrations, he discovered a hitherto unknown energy. He was subjecting water to sonic vibrations and had an explosion which wrecked his apparatus. Six years of intensive experiments passed before he was able to produce this energy at will. He found that 42,800 vibrations per second would vaporise water instantly into energy. He named this energy 'Etheric Force' and the process of changing the substance of water into etheric force Dissociation".

In 1862 Koenig had invented the manometric flame which allowed researchers for the first time to observe sound visually. Keely would have had one when he did his experimenting. Being intensely interested in the subject he would have read about it. It is not a complex instrument and he would have found it easy to make one or have one made for him cheaply.

It is important here to explain what a manometric flame is, how it works and why Keely had to be in possession of one.

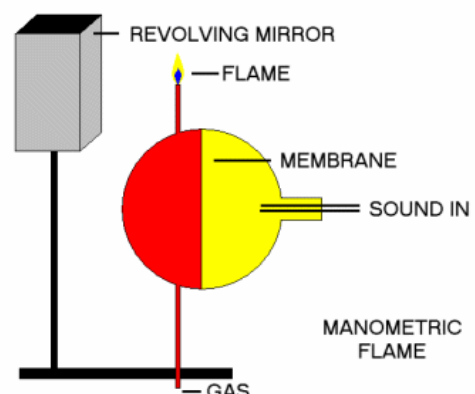
Manometric Flame Apparatus

Inside a resonant cavity is a membrane made out of thin rubber that divides the cavity into two equal sections.

Through one half a stream of gas is passed leading to a small burner at the top, the other half has an opening through which sound can enter.

The introduction of sound waves causes the membrane to vibrate.

These vibrations are transferred to the stream of gas



by the membrane the result being that the height of the flame varies with different compression and decompression cycles.

The flame is observed through a rotating mirror or prism, which acts as a stroboscope allowing the operator to 'freeze' the motion of the flame simply by matching the speed of rotation to the cycle under observation.



Just the thing for Keely. I cannot find anything in his writings that mentions a manometric flame though I know that he was in possession of a revolving prism, he mentions it in connection with one of his devices in his writing.

Events leading up to the Discovery of the Dissociation of Water.

In all probability this is what happened.

Reasoning that the poor performance of his little motor was due to rogue frequencies generated by the structure itself he decided to improve the device by tuning all components parts to compatible harmonics.

In later life he continually talks about the absolute necessity of doing this so we are still on safe ground.

The next step was to find out the optimum frequencies for such a device.

It would not be necessary to build his motor to study the optimum frequencies involved, researching a single resonator would suffice. I believe he started his investigations with a device not unlike this one.

Resonator with electrically driven tuning fork

By placing a manometric flame in front of the resonator the sound vibration coming from the instrument became visible.

The results would have been disappointing and inconclusive.

In this apparatus the tuning fork sits in front of the resonator opening and the vibrations from the tuning fork would have dominated the vibrations coming from the resonant chamber.

Keely knew all there is to know about tuning forks, the object of his study was the behaviour of the sound waves inside the resonator.

There really is only one way to do this with the instruments of the time and it would not have taken Keely long to realise how to go about it.

By tuning two identical resonators to the same pitch, as to cavity frequency and mass frequency both being connected on a stand with a metal rod tuned to the same frequency, or one harmonically compatible it was possible to excite the first resonator transfer the vibrations mechanically to the second the same conditions would exist in both cavities. That would make it possible to study the waveforms in the second cavity without the dominating vibrations from the tuning fork.



This is not a farfetched speculation since all his later devices follow the same pattern, whether he calls the exciting device his transmitter or liberator or something else.

It is at this stage that he started to prefer a vertical arrangement of components rather than the traditional horizontal, presumably to keep unwanted frequencies at bay by having as few points as possible in contact with other resonating structures, such as a bench.

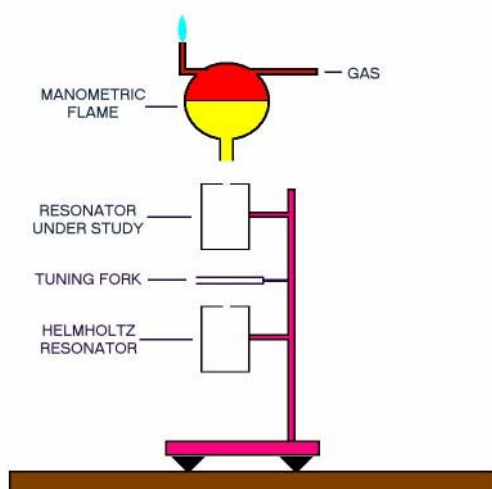
The way I see this arrangement is something like this.

This would have enabled him to study the sound phenomenon occurring inside the resonator with as little interference as possible.

That would not have held his attention for long.

As the next experiment he would have tried to investigate more complex sounds, such as a harmonic chord and study the effects of that on the body under investigation.

The only way he could achieve this was by mounting three resonating bodies in front of the first cavity resonator in place of the tuning fork.



This required re-designing his device. He acquired a ring of metal, carefully tuned it to a compatible frequency with the three resonators so mounted inside, them being a tuning fork, a tonometer bar and a Chladni plate, mounted his cavity resonator on the top, put it onto a suitably tuned vertical stand and now he could produce a complex waveform inside another cavity resonator induced by resonance and observe the waveform inside that resonator by placing a manometric flame above it.

His vibrating transmitter was born.

Fanciful speculation, I hear many of you say at this point.

NOT AT ALL!

The device existed, maybe still exists. There are a few photographs of it though no-one I know of has ever mentioned its purpose.

He refers to it in his writings as the 'vibrating transmitter with the telephonic head'.

The description is an allusion to the shape of the resonator mounted on top of the ring, which bears a resemblance to an earpiece of a contemporary telephone.

Why he chose a conical resonator for this device is unclear to me, maybe by giving it the shape of a megaphone he tried to amplify its output.

Later, when he had learned to produce the wave patterns he needed inside a resonator cavity he discarded the shape in favour of a spherical arrangement.

But, no more talk, here it is.

Keely's first "Compound Transmitter"

Notice the conical resonator on top of the ring, the tonometer bar inside the metal ring topmost, followed by the tuning fork in the middle and the Chladni plate at the bottom.

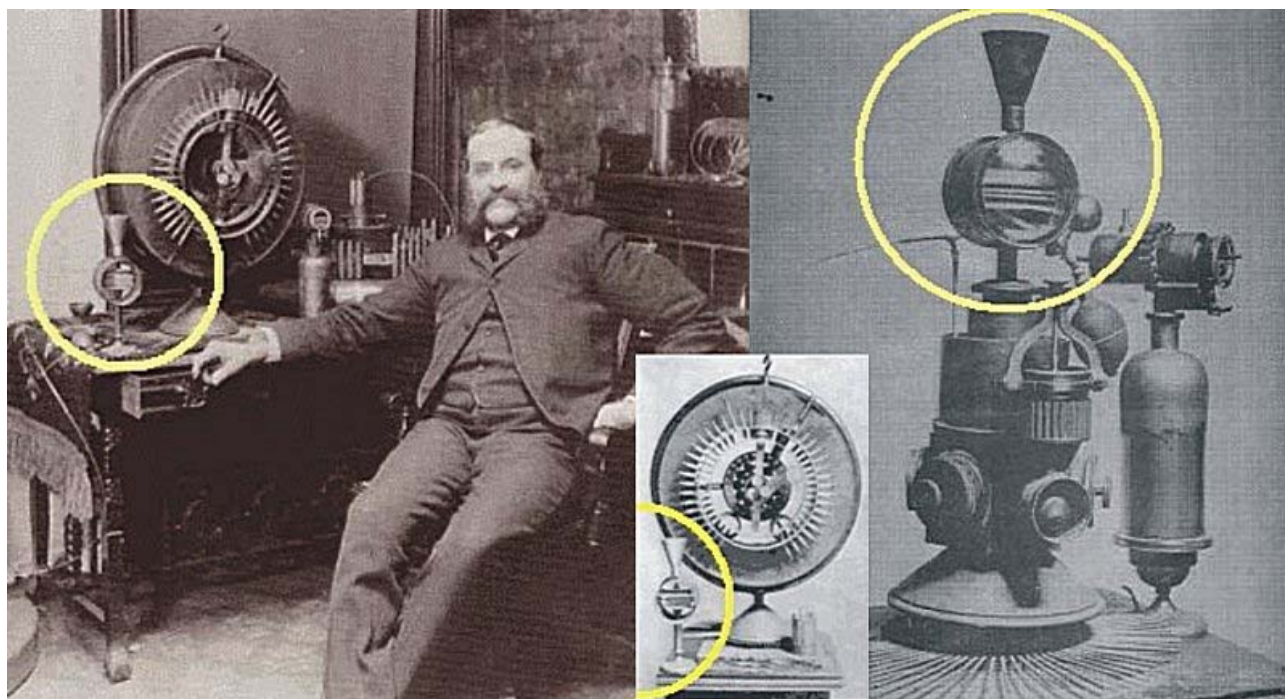
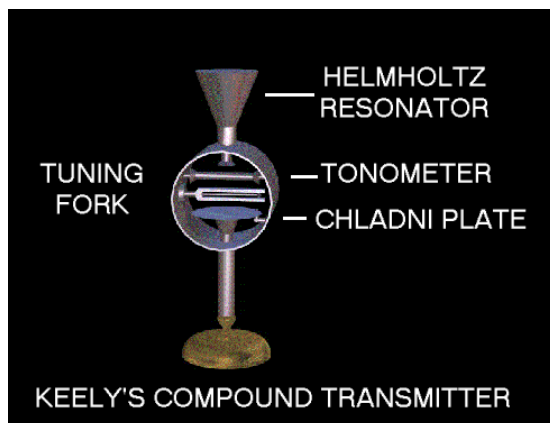
It is here worthy of note that tonometers, tuning forks and Chladni plates were standard items in every acoustics laboratory at that time.

For photos of contemporary examples click on the words.

The device must have worked well.

Here are some more photographs where his device is featured, a sure sign that this was his main transmitter for a while until superseded by later designs. In later designs he places his resonators inside a hollow metal sphere.

There would have been good reason to do so. The open ring with the resonators inside would have been far more likely to pick up rogue frequencies from the environment, a problem he appeared to have overcome with his later arrangement.



I have to apologise here for the poor quality of the pictures, mostly poor resolution JPG's I have plucked from various web sites. If someone could let me have some better quality scans of his equipment it would be most helpful.

But, back to our subject. How did this lead to the disintegration of water allegedly by accident, or was he doing something else that he never talked about?

I don't believe he did something else. By following in a logical and methodical manner the same path of research we will see how it leads to that particular discovery and why no-one known has been able to duplicate it.

O.K. so he had his compound transmitter. In today's terms we would call it an acoustic waveform generator. What now?

Since the whole idea of building the thing was to study complex waveforms and their behaviour inside a cavity resonator he would have done just that.

The arrangement of the various elements would have looked something like this:

Now he is looking at complex waveforms inside a resonator. So, what? And how does water get into the equation?

This question puzzled me for some time until I remembered something from when I was a boy.

Toys and musical instruments were scarce in early post-war Germany. I loved both. An old man told me that if I collected a few bottles he would make me a musical toy. When I had a number of bottles he suspended them on strings from a broom handle resting horizontally on two timber forks cut from a tree branch and staked vertically in the ground. He then filled the bottles with various levels of water and bingo a sort of xylophone. The bottles when struck with a hammer made different notes and it was possible to play simple tunes on the thing. As the water evaporated they would get out of tune and required retuning by adding a bit more to various bottles. The process of tuning was so tedious I soon tired of the device and did something else.

Of course, that was it!

Keely would have done just that to study the patterns caused by minor changes in pitch.

For his purpose an eyedropper would have been ideal. We know from his later experiments and writings that he never used more than a few drops of water at a time. I don't know how many times he made his experiments. Judging by his tenacity in pursuing failed experiments until they paid off, as commented upon by many of his contemporaries, perhaps a thousand times or more.

Eventually he struck the right combination. The water dissociated into H_2 O_2 , a highly explosive gas, the manometric flame at the top ignited it and BOOM, his first taste of "etheric vapour".

After that there was no stopping him. I don't think he knew for quite some time what he had done, but of one thing he was convinced. He had 'liberated' an enormous amount of energy using sound.

Aquaeous Disintegration.

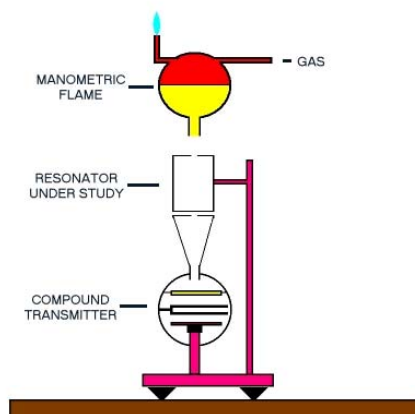
It took Keely a long time to repeat his disintegration of water and, incurring many explosions, even longer to get it under some measure of control.

That the explosions occurred of that there was no doubt. Many of them were so serious they were reported in the press and put Keely out of action for weeks at a time. So what took him so long? Keely was a meticulous researcher, he would have kept notes. He knew precisely what frequencies he used as well as the precise design and composition of his apparatus. Simple, build a new one, tune it the same way and repeat the experiment.

Keely would have been stunned to see that in spite of meticulous reconstruction he could not get the device to work.

He had done the same experiment with and without water many, many times and nothing spectacular occurred. What was different that time when it blew up?

He experimented and experimented until he caused another explosion, still not knowing why.



He kept on doing this until he found out what was different when the explosions occurred.

He had noticed that as a result of repeated experiments changes had occurred in his equipment that brought forth a new set of conditions.

He talks about it repeatedly in his writings and in his interviews. I am surprised that for so many years of study I have missed the significance of it when it was plainly laid out before me.

I will quote here only one reference, this one perhaps the most explicit. He is talking to a reporter about his demonstrations at Sandy Hook where he was firing a gun using his "etheric vapour".

A reporter of the Press was cautiously examining a vaporic vibrator that lay on the table in the middle of the room. Laying down his paper the inventor wheeled around in his chair, and, after studying for a moment, broke the silence that he has so persistently maintained, and, for the first time in several years, communicated his thoughts to a newspaper man. "My experimenting days are over," he said. "This will develop my active enterprise. Complete success is very near at hand. My experiments at Sandy Hook demonstrated that my vaporic force is a fact and not a mere creation of fancy, as many persons have persisted in declaring. I am now able to produce a power of projection thrice greater than that of gunpowder, and there is no limit to this force. My motor will be completed in less than two months and I will then make a public exhibition of its wonderful power, which are already in a position to manifest themselves. The adaptation of my force to gunnery is positively assured. I can apply it with more effect than that of nitroglycerine."

The inventor paused and took out of a satchel what looked like a policeman's billy. "This," he said, "is what I call a vibrator. It is a hollow coil of steel of the finest quality. In one end is an orifice, by which it is attached to the gun. It is the most peculiar piece of steel in the world. Listen," and the inventor tapped one end of the coil twice, sharply, upon the floor and held it to the ear of the reporter. "Do you hear anything?" The reporter did hear something. The steel cone was humming in a very high key. The noise was like that of a tuning fork. Taking the core in his hand, the reporter found that it was quivering from one end to the other. Mr. Keely continued: "It hums, don't it? No other piece of metal in the world of similar shape will hum at all. See if it does," and he tapped another hollow bar of steel on the floor and held it to the reporter's ear. Not a sound was audible, not a quiver could be detected.

"That steel bar," said Mr. Keely, "was the beginning of my motor. By means of it I stumbled on my discoveries. For seven years I have kept flowing through that core a stream of etheric vapour. The action of the vapour has been to affect the relations of the molecules and to alter to a certain extent their conditions. For this reason it has become subject to these vibrations, which are excited in the manner I have shown you. There has been no apparent outward change in the steel. Its weight is the same as before, but it is in the process of silent dissolution. Were I to pass through it for 20 years longer, this etheric vapour, it would crumble into nothingness, be transformed into the most impalpable dust, or whatever you may choose to call it.

The steel core is necessary for the promulgation of the projecting force of the etheric vapour when applied to gunnery. When the vapour was first allowed to flow through the core of steel, the vibrations were scarcely audible. Gradually they increased in volume, and the noise became more and more audible. The vibrations through it have averaged 300,000 per second. It has sufficient force to operate a 500-horse power engine. So what does that mean and how does it relate to problems encountered with the disintegration of water?

What he is saying is that prolonged exposure to specific frequencies relating harmonically to the body under study changes the structural arrangement within that body and makes it more receptive to these frequencies.

The structural changes are subtle and cumulative.

In other words, the vibratory stream causes a structural re-arrangement on the outside of the resonator, perhaps only one molecule thick. This layer now being capable of transmitting pure concordant harmonies influences the layer below and so forth until the whole body is free from nodal inferences. The depth to which the vibrations can penetrate and cause a structural re-arrangement at any given time is what he calls in his later writings "sympathetic outreach".

He continually talks about the absolute necessity of doing this with all parts of his equipment. He calls this his system of 'graduation'.

I had often wondered why it had taken him four years to graduate the parts of his "quartz disintegrator". No tuning of resonators should have taken that long, even to the fine tolerances that he required. Now I know why.

He must have later found some way of increasing the "sympathetic outreach" thus shortening the process or he could not have built the multitude of devices that he did.

The question here is how does that sit with conventional physics and it is there some evidence other than Keely's writings that the phenomenon exists.

There is no problem with orthodox science, there is ample proof that the phenomenon exists.

Every musician knows that a well played string sounds 'sweeter' than a new one. A fine musical ear can tell the difference.

Especially in Keely's time opera singers delighted in shattering a thin wine glass with their voice alone. If that is not a structural re-arrangement I don't know what is.

Engineers know that vibrations close to the fundamental frequency (or a harmonic thereof) of a component part bring about its premature failure. We call this metal fatigue. Engineers go to extreme lengths to avoid these kind of vibrations in their equipment and use every trick in the book to neutralise or dampen their impact.

We are still on safe ground as far as orthodox science is concerned, no new theories, metaphysical or otherwise, are needed.

Every day of the week scientists and engineers subject parts under study to various vibrations and carefully note any changes that occur.

So what brings about these structural changes and in what way does it alter the properties of matter?

To get some answers we must look at the properties of sound, what is it, and how it behaves.

I will not go into a long dissertation on sound, there is better stuff around on the subject than I could ever write, just enough of the basic principles to enable the reader to follow my line of argument.

The Nature of Sound.

Sound is a mechanical longitudinal pressure wave in gases and liquids.

In solids and metals transverse pressure waves are also generated.

It requires a medium to travel.

The speed at which sound travels through a medium is largely dependent on the density of the medium.

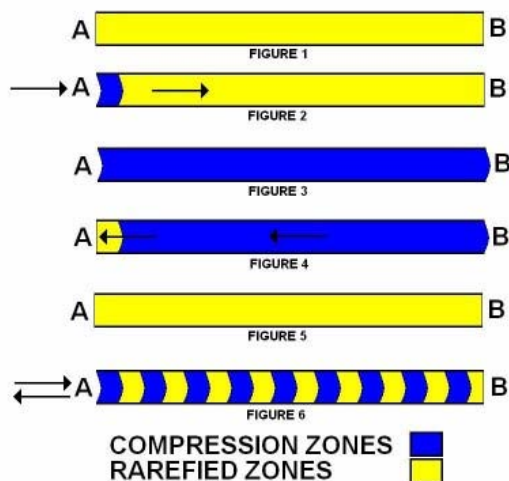
As a rule of thumb, the denser the medium, the faster the speed of sound.

So what does that mean in practical terms?

Say we have a long tube filled with some medium, say air, each end sealed with a flexible membrane. Figure 1.

We now push membrane A towards membrane B. What happens when the air particles adjacent membrane A get compressed? Figure 2.

We now have an area of high compression adjacent to the membrane while the rest of the particles in the tube are still in their old positions. We have disturbed the equilibrium of forces inside the tube. Since nature always tries to re-establish equilibrium the compression gets passed on to the next lot of particles from there to the next and so forth until the compressed zone reaches Membrane B. The compression zone acting on



Membrane B causes said membrane to move in the direction of the original push by exactly the same amount of displacement, minus some minor losses due to friction etc, as that caused by Membrane A. Figure 3.

Equilibrium thus re-established the movement comes to rest. The reaction is not instantaneous through the length of the tube. It requires time for each particle to push the adjacent one in turn. In other words the compression zone travels. The speed of travel is the speed of sound, although we express this usually as the length of travel over a given time frame in m/sec or ft/sec. What happens now when we withdraw the pressure from Membrane A? Figure 4.

The particles in the compression zone adjacent to the rarefied zone rush in to fill it, in turn creating a rarefied zone behind. This reaction happens in turn throughout the tube until the rarefied zone reaches Membrane B, allowing the membrane to assume its original position.

In other words the rarefied zone travels in the same way as the compression zone did and at the same speed.

Equilibrium thus restored the movement come to rest. Figure 5.

If the compression and decompression cycles are shorter than the time required for the compression zone to reach Membrane B we get a rarefied zone behind membrane A while the compression zone still travels towards Membrane A. We thus get a series of compression and decompression zones following each other from Membrane A to Membrane B at the same intervals as membrane A is moved, causing membrane B to move in exactly the same manner as Membrane A, albeit some time later. Figure 6.

The travelling compression zones thus created we call waves. The rapidity of movement we call frequency.

Frequency is expressed as cycles per second or Hertz.

This is what the movement looks like:

It is of importance here to note that the actual particles in the tube move only for very short distances before returning to their original positions.

This is in stark contrast to electromagnetic radiation (which is also called waves) where actual particles travel across a distance, be they ions, electrons, photons or alpha and gamma particles.

That is why light, radio waves etc can travel through a vacuum, whereas sound cannot.

Two light waves crossing, each other at right angles do not effect each other in any way.

Two soundwaves crossing at right angles have a profound effect on each other that becomes more noticeable when the frequency of the waves are different.

Leaving that aside for the moment, for this comes under category of harmonics, beat frequencies, feedback etc, let us get back to structural changes within matter brought about by sound.

We know we can destroy particulate structures using sound. Metal fatigue and the breaking of glass can be brought about by sonic vibrations.

Since we also know that prolonged exposure is required to achieve this, which means that the effects of sound are cumulative, there must also be intermediate stages where the effects of sound have not brought about destruction, but have altered matter in profound ways nevertheless.

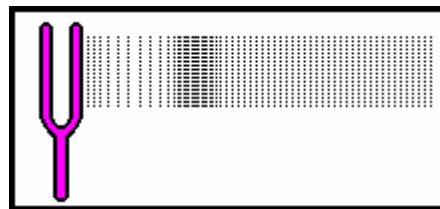
It is in that area where Keely's work is unique.

Keely with diligent research and meticulous observation had invented a way to create a resonating body that was so pure in its frequency response that harmonics of incredibly high frequencies could manifest in sufficient amplitude to dissociate water, given the right introductory frequency mix.

Having thus explained the nature of the equipment Keely used we now come to the second hurdle.

What frequencies did he use to disintegrate water.

The direct quote from the book "Keely and His Discoveries" by Bloomfield Moore, published in 1893:



".The acceleration of these orders is governed by the introductory impulse on a certain combination of vibratory chords, arranged for this purpose in the instrument, with which Keely dissociates the elements of water, and which he calls a Liberator. “

"In molecular dissociation one fork of 620 is used, setting the chords on the first octave. "In atomic separation two forks, one of 620 and one of 630 per second; setting the chords on the second octave.

"In the etheric three forks; one of 620, one of 630, and one of 12,000; setting the chords on the third octave."

As a matter of further clarification, Keely states that you cannot DIRECTLY dissociate a single level of aggregation due to the shell structure of matter. In other words, if you wish to dissociate the Atomic level, you must first dissociate the molecular to be able to get to the atomic. That follows also if you wish to dissociate the etheric, you must disrupt the molecular AND the atomic, THEN the etheric. Keely refers to this technique as progressive dissociation.

How these frequencies have sent researchers up the garden path for over 100 years.

These frequencies are not in a harmonic relationship with each other. The create dis-harmony and beat frequencies all over the place, the very opposite of what Keely is saying.

So why did Keely give these specific frequencies?

Look at his statement again. He never said that he used them, he only said they were used to set the chords. Same thing you say. No, he is talking about something quite different.

In order to understand what Keely was doing with these three tuning forks we must gain an understanding of his "vibratory microscope".

Keely's Fabled Vibratory Microscope.

I have seen diagrams of Keely's "atomic triplet" described "as seen through his vibratory microscope". It has also been said he used ultraviolet light in his microscope.

Such notions are based on myth and rumour.

Here is why:

1) No optical instrument can be built to look at molecular and atomic structures. At extreme magnification (the maximum usable magnification on an optical devices about 1000 times) all you will see is Brown's movement (sort of looks a little bit like sperm wriggling through spermal fluid). That is why we have Electron Microscopes to look at smaller parts, the downside being that the EM cannot look at living things as it requires the specimen to be held in a vacuum to enable the electron flow.

2) It is possible to build an optical microscope using ultraviolet light. I quote here Stephen M. Wolniak, Professor & Interim Chairman, Department of Cell Biology & Molecular Genetics, University of Maryland, who in a paper on optical microscopy says:

"In the early 1950's, a UV microscope was designed, but required quartz objectives and a specialized imaging device. The quartz lenses provided slightly better resolution ($d_{min} = 0.1 \text{ } \mu\text{m}$), but image quality suffered from an inability on the part of the manufacturers to correct for aberrations caused by the quartz."

It is noteworthy here that a microscope with a conventional maximum resolution of 1000 times has a resolution of ($d_{min} = 0.2 \text{ } \mu\text{m}$), which would make the theoretical maximum magnification in a ultraviolet microscope around 2000 times. This is a long way short of the magnification required to look at molecular and atomic structures, not to mention sub-atomic particles.

3) It is possible to use sound waves to create a visual image, but the technology is very recent and is incapable, and by the nature of the waves and the technology required always will be, of looking at small items. If you don't believe me look up the technology surrounding ultrasonic scans. Besides, in Keely's time building an ultrasonic imaging device would have been akin to building a

nuclear reactor with a hammer, a screwdriver and a bit of radioactive ore, considering the technology of the day.

So what then is his vibratory microscope. Is it some mysterious instrument designed by true genius and since lost to the world?

Sorry guys, the mysticism will have to wait. Far from being something esoteric Keely's vibratory microscope (called vibrating microscope in some contemporary literature) was at the time standard equipment in any acoustics laboratory doing serious research. In fact Keely could not have built his machines without one.

It was invented by Lissajous, a contemporary of Keely and was built and sold by Rudolph Koenig during Keely's time. The picture below is of a contemporary device (1876), now in the collection of Amherst College in Massachusetts. It is listed at 140 francs in the 1889 Koenig catalogue (Cat. No. 234i).



So, how did it work and what was it used for?

In his 1900 book, *Sound and Music*, the Rev. J. A. Zahm of Notre Dame noted that the device *".....is composed of an electric fork, attached to a solid support, and a microscope. The object of the microscope is borne by one of the prongs of the fork (in the apparatus above it is attached to the lower fork) When the fork is set into motion the objects visible in the field of the microscope seem to move in the same direction as does the fork. If now a second tuning-fork, whose prongs are perpendicular to those of the first, be caused to oscillate, a point on the second fork will appear to describe a curve, whose form will depend on the vibration-frequencies of the two forks used. If the intervals of the forks be perfect, [simple Lissajous figures] will appear... If, however, the interval be perturbed in any way by a change in the temperature of the forks, for instance, the figure is no longer constant. It immediately begins to pass through a cycle of changes... The longer the time required for effecting a complete cycle of changes, the nearer the intervals of the forks are perfect. [Consider a vibration microscope] made to execute exactly 128 vibrations per second. If ...[the figure] goes through a cycle of changes in 10 minutes, it means that our comparator executes $10 \times 60 \times 128 = 76800$ vibrations, while the other fork, during the same period, makes one vibration more or less than this number."*

From J. A. Zahm, *Sound and Music*, second edition (A. C. McClurg & Co., Chicago, 1900) pp 418-419.

The tuning forks that Keely mentions in the article about aqueous disintegration were simply reference forks used in his vibrating microscope to enable him to tune the resonators in his "liberator" to very tight envelope tolerances, as we would say today.

So what were the frequencies used, and why was a complex sound required?

To get our next clues we must look at water and its structure.

Water, its Structure and its Isotopologues.

WATER (H₂O) is the third most common molecule in the Universe (after H₂ and CO), the most abundant substance on earth and the only naturally occurring inorganic liquid, a billion cubic kilometers of which reside in our oceans and 50 tons of which pass through our bodies in our lifetimes. It has been very well studied with a number of model structures having been proposed and refined. Notwithstanding this, extensively hydrogen-bonded liquid water is unique with a

number of anomalous properties. It has commonly been stated that no single model is able to explain all of its properties.

And we all thought water was the simplest of all things. Evidently not. Let's have a closer look at it.

The first complication with water is that there are three different forms of hydrogen that we know of, each capable of combining with oxygen to produce a clear odourless liquid that on first inspection looks and feels like water.

The first, protium (H), is the one we commonly associate with hydrogen. It has at its core only one proton.

The second, deuterium (D), has one proton and one neutron at its core. In combination with oxygen it becomes D₂H, which is known as heavy water. Deuterium occurs in water at about 0.015%.

The third, tritium (T), has one proton and two neutrons at its core. It is radioactive and has a half life of 12.32 years. It combines with oxygen to form tritiated water T₂O. The low-energy beta radiation from tritium cannot penetrate human skin, so tritium is only dangerous if inhaled or ingested.

The three forms of hydrogen combine with water to form what we know as water and five isotopologues. (The isotopologue of a chemical species has at least one atom with a different number of neutrons.) This gives as the only possible combinations, all of which occur in what we call water:

H-O-H, D-O-H, T-O-H, D-O-D, T-O-D, T-O-T

This is not where the complexity stops.

The following are a few selected facts from available literature:

The water molecule may vibrate in a number of ways. In the gas state, the vibrations involve combinations of symmetric stretch (ν_1), asymmetric stretch (ν_3) and bending (ν_2) of the covalent bonds.

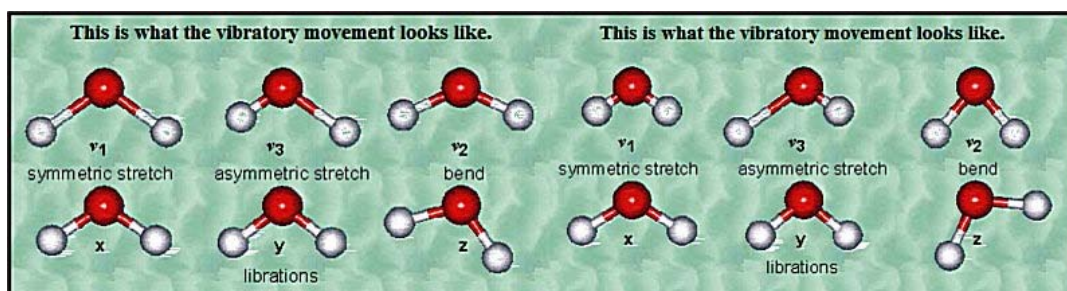
Main vibrations of water isotopologues			
Gas	ν_1, cm^{-1}	ν_2, cm^{-1}	ν_3, cm^{-1}
H ₂ ¹⁶ O	3657.05	1594.75	3755.93
H ₂ ¹⁷ O	3653.15	1591.32	3748.32
H ₂ ¹⁸ O	3649.69	1588.26	3741.57
HD ¹⁶ O	2723.68	1403.48	3707.47
D ₂ ¹⁶ O	2669.40	1178.38	2787.92
T ₂ ¹⁶ O	2233.9	995.37	2366.61

The main stretching band in liquid water is shifted to a lower frequency (ν_3 , 3490 cm⁻¹ and ν_1 , 3280 cm⁻¹) and the bending frequency increased (ν_2 , 1644 cm⁻¹) by hydrogen bonding.

Main vibrations of liquid ordinary and heavy water				
Vibration	liquid H ₂ O (25°C)		liquid D ₂ O (25°C)	
	ν, cm^{-1}	$E_0, \text{M}^{-1} \text{cm}^{-1}$	ν, cm^{-1}	$E_0, \text{M}^{-1} \text{cm}^{-1}$
ν_2	1643.5	21.8	1209.4	17.4
$\nu_2 + \text{libration}$	2127.5	3.50	1555.0	1.91
$\nu_1 + \nu_3 + \nu_2$ (overtone)	3404.0	99.9	2504.0	71.5

This is what the vibratory movement looks like.

It is clear that life on Earth depends on the unusual structure and anomalous nature of liquid water. Organisms consist mostly of liquid water. This water performs many functions and it can never be considered simply as an inert diluent; it transports, lubricates, reacts, stabilizes, signals, structures and partitions.



The living world should be thought of as an equal partnership between the biological molecules and water. In spite of much work, many of the properties of water are puzzling. Enlightenment comes from an understanding that water molecules form an infinite hydrogen-bonded network with localized and structured clustering. The middling strength of the connecting hydrogen bonds seems ideally suited to life processes, being easily formed but not too difficult to break. An important concept, often overlooked, is that liquid water is not homogeneous at the nanoscopic level.

There is obviously much more to it, but this is what it boils down to.

Water is not H-O-H, this is only a way of talking. True, for most purposes the formula holds, but it is only true for the average body of water over a longish period of time.

The hydrogen atoms in water are not rigidly fixed to the oxygen atoms and have a tendency to move around and find new oxygen partners. A bit like our modern society perhaps?

Even in true H₂O molecules there are at least three distinct modes of vibration that have different frequencies.

Water has a tendency to form clusters.

Water has memory. Water can remember a structure it was forced to assume by being made to regroup in the presence of some foreign substance long after that foreign substance disappeared. (According to some scientists this explains the workability of homeopathy.)

There are sixty three known anomalies of water. To go into this subject here exceeds the scope of this paper. Suffice it to say we are dealing with a complex substance that has a life of its own and often behaves in ways difficult to forecast.

Therefore the dissociation of water with a vibratory stream is not an easy task and should not be undertaken lightly without reasonable safeguards especially as to explosions.

Keely's Theories.

In Keely's time ether theory was still in the scientific mainstream. It was not until the Michelson experiment in 1887 that the theory began losing credibility. In the 1920's most mainstream scientists rejected the concept altogether.

There are many even today that still maintain the existence of the ether. Some eminent scientists, including Einstein, saw no contradiction between the contemporary model and the existence of an ether. In the end it makes no difference. The whole question whether the whole universe floats in some penultimate soup or not is purely academic, since by definition we will never be able to deal with the ether directly, it being part of the observer as well as the observed and must therefore always be hidden from view. We are still stuck with studying the observable whether the ether is there or not.

Be that as it may, all of Keely's theories revolve around the ether and its properties as he saw it. This, combined with his archaic language, makes his writings impalatable to scientists and technicians of our time.

Before we go into his theories as such let us remember that the theories of the alchemists led to many discoveries including gunpowder and phosphorus. The phlogiston theory, fashionable in the 18th century, led to the discovery of hydrogen (phlogisticated air) and oxygen (dephlogisticated air).

Both theories are discredited today, nevertheless they had a degree of workability in their time.

Theories come and go, the discoveries and technical achievements coming from them stay with us. No doubt our current theories about things will undergo profound changes as new knowledge comes to hand. Bearing that in mind let us look at how Keely saw things.

The following abstract of Keely's Theories was published in "KEELY AND HIS DISCOVERIES" by Clara Bloomfield Moore in 1893.

It was written by Professor Brinton with Keely's full knowledge and approval. I am using this here rather than direct quotes from Keely himself as Keely says essentially the same, but is much more difficult to read and understand because of his obscure terminology. The paper is dated 12-08-1889 (mm-dd-yy by US convention)

Abstract of Keely's Physical Philosophy in its main features up to the point of practical application; by Professor Daniel G. Brinton, of the Pennsylvania University (subject to modifications and additions when Keely has made public his system.)

The fundamental conception of the Universe is force manifesting itself in rhythmical relations. This definition is exhaustive, including both thought and extension, matter and mind. The law for the one is the law for the other. The distinction between them is simply relative, i.e. quantitative, not qualitative. The rhythmic relations in which force acts are everywhere, under all conditions, and at all times, the same. They are found experimentally to be universally expressible by the mathematical relations of thirds.

These threefold relations may be expressed with regard to their results as,

I. Assimilative.

II. Individualizing.

III. Dominant or Resultant.

From these three actions are derived the three fundamental;

LAWS OF BEING.

I. Law of Assimilation: every individualized object assimilates itself to all other objects.

II. Law of Individualization: every such object tends to assimilate all other objects to itself.

III. Law of the Dominant: every such object is such by virtue of the higher or dominant force which controls these two tendencies.

Applying these fundamental laws to an explanation of the universe, as it is brought to human cognition, all manifestations of force may be treated as modes of vibrations.

The essential differences give rise to the three;

MODES OF VIBRATION.

I. The Radiative : called also the `Dispersing,' the `Propulsive,' the `Positive,' and the `Enharmonic.'

II. The Focalizing: called also the `Negative,' the `Negative Attractive,' the `Polarizing,' and the `Harmonic.'

III. The Dominant: called also the `Etheric,' or the `Celestial.'

These, it will be noted, correspond to the three laws of being. It is not to be understood that any one of these three modes of vibration can exist independently.

Each by itself is called a `current,' and all three must be present in every `stream' or `flow' of force. The relations of the currents in every flow are expressible in thirds, and it is experimentally demonstrable that the relation of the three are in the order named: as $33 \frac{1}{3} : 66 \frac{2}{3} : 100$.

The evolution of what is called `matter' from the different modes of vibration is through the action of the second law, that of focalization, or `negative attraction,' or `negative affinity.'

Where the vibrations under this mode meet, and are maintained in a state of mutual affinity or equilibrium, there is established what is called a 'neutral centre,' or, as otherwise expressed, a centre of sympathetic coincidence. The terms 'neutral attraction,' 'neutral affinity,' 'negative attraction,' or 'polar negative attraction,' are employed to express the property of a mode of vibration to direct its components toward such centre.

As no current or flow of force can be composed of one mode of vibration only, but must always be composed of three modes uniting in varying thirds, we have $1 \times 2 \times 3 = 6$ as the total possible forms of sympathetic coincidence, or, to speak in ordinary terms, there can be six; and six only, possible forms of individualized being.

These are what Keely calls the six orders of atomic subdivision, or orders of vibratory motion, and he names them as follows:

- I. Molecular.
- II. Inter-molecular.
- III. Atomic.
- IV. Inter-atomic.
- V. Etheric.
- VI. Inter-etheric.

In this last the forms of matter are arranged in the mathematical sequence of the rapidity of the oscillations of their constituent members; the proportion being proved by experiment to be as follows: for the molecular orders: $1 : 3 : 9 : 27 : 81 : 243$. This arithmetical progression changes in the atomic orders to a geometrical progression as follows: $3 : 9 : 81 : 6561 : 43046721$, etc. This same method of progression is believed to hold in all the orders of vibrations above the molecular, and soon passes into mathematical infinity.

Actually, however, all matter of which we are capable of cognition through the medium of our senses is in one of three forms of aggregation:

- I. Molecular
- II. Atomic
- III. Etheric;

in each of which the controlling mode of vibration is respectively,

- I. The Enharmonic
- II. The Harmonic
- III. The Dominant

But it must be understood that each of these modes is a positive and real constituent of every atom and molecule. It will be seen that as every form of material aggregation is to be considered as a 'neutral centre of attraction,' where the vibratory force of all three orders are held in 'sympathetic coincidence,' that is, in balanced activity or harmonized motion, and not by any means cancelled or mutually destroyed, there is no diminution of force, but only temporary suspension of its radiating or propulsive activity or expression.

This is the foundation of Keely's doctrine of 'latent force,' and of the indefinite power which can be obtained by breaking up the harmonious balance or equation of forces of every mode, which exists in every 'neutral centre,' that is to say in every mass of matter.

Inasmuch as every mass of matter consists thus, in fact, of vibrations in harmonic equilibrium, related by simple proportions of thirds, it follows that every mass of every description stands in harmonic relation to every other mass.

This is, in part, what is meant by the sympathy of all forms of matter and of motion; and it is through the study of the methods of increasing or diminishing this sympathy that we reach practical results in this field of research.

At present this is best accomplished by resonance ; that is, through the harmonic vibrations created by musical instruments, bringing out the acoustic world as the microscope reveals the hidden visual world.

Every visible or tangible mass of matter must be regarded as an aggregation of molecules ; the molecules being the true centres of the equated forces of 'neutralized attraction.' These molecules

have been experimentally proved by Keely to be formed of all three modes of vibration ; the proof being that they respond to all three modes when subjected to the tests of compound concordant impulses. It is through the disturbance of this oscillatory equilibrium, by means of resonant impulses, that Keely alters the relations of the vibratory impulses which constitute matter.

This he does by striking the same chord in three octaves, representing the third, sixth, and ninth of the scale. Of these, the sixth reduces the range of molecular vibrations or oscillations ; and, by thus bringing nearer to each other the neutral centres, increases solidifications. The ninth extends the range of molecular oscillation, and thus tends to give greater tenuity to the mass. It induces 'trajectile velocity' from neutral centres, or 'neutral radiation.'

Experiment shows that molecular dissociation does not take place until the molecule attains an oscillation approaching, if not fully reaching, two-thirds of its diameter. This can be effected by means of the 'enharmonic' or 'radiating' current applied to the mass, after its molecules have once been disturbed by an 'introductory impulse;' that is, by the musical note above mentioned. The third represents the 'dominant,' and when brought under control of a harmonic resonant impulse induces a complete rearrangement of the modes of vibration and oscillation ; in other words, will transform the mass either into its component initial forces, or into some other form of matter.

It is the study of the dominant to which Keely has devoted his recent researches. He aims to control the power he evolves by altering the dominant or etheric mode of vibration in the triplicate flows of force.

As all molecules and masses are mere centres of harmonized vibrations, temporarily held in suspension by simple laws identical with those of resonance, it follows that these centres can be broken up or divided by certain orders of vibration impinging upon and disturbing them.

It is a familiar fact that a cord in vibration tends to produce a similar vibration in a cord placed near it. This property belongs to all vibrations, whether resonant or not, and they exert it in proportion to the 'order' to which they belong. The distance in space to which this power extends, or can be extended, is what is called 'the sympathetic outreach' of the current or flow.

In this manner we have 'sympathetic negative attraction,' and 'sympathetic positive propulsion,' with reference to the 'outreach' of the third or dominant current of the stream, which is allied to the order of etheric vibrations. Each molecule of a given mass of matter represents the same harmonic chord or note in its oscillatory motion. The 'chord of the mass' is, therefore, the chord of every molecule the mass. But, as the condition of absolutely stable equilibrium is theoretical only, and does not exist in nature, the chord of the mass is constantly changing. Yet we must learn to control this 'chord of the mass' by resonant induction, if we would gain command of the molecular forces.

Keely believes he has solved this problem, by the invention of a mechanical device which brings the chords of all masses within the conditions of a few simple acoustic tests. The range of molecular oscillation is affected differently in different substances when submitted to the same vibratory impulse, and these ranges can be measured.

In the three metals, silver, gold, and platina, we obtain the proportions --- 3 : 6 : 9 : --- As this is the primary relation of the modes of vibration, a wire made of these three metals is peculiarly adapted to transmit concordant impulses : and nodes made of these substances placed upon a wire, transmitting resonant vibrations, indicate, by the different orders of vibration induced in them, the rate of oscillations of the atomic constituents.

The phenomenon of rotation arises from the harmonic interaction of the dominant and enharmonic elements of the flow, in other words, the first and third, the third and ninth, etc; those whose vibrations bear the proportions to each other $3\frac{1}{3} : 100$. A practical example of rotation is a wheel in revolution on its axis. This is force in its commercial or economic aspect. To accomplish this result by molecular vibratory action, we must gain control of the 'negative attractive' or 'enharmonic' current of the triple flow, and the problem is then solved up to any limit of power.

So much for the good Professor.

At first inspection the abstract appears quite clear. On a closer look it becomes quite obvious that Professor Brinton did not know much about music and harmonics, otherwise he would have clarified obvious ambiguities in his paper.

Take for instance:

Each by itself is called a 'current,' and all three must be present in every 'stream' or 'flow' of force. The relations of the currents in every flow are expressible in thirds, and it is experimentally demonstrable that the relation of the three are in the order named: as $33\frac{1}{3} : 66\frac{2}{3} : 100$.

What does he mean here? Is he talking about harmonics or amplitude when he talks about the relationship between the flows?

Further:

This he does by striking the same chord in three octaves, representing the third, sixth, and ninth of the scale.

Here he appears to be talking about harmonics. What is confusing is the term "chords". The first, sixths and ninth of a scale are harmonics of the same note. They do not represent a chord, unless he is talking about the third, sixths and ninth octave.

And:

It is a familiar fact that a cord in vibration tends to produce a similar vibration in a cord placed near it.

This sentence does not make sense whether he means cord or chord.

Then this:

In the three metals, silver, gold, and platina, we obtain the proportions --- $3 : 6 : 9$: --- As this is the primary relation of the modes of vibration, a wire made of these three metals is peculiarly adapted to transmit concordant impulses : and nodes made of these substances placed upon a wire, transmitting resonant vibrations, indicate, by the different orders of vibration induced in them, the rate of oscillations of the atomic constituents.

What on earth is that supposed to mean "nodes made of these substances placed upon a wire"?

And finally:

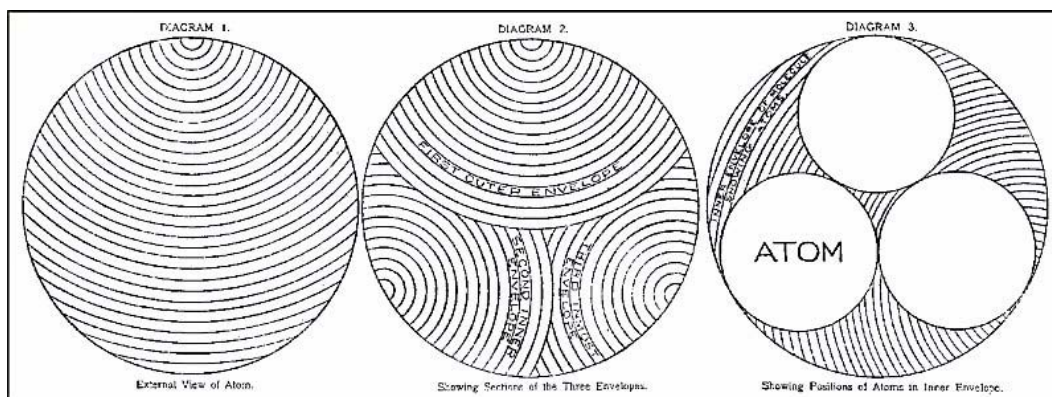
The phenomenon of rotation arises from the harmonic interaction of the dominant and enharmonic elements of the flow, in other words, the first and third, the third and ninth, etc; those whose vibrations bear the proportions to each other $33\frac{1}{3} : 100$.

Here he is talking again of either harmonics or amplitude.

It would appear that the good Professor did not know what he was talking about, which is perhaps not strange since he was a medical doctor and presumably a theosophist.

There is of course one other explanation and that is that Professor Brinton's paper was tampered with at the direction of the Theosophical Society who judged the knowledge he was imparting too dangerous in the "wrong hands", as evident in Helena Blavatsky's book The Secret Doctrine, Chapter 10. But more of that in my chapter on Keely and Theosophy.

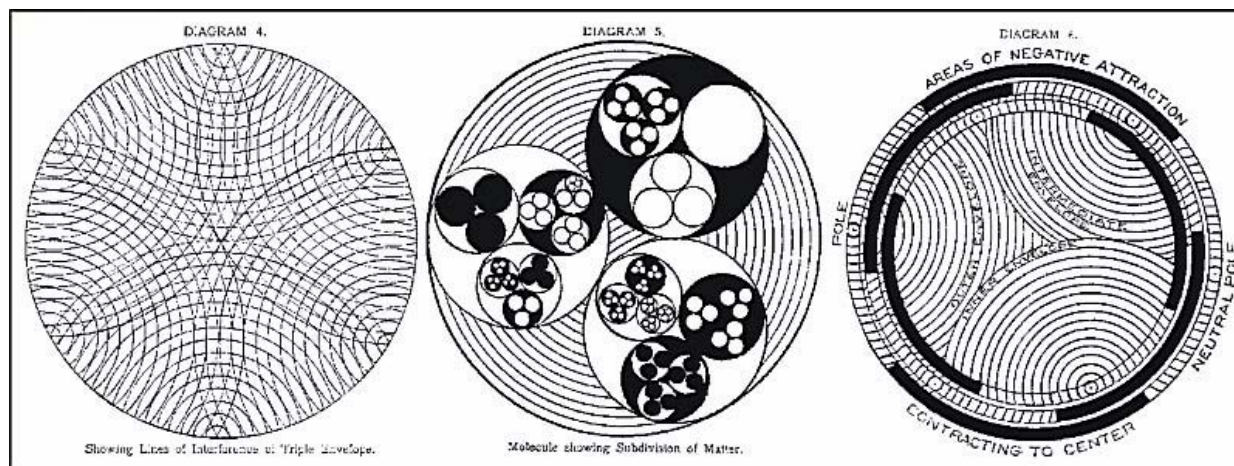
Keely's Model of Molecular Structure



Each molecule has three envelopes. The most external one may be illustrated by an india-rubber ball on which are traced a number of meridian lines.

On another ball, three envelopes are represented. The outer hemisphere of one of the envelopes is removed to show the under envelope, the outer hemisphere of which is removed in still another part of the diagram to show the inmost envelope.

A third diagram shows the position of the atoms which the rotating envelopes enclose.



A fourth diagram shows the lines of interference of the rotating envelopes. There being three perfect envelopes, these of necessity must have six poles, to which add the neutral centre of the sphere itself, comprising the origin of the septenary (7) of mysticism which is universal in nature.

The fifth diagram shows the subdivision of matter into atomic, atomolic, and atomolinic. A black disc representing a sphere shows the negative atom; two white discs also representing spheres, illustrate the two positive atoms in the triad, completing the tertiary aggregation forming the molecule.

Each atom is in turn composed of three atomoles; in the negative atom are three positive atomoles, positive in the sense of activity; in the positive atom are also three atomoles, two of which are negative, i.e. passive, and one positive.

The negative is always that which seeks the neutral centre; for instance, the sun is a medium for transmitting radiant energy of positive order, which all the planets receive negatively, i.e. it focalizes upon their neutral centres. This order extends to infinity.

The final diagram presented was simply intended to further elucidate the action of the rotating envelopes, illustrating the compressing force of the rotating spherul and the protection of the neutral poles.

In the rotating envelopes force acts in the opposite direction to its action in the revolution of the earth, where the centrifugal action is greatest at the equator; and the greater the speed of rotation, the greater the centre-fleeing force.

In the case of the etheric envelope, however, the greater the speed of rotation, the more powerful is the centripetal (centre-seeking) force which compresses the atoms within; the pressure, therefore, is greatest at the equator and gradually lessens toward the poles.

If there were only one envelope, the tendency would be for the atoms to be oblate, to fly out at the poles, where the pressure is least.

A beautiful provision of nature obviates this, by providing three envelopes, rotating one within the other, like three shells; the line of greatest internal pressure in each one of which being protected by the equatorial lines, the line of greatest pressure covering the line of least pressure on the others. Each of the three atoms is placed directly under one pole of each of the three envelopes.

If the rotating envelope of the molecule were in any way checked in its motion, the enclosed matter would immediately burst forth, producing the phenomenon of integration, releasing from its previously pent-up condition a volume of matter many times as great as that before disintegration took place.

Sound-force moving at certain rates of vibration negatizes the action of the rotating envelopes, producing conditions which result in their breaking up, followed by the separation of the atoms contained in those envelopes, and also of inter-molecular substance occupying space not taken up by the atoms.

By successive orders of vibration the atoms, atomoles, and atomolini are disintegrated, and so on to the luminous order, where all control ceases.

The human brain being formed of an inestimable number of spherical resonators, termed in medical science NERVE CELLS, forming the gray matter of the brain, these minute spheres take up the THOUGHT FORCE which permeates all space in endless waves, eternally active.

This force we term ATOMOLIC; the cells are composed of ATOMOLES, whose vibratory motions under the action of universal THOUGHT FORCE result in the phenomena of thought, cognition, intellection, etc. Understanding this, no one should continue to feel surprise at the varying emotions and impulses of a human being in an undeveloped state, as only by developed WILL can the motions of this force be directed.

The entire human economy, in the action of all its functions, assimilations, and motions, is the result of differentiation of this unitary force, all tending to supply the instrument connecting the organism with this force (the brain) with certain gases whereby it sustains its ceaseless action from birth to death: these gases supply the rotating envelopes with necessary substance for their continued activity. Were this supply cut off, death would immediately ensue; it is a fact well demonstrated that the resonating brain-structure is the first to undergo decomposition.

In all embodied conditions of the manifested universe, the law of harmony reigns supreme; the cause of this manifestation is the result of the positive being stronger than the negative; the positive is everywhere the dominant order of the universe; this reality is perfectly embodied in the word I AM; it is the reason why annihilation is both inconceivable and impossible in the universe.

The truth of this statement can be experimentally demonstrated; its law is found in all threefold aggregations, and there is a UNIVERSAL trinity composed of two positives and one negative.

Eternal consciousness, immortal life, and an infinite order of beings is the result, whilst every provision is made in the order of creation for the happiness and enjoyment of all manifested beings. Conditions are also provided whereby satiety falls to the lot of none.

The eternally conscious entity - call it by whatever name we please - moves in cycles as eternal and infinite as itself; it oscillates and vibrates perpetually and is never unconscious of any present condition, be it pain or pleasure, joy or sorrow, shame or glory; like the pendulum of a clock or the sun, moon, or tides, it swings from the one to the other of these conditions, now in pleasure, now in pain, by its contact with the extremes of all varying conditions, like a child which throws up its head and laughing for joy exclaims, I KNOW I AM.

So much for W. J. Colville, whoever he was.

For further reading on Keely's theories I have included the following dissertation, also reputedly from Colville's "metaphysical novel" Dashed against the Rock, Keely's Forty Laws of Sympathetic Vibratory Physics in the appendix.

Comments on Keely's Theories

Keely offers a philosophy, seemingly supported by his discoveries, that is coherent and elegant in its simplicity. In effect what he is saying is that the whole universe is but a manifestation of the Holy Trinity and can be understood through that principle alone.

No wonder the theosophists loved him.

How much of Keely's theories are an attempt to keep his funding going by telling theosophists what they wanted to hear is anyone's guess.

His theories, though interesting and attractive, should not be taken too literally. The proof of a good theory, however transient, lies in its ability to lead to further knowledge and discovery.

In over 120 years Keely's theories, though studied by thousands of earnest researchers, have led to nothing.

That in itself is telling.

If Keely's achievements are real, as I am endeavouring to show, we must look first and foremost at his machines and analyse what he has to say about his experiments and his results.

In places it is helpful to look at what Keely thought had happened, but let us not focus on the religious aspect of his explanations and consider that his penultimate truth.

There is no such thing as a "Sacred Science", there is only science.

Keely's achievements will never be understood through his theories alone, for a start we do not know what they were. Keely's writings have mysteriously disappeared, his machines can no longer be examined, all we have are a few photographs and a few newspaper articles that can be credited with any degree of objectivity, the rest are second hand accounts by theosophists who, by their own admission, judged Keely's discoveries too dangerous to be made public. The role of the Theosophical Society is covered in my chapter on Keely and Theosophy.

Keely Explains his Motor

The following is an article written by Keely where he explains one of his motors. This is one of his later motors, perhaps the last one he ever built. I have been fortunate to find three contemporary photographs of the device. Mark Baker in the attached biography of Keely wrote:

The New Science Review for April 1895 has an article discussing the action of the motor, entitled "The Operation of the Vibratory Circuit", by Mr. Keely himself. It is an almost incredible jumble of technical terms: 'molecular vibration', 'sympathetic equilibrium', 'oscillation of the atom', 'etheric disintegration', 'quadruple negative harmonics', 'atomic triplets'.

I believe this to be the article. I omitted Part 2 of this article as it deals with magnetism and is not helpful here.

THE OPERATION OF THE VIBRATORY CIRCUIT.

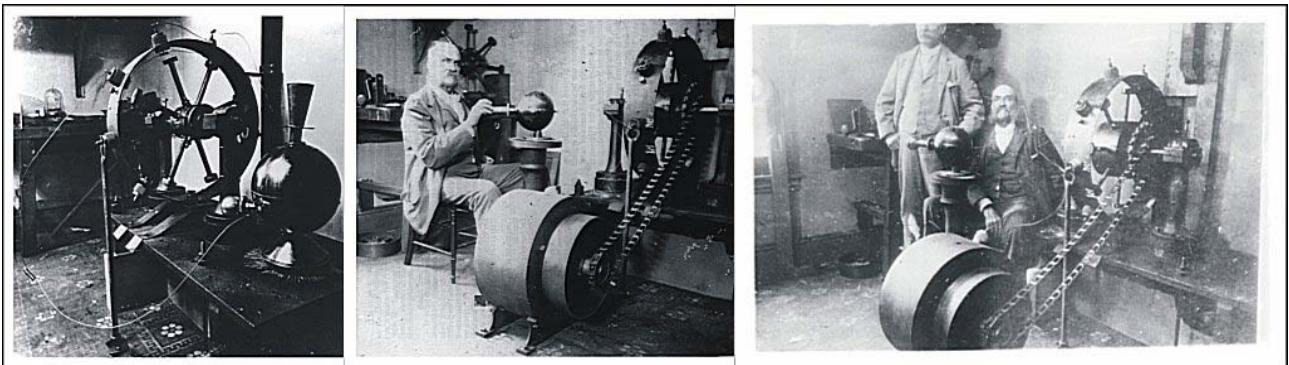
(By Polar and Depolar Sympathetic Interchange, as Associated with the Transmitter.)

By JOHN W. KEELY.

PART I.

I have long held an opinion almost amounting to a conviction that the various forms under which the forces of matter are made manifest have one common origin; or, in other words, are so directly related and mutually dependent that they are convertible, as it were, into one another, and possess equivalents of power in their action. FARADAY.

The working part of this device consists, first, of an outside ring carrying on its inside face nine pieces -- equidistant from each other --- called polar accelerators; which constitute the polar field or polar circuit. Second, another ring of less diameter, situated inside of the larger ring, and carrying on its face eight disks, with a triple grouping in each, representing the depolar field, or field of high polar interference. In the Centre is placed a resonating intensifier, through which the sympathetic currents pass. By a spiro-vibrophonic arrangement these currents are diverted toward the neutral Centre of the earth.



This device is the sympathetic multiplying agent for the polar field, and the negatizing agent for the anti-polar field. When under action it is entirely subservient to the transmitter, both in regard to high intensification and thorough neutralization of polar and depolar interchange.

THE PHILOSOPHY OF ITS ACTION

The circles containing the sensitized disks -- both polar and depolar - are in sympathetic relation to the polar negative circuits of the earth, and in a condition to be brought into action by the negative transmitter. The sympathetic conditions of the polar and depolar field of the circuits remain latent until the transmitter is associated and the introductory impulse given. Then conditions assert themselves which demonstrate the wonderful power of sympathetic action in abeyance to the laws by which they are governed.

The introductory impulse represents the sympathetic chord of unity to polar attraction. When this is given, the polar outreach is immediately established in the polar circuit, which seeks to assimilate itself to the anti-polar, or triple groupings; but as the alternation of the two circuits represents a condition of sympathetic antagonism (as 8 is to 9), an intensified differentiated wave motion is induced between the two, thus developing eight alternations, or waves, to one revolution of the device.

Consequently, an equation cannot be established on account of this negative interference, which represents the power exerted to bring about sympathetic equation between the neutral centre of terrestrial gravity and sympathetic outreach,¹ the power that induces planetary suspension.

Every revolution of the circuits represents eight distinct polar and depolar waves. When the maximum (five hundred revolutions per minute) is reached, there are four thousand polar and depolar interchanges. In sympathetic philosophy the polar circuit represents the brain power of the instrument, or the medium of impregnation from celestial radiating outflow; the depolar circuit represents the organism, which is actuated to do the sympathetic work as dictated by the same power, or element, ² that virtually operates our physical organisms; the work done representing the power expended to equate the power transmitted, although the movements in the physical organism are much more complicated.

The polar flow, as induced by the transmitter, is intensified or diminished by an oscillating bar which governs the revolutions to any number without variation.

The aerial propeller has a sympathetic polar accumulator and disperser in one instrument, which is entirely distinct from any of the devices intended for terrestrial use; also other mechanical adjuncts not needed on land nor water.

All forms of non-sympathetic machinery have, associated with them, conditions of centrifugal force on the ratio of the velocity induced; the diverging power from the centre of induction being governed specifically by its gravital weight according to the diameter it occupies in its circle of rotation.

In a sympathetic negative circuit this order of conditions is reversed; for the power of neutral attraction draws the molecules of any mass, no matter what the weight, toward the centre of rotation (instead of toward its periphery) according to the intensity of the negative vibration that is induced upon that particular circle.

Our earth, in its routine of revolution, is governed by the same law in every particular; its mass tending toward its centre of neutrality with a force that is equivalent to the character and velocity of its rotation. If its rotation were increased, the tendency of everything associated with it would be increased toward its centre of neutrality on the same ratio. That is, a pound in weight would, under certain conditions of increased velocity, become two pounds in weight. The laws governing the sympathetic rotation of vibratory machinery are the same laws that govern planetary suspension. To those who have not witnessed the operation of my devices, my theories must indeed seem wild; but the laws of nature are the same yesterday today and forever. They know no change; and sympathetic physics, demonstrated mechanically, must triumph over all ridicule and opposition

in the end. To contradict the laws governing sympathetic rotation is to contradict the laws governing planetary suspension, as I am prepared to demonstrate.

If the earth were rotated on a shaft by mechanical force, the present condition of its rotations would be reversed; everything on its surface would fly off at a tangent, on the ratio of the velocity induced. The equilibrium of all things would also be changed. The gyroscope reveals astounding facts in relation to this philosophy, even when operated mechanically. No other known device is so nearly associated with sympathetic vibratory physics.

The vitalization of the disks for the polar and depolar field is established on the ratio of thirds, sixths, and ninths; the ninths being the circuit occupied by the polar field, must represent, in the scale of vitalized focalized intensity, 100 in my system: sixths in the depolar field, or $66 \frac{2}{3}$; and in the neutral field, or thirds, $33 \frac{1}{3}$. The triplets must represent one true chord of equation. The sympathetic transmitter transfers any degree of intensity desired from zero up to disintegration; all the transfers being made above the line of the first inaudible, as associated with my resonating system of transfer.

On the sixths and ninths, in the progressive triple subdivision of the elements of water, the nearest sympathetic approach is made to the high luminous, which is the main sympathetic link to the earth's polar negative envelope, and the one whereby coordination is effected for commercial work. In short, this progressive condition establishes the necessary association between celestial radiation and terrestrial outreach, in regard to controlling the polar negative attractive force in mechanics; whether for serial navigation or for terrestrial commercial work, in all its multiplied forms.

The atmospheric envelope of our earth owes its activity and its volume entirely to celestial radiating forces. Reception and dispersion are kept up by atomic and interatomic conflict between the dominant and enharmonic currents of the triune polar stream. The harmonic and enharmonic current with the dominant (in the electric stream) by their sympathetic association evolve the energy of matter. The mechanical proof of the correctness of my theories, in sympathetic or spiritual physics, is so overwhelming in its simplicity that it needs but to be witnessed to convince the most learned or the most simple mind that this system will place both science and commerce on a platform which will elevate each to a level far higher than those they now occupy.

Keely's System of Graduation

All of Keely's system revolves around the introduction of a specific, pure, tightly controlled, complex waveform into a resonating cavity.

That, believe it or not, is the be all and end all of Keely's technology.

The Premise:

When specific conditions are met inside a resonating cavity a stable beam of "coherent sound" is formed, similar to a laser beam, that is capable of reaching into the heart of matter.

By using the principles of an ultrasonic horn it is possible to conduct that beam along a waveguide and enable it to act upon matter outside the confines of the generating chamber.

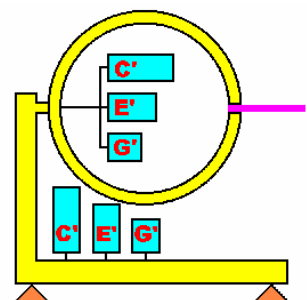
More of that in the chapter on ultrasonic horns. I am only including it here to show why the system of graduation is vital.

Keely insists that three flows need to be generated that are in precise relationship to each other as to frequency and amplitude.

This is unbelievably difficult to achieve by acoustic means alone.

Going back to my earlier simplified model of his liberator, disintegrator or whatever else he chose to call it from time to time, we see clearly the approach taken by Keely.

Although we do not have any photographs of the inside of the small spherical device he used in later experiments we do have explicit photos of earlier devices that operate on the same principle and were used for the same purpose. Because of that we can form a fairly precise picture of



what its internal adjuncts looked like.

It all boils down to this:

- 1) An external set of resonators that can be excited by either acoustic or mechanical means.
- 2) A resonating cavity.
- 3) An internal set of resonators that are activated through resonance by the pressure waves generated by the outside resonators and conducted through the structure itself.
- 4) A wave guide capable of transporting the collimated waveform to an outside point to act upon.

The successful operation of the device relies on resonance alone. That means that all component parts of the device must be in harmonic relationship to each other without interference and without the introduction of incompatible frequencies. It also means that all parts must be tuned with utmost precision.

Quite a feat! But it does not stop there.

In order to manipulate the amplitude of specific frequencies in relation to the others multiple resonators for each flow are required. They also must be tuned with utmost precision, otherwise they will generate beat frequencies.

Keely informs us that the sympathetic concordance must be so precise that tuning alone is not enough.

The nearest approach to molecular uniformity in metallic masses is in the wire drawn for commercial uses, gold and platina being the nearest to freedom from differentiation. But even these wires, when tested by a certain condition of the first order of intensified molecular vibration, for a transferring medium between centres of neutrality, I find to be entirely inadequate for the transfer of concordant unition, as between one and the other, on account of nodal interferences. We can appreciate the difficulty of converting such a medium to a uniform molecular link, by knowing that it can be accomplished only by removing all nodal interference, by inducing between the nodal waves a condition in which they become subservient to the inter-sympathetic vibratory molecular link of such structure or wire.

Therefore, it is necessary to submit the wire to a system of graduation in order to find what the combined chords of these nodal interferences represent when focalized to one general centre. Then the differentiation between these nodal waves and the inter-molecular link must be equated, by what I call a process of vibratory induction, so as to induce pure concordance between one and the other. To elaborate on this system of graduation, for effecting conditions necessary to ensure perfect and unadulterated transmission, would make up a book that would take days to read and months to study.

The graduating of a perfectly constructed instrument to a condition to transmit sympathetically, is no standard whatever for any other one that may be built, nor ever will be, because no concordant conditions of compound molecular aggregation can ever exist in visible groupings. If it were even possible to make their parts perfectly accurate one to the other, in regard to atmospheric displacement and weight, their resonating qualities would have a high rate of sympathetic variation in their molecular groupings alone. If one thousand million of coins, each one representing a certain standard value, and all struck from the same die, were sympathetically graduated under a vibratory subdivision of 150,000, the most amazing variation would present itself, as between each individual coin throughout the number, in regard to their molecular grouping and resonance.

KEELY.

The above passage makes it clear that after precise tuning his components must be subjected to a vibratory stream to bring about a more favourable molecular structure free of nodal interferences.

So what was Keely's procedure?

From isolated bits he discloses here and there I believe we can assemble a fairly accurate picture of what he did.

In drawn wires and tubes as well as in spun shells a certain amount of molecular alignment is already achieved by the manufacturing process.

Not so in cast components or in components that have been shaped, say by bending a tube or rolled strip into a ring. In order to produce a certain degree of uniformity Keely used a process of annealing.

He heated the components to cherry red heat and then cooled them down very slowly in a sand bath. The sand had been preheated to the same temperature as the component in order to avoid thermal shock.

It is a well known technique to create uniformity and eliminate internal stresses. Keely describes the process in one of his elucidations.

Having achieved uniformity as far as the manufacturing process allows he now proceeds to tune his components to the required frequencies. By using a vibrating microscope he would have been able to tune them to a precision better than 1 Hertz.

Even that was not enough for his purposes. He then subjected his components to a vibratory stream for extended periods of time. This was to achieve a better, more favourable molecular structure.

As stated earlier, I believe he used a wind chest, some organ pipes and compressed air to generate the frequencies required for as long as necessary.

The final adjustment after mounting was achieved by adjusting diaphragms in some of the resonators of his motor.

Acoustic feedback was controlled by dampening some resonators with small tubes of gum.

As sophisticated as the system was there must have still been some unwanted frequencies occurring which Keely controlled with special resonators that directed a "negatising vibration" at them. Just how he achieved the required phase shift by purely acoustic means is unclear to me at this stage. He talks about it though in places.

This I believe is in essence Keely's system of graduation.

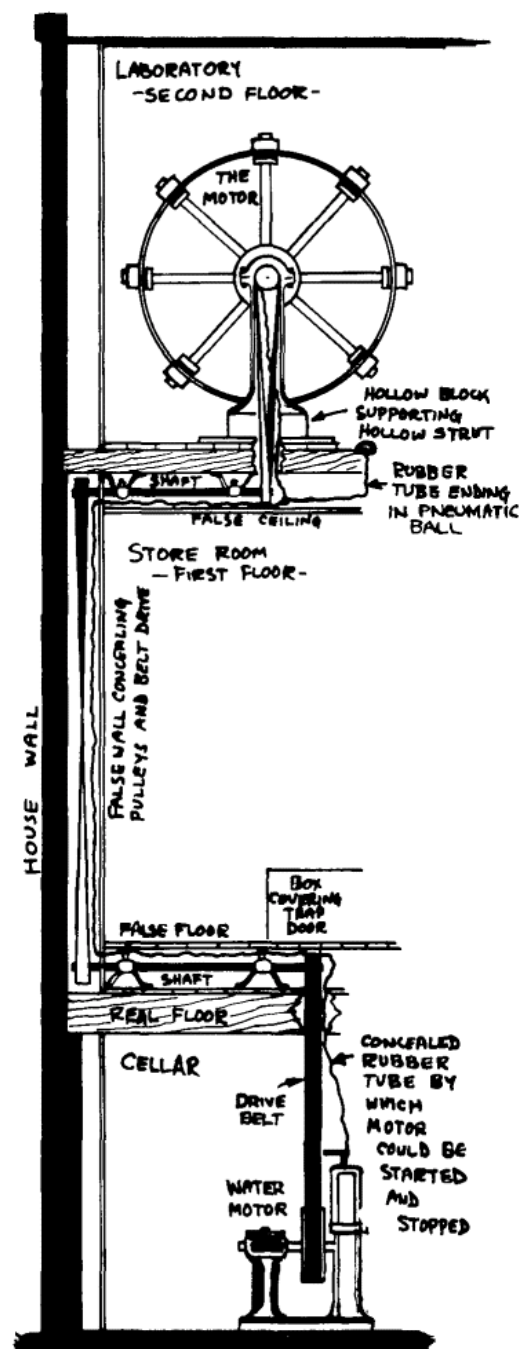
Today there are far more precise and less cumbersome methods available to achieve the same effects, something that I will go into in the chapter on "Design of a Keely Device using Modern Technology", which at the moment exists only in note form.

Keely's "Fraud"

Quotes from the Contemporary Press

After Keely died on Nov. 18, 1898, suspicious skeptics and newspaper reporters did a careful examination of his laboratory. Some of Keely's machinery had already been removed by "believers" who hoped they could make it work.

A Boston electrician, Burton Kinraide, removed the engine to his home at Jamaica Plains. Some of the apparatus ended up in England. No one could make it function as it had in Keely's laboratory. The secret was not in the machines; the secret was in the laboratory building itself.



Engineer Alexander Scott and Mrs. Moore's son, Clarence, examined the building, accompanied by press and photographers. False ceilings and floors were ripped up to reveal mechanical belts and linkages to a silent water motor in the basement (two floors below the laboratory). A system of pneumatic switches under the floor boards could be used to turn machinery on and off. A three-ton sphere was found in the basement, apparently a reservoir for compressed air.

The walls, ceilings and even apparently solid beams were found to have hidden pipework. The evidence of fraud on a grand scale was obvious and undeniable.

What's really remarkable is that Mrs. Moore had persuaded a number of apparently respectable scientists to observe Keely's demonstrations, and some of them affirmed that they were impressed, and even convinced that Keely had made revolutionary scientific discoveries. Why were some so easily duped by Keely's obvious (though very elaborate) deceptions, which were correctly guessed by more perceptive and skeptical observers? Of course, it must be stated that Keely never allowed anyone to examine his machines, independently test them, or even look inside of them. Even today, scam artists promoting energy machines can find at least a few degree-holding engineers or physicists willing to declare publicly that they found no fraud or deception in the machines and who are convinced that new scientific principles are at work. So much for "expert witnesses".

Keely had kept his company going for 26 years without ever putting a product on the market, paying a dividend or revealing his secrets. That's his one undisputed accomplishment. He never divulged his secrets with anyone, so far as we know. One close friend reported that he had once asked Keely "John, what do you want for an epitaph?" His answer: "Keely, the greatest humbug of the nineteenth century."

The evidence that this equipment existed is undeniable. The conclusion that Keely used compressed air to operate his machines appeared to be proven and history has left it at that.

But is it true? I do not think so. The evidence speaks against it.

We have detailed and explicit photographs of some of Keel's motors in assembled and disassembled states. There is nothing in his motors for compressed air to act upon. The very people that cried fraud were at the time in possession of his motors. It would have been a simple matter to disassemble them and show the driving mechanism (some air turbine or some piston arrangement). Photos of such an arrangement would have convinced the sternest sceptics.

No such proof was forthcoming. It simply did not exist. So is there another reason for the existence of the compressed air equipment and can we after all this time reconstruct what it was used for based on existing evidence alone.

I believe I have found the answer to that puzzle.

I have talked at length about the necessity of bringing about structural changes in the materials of his resonators in order to achieve pure resonant frequencies free from nodal interferences. Keely tells us that this is achievable through subjecting his resonators to a stream of "pure concordant harmonies", an essential part in his system of "graduation". This stream had to be kept up for extended periods of time to bring about the re-arrangement, at least weeks, if not months.

So, how did he do it?

Today it would be a simple matter. Connect a series of phase locked loops to an amplifier, and a speaker. Put the speaker into some sort of soundproof box to eliminate rogue frequencies from the environment, mount his resonators to be graduated inside the box and let the thing run for the time required.

But Keely did not have access to that kind of technology.

How then could the same effect be achieved with the technology of the day?

Again we must look to Rudolph Koenig and his scientific apparatus. Koenig calls his device in his catalogue "Wind Chest"



Koenig's Wind Chest

The way it operates is simple.

On top of a hollow box are mounted one or more organ pipes. The box is connected to an air supply and voila an audio generator capable of generating complex waveforms that will work as long as the air supply is kept up.

Notice the air supply at the back and the organ stops in the front.

Of course you can have as many pipes as you want as long as the wind chest is big enough.

This explains the water motor, the compressed air sphere and the pipes leading into his workshop. There really was no other way of doing it in Keely's time.



Keely's use of Thirds

Throughout his writings Keely continually talks about the necessity of tuning his resonators to "thirds" in order to achieve the effects he is after.

So what are the "thirds"?

Unfortunately here is where it gets complicated. In music the term can apply to three different conditions:

- 1) Third octave
- 2) Third harmonic
- 3) Major Third, Minor Third

So, what are they and which one is he referring to?

Third Octave

Third octave is clear. This is simply fundamental frequency $\times 2 \times 2$

C = 256 (1st octave)

C = 512 (2nd octave)

C = 1024 (3rd octave)

He often refers to first, third, sixth and ninth octaves.

Third Harmonic

He also refers to frequencies relating to each other in the ratio of $33 \frac{1}{3} : 100$.

Clearly here he means harmonic thirds. The third harmonic is the fundamental frequency multiplied by 3 or one third the wavelength of the fundamental.

Major Third

A Major third is a musical interval that is the fundamental frequency multiplied by 5 and divided by 4. The two notes combined constitute a pure harmonic chord.

A pure harmonic chord in many keys can only be produced by using an enharmonic keyboard or on a violin where there are no fixed positions for the notes. He talks about the use of enharmonic scales. He also talks about the use of E double flat, a clear indication that he is talking about a major enharmonic fifth interval in the scale of B flat, which he mentions also.

This is where it gets confusing. Keely uses the term thirds in conjunction with all three assuming that the reader has sufficient musical knowledge to tell which one is meant.

Since we often have only short quotes of what Keely actually said we can only guess in what context the word third applies.

Increasing Amplitude

As if that is not enough in some of his writings the term applies to amplitude rather than frequency.

One of the first things we notice by studying Keely's machines in the large number of resonators he is using. Far too many to construct say a chord in three octaves, For that he would have needed only nine, three for each octave.

So why did he use so many?

Keely worked with acoustic resonators to generate his waveforms.

Say he was using the chord C major, i.e. C - E - G. The interval between C and E is a major third, the interval between E and G is a minor third the interval between C and G a perfect fifth. E3 and G3 are the 3rd and 5th harmonics of C1.

The three notes being struck simultaneously results in each note contributing harmonically to the sound created, achieving overtones further into the spectrum (i.e. of higher frequencies) than that Note C could have achieved on its own regardless of amplitude (volume).

Keely was after very high frequencies, far higher than the note could have achieved on its own with effect. It is believed overtones stretch into infinity albeit with much reduced volume.

So how do you increase the volume of overtones far into the spectrum?

In order to increase the amplitude of the overtones he had to increase the amplitude of the notes contributing to it.

There was only one way he could do it with the technology of the day. He did what organ builders had been doing for centuries.

As I said earlier, an organ pipe either goes full blast or is silent, there are no in-betweens.

There is only one way and that is to add more pipes of the same construction and pitch. That is why large organs have over 5000 pipes. No typing error, they can really have that many. Keely did the same with his resonators.

Here something interesting occurs.

If you add one more pipe you increase the volume by 100%. Or by a factor of two. Adding one more you increase the original volume by a factor of three and so on.

See what I mean?

The volume increase follows the same arithmetic progression as the harmonics.

This where Keely parted company with contemporary acoustics. His machines exhibited not only precise mathematical relationships between the notes, but also in their relative amplitude.

I consider this a vital aspect in the overall design of his machines.

I have in all my research never come across a comment that mentions that fact.

The Scale of B-flat and its Importance.

The only scale that Keely mentions in his writings is the scale of B-flat. It appears strange that no other scale is ever mentioned considering the man was doing research into harmonic relationships, musical intervals and chords. Here are two of the many occurrences to give an illustration what I mean:

The only two vibratory conditions that can be so associated as to excite high sympathetic affinity, as between two physical organisms, are: -

Etheric chord of B flat, 3rd octave, and on Etheric sympathetic chords transmission Eb on the scale 3rd, 6ths and 9ths; octaves harmonic; having the 3rd dominant; the 6th enharmonic, and the 9th diatonic.

The chord mass representing the musical sphere, being the sympathetic etheric chord of B flat third octave 

KEELY

Example.- Suppose that we had just received from the machine shop a spun shell of twelve inches internal diameter, 1-32 of an inch thick, which represents an atmospheric volume of 904'77 cubic inches. On determination by research we find the shell to be on its resonating volume B flat, and the molecular volume of the metal that the sphere is composed of B natural. This or any other antagonistic chord, as between the chord mass of the shell and its atmospheric volume, would not

interfere, but would come under subservience. We now pass a steel shaft through its centre, $\frac{1}{4}$ inch in diameter, which represents its axial rest. This shaft submits the atmospheric volume of the shell to a certain displacement or reduction, to correct which we first register the chord note of its mass, and find it to be antagonistic to the chord mass of the shell, a certain portion of an octave. This must be corrected. The molecular volume of the shaft must be reduced in volume, either by filing or turning, so as to represent the first B flat chord that is reached by such reduction. When this is done the first line of interference is neutralized, and the condition of sympathy is as pure between the parts as it was when the globe was minus its axis. There is now introduced on its axis a ring which has seven tubes or graduating resonators, the ring being two-thirds the diameter of the globe, the resonators three inches long and $\frac{1}{4}$ inch diameter, each one to be set on the chord of B flat, which is done by sliding the small diaphragm in the tube to a point that will indicate B flat. This setting then controls the metallic displacement of the metallic combination, as also of the arms necessary to hold the ring and resonators on shaft or axis. Thus the second equation is established, both on resonance and displacement. We are now ready to introduce the diatonic scale ring of three octaves which is set at two-thirds of the scale antagonistic to the chord mass of the globe itself, which is done by graduating every third pin of its scale to B flat thirds, which represent antagonistic thirds to the shell's molecular mass. This antagonism must be thoroughly sensitive to the chord-mass of one of the hemispheres of which the globe is composed. The axis of the scale-ring must rotate loosely on the globe's shaft without revolving with the globe itself, which it is prevented from doing so by being weighted on one side of the ring by a small hollow brass ball, holding about two ounces of lead. The remaining [Page 13] work on the device is finished by painting the interior of the globe, one hemisphere black and one white, and attaching a rubber bulb, such as is used to spray perfume, to the hollow end of the shaft. This bulb equates vibratory undulations, thus preventing an equation of molecular bombardment on its dark side when sympathetically influenced. It is now in condition to denote the sympathetic concordance between living physical organisms, or the receptive transmittive concordance necessary to induce rotation.

KEELY.

So, is there something special about the use of B-flat or is it simply that he started his work using B-flat in his first machine and found it too cumbersome to change all his graduating instruments, tuning forks, reference forks in his vibratory microscope and so forth over to some other key? It certainly would have been easier to continue in the same key, rather than re-calibrating everything.

And, if that was not the reason, what other reason could there be?

An added complication is that we do not know what Keely's B-flat means in terms of frequency.

Easy you say, go to a piano, the black key between A and B is B-flat.

Actually, it isn't. Aside from the fact that on the tempered scale we are using B-flat and A-sharp are the same note, when in reality they are two different notes that have been adjusted to a common denominator to make playing easier there is the question of concert pitch.

So what is a concert pitch and why is it important?

In order for any number of musical instruments to be able to play together and sound harmonious they all must be tuned to the same pitch. The concert pitch is an agreed upon arbitrary value that acts as a reference point to which all instruments are tuned. In common use today is A=440, that means that the A above middle C has a frequency of 440 cycles per second or Hertz. Though common in English speaking countries it is by no means universal. Continental Europe uses A=442 whereas Germany, Austria and China use A=445. But that standard was first proposed in 1939 and only introduced in 1955 when the International Standards Association adopted A=440 as ISO16. In other words long after Keely's time.

So, to what pitch did Keely tune his machines?

We don't know. It could have been anything between 435 and 445, though there were concert pitches around in the 19th century that were outside even that wide range. Bearing that in mind let us

choose the midpoint between these values as a starting point in our examination. If we now create a Pythagorean diatonic scale around A=440 we get about 261.12 for middle C. going down six octaves we get around C=4.08.

Now we make a startling discovery.

On the scale C=4.08 B-flat becomes 7.25333 and B-natural becomes 7.74562. These are almost exactly the accepted boundary values of the Schumann Resonance, the resonant frequency of earth! Curiously enough these are also the frequency band of alpha brain waves associated with elation and religious feelings.

See for yourself in the attached spreadsheet:

PYTHAGOREAN DIATONIC TUNING WITH ADDED F# and Bb.									
NOTE	FUNDAMENTAL	RATIO	OCTAVE 1	OCTAVE 2	OCTAVE 3	OCTAVE 4	OCTAVE 5	OCTAVE 6	OCTAVE 7
C	4.08	1/1	4.08	8.16	16.32	32.64	65.28	130.56	261.12
D	4.08	9/8	4.59	9.18	18.36	36.72	73.44	146.88	293.76
E	4.08	81/64	5.16375	10.3275	20.655	41.31	82.62	165.24	330.48
F	4.08	4/3	5.44	10.88	21.76	43.52	87.04	174.08	348.16
F#	4.08	729/512	5.809219	11.61844	23.23688	46.47375	92.9475	185.895	371.79
G	4.08	3/2	6.12	12.24	24.48	48.96	97.92	195.84	391.68
A	4.08	27/16	6.885	13.77	27.54	55.08	110.16	220.32	440.64
Bb	4.08	16/9	7.253333	14.50667	29.01333	58.02667	116.0533	232.1067	464.2133
B	4.08	243/128	7.745625	15.49125	30.9825	61.965	123.93	247.86	495.72
C	4.08	2/1	8.16	16.32	32.64	65.28	130.56	261.12	522.24
D1	8.16	9/8	9.18	18.36	36.72	73.44	146.88	293.76	587.52

Coincidence? Perhaps not.

Keely was evidently aware of having tapped into some field or other as the following comments of his show.

"It is only necessary to ascertain the terrestrial chord masses to be able to run sympathetic machinery. When I have mastered these mechanical difficulties I shall be able to control this most subtle force."

and

"All diversion from the polar terrestrial envelope are but nodal outreaches, induced by the proper order of sympathetic vibration; not dissociations and associations of sympathy; but operating on the same principle as the outflow, or nodal outreach of the mental organism toward the physical, in its control over it."

and

"It is through the action of nature's sympathetic forces that planets are born and their volume of matter augmented. If the sympathetic, negative polar stream were cut off from the earth, its molecular mass would become independent, and would float away into space as would a soap bubble filled with warm air."

and

"Though alternate active energy could be evolved in a cubic inch of steel, by the proper sympathetic exciter, to do the work of a horse, by its sympathetic association with the polar force in alternate polarization and depolarization. This is the power that I am now getting under control to do commercial work. In other words, I am making a sympathetic harness for the polar terrestrial force." KEELY, 1892.

In 1893, Keely, in reply to the question, "What do you include in the polar force?" answered, "Magnetism, electricity, and gravital sympathy; each stream of force composed of three currents which make up the governing conditions of the controlling medium of the universe.

The ninths which I am now endeavoring to graduate to a sympathetic mechanical combination will, if I succeed, close my researches in sympathetic physics, and complete my system." Within the year the announcement was made that Keely had completed this graduation, with entire mechanical success, "hooking his machinery on to the machinery of nature."

Perhaps that explains where the surplus energy came from in his machines. If he created a resonant circuit that was absorbing energy from the earth's field that would make sense. That the so created resonant field would drag in other streams of energy on one of the harmonics of the fundamental is also feasible.

In fact Keely talks about this. This is a quote from a contemporary article on his airship:

At an early period of Keely's researches, on the lines suggested by the distinguished professor of the Bonn University, Dr. Hertz, viz., of the conditions governing the operation in nature of the unknown energy he was dealing with, Keely wrote to a friend:

"It appears, in my researching experiments, quite evident to me, that under different orders of progressive vibration, when the sixth order is reached on the positive, a condition presents itself in an accompanying agent that adds to the etheric flow a very peculiar action. I call this third agent its sympathetic attendant."

Maybe all that Keely was doing was to use the earth's frequency as some sort of carrier wave.

I am not saying that is the case, but to me it appears as a promising area of research that should be undertaken.

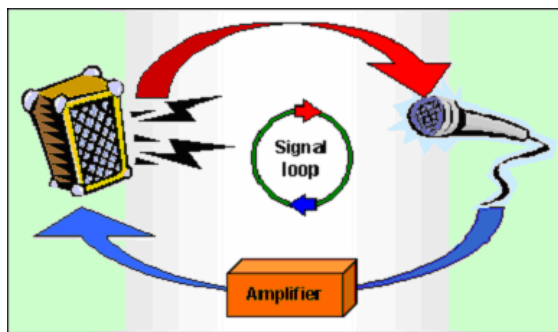
The Role of Acoustic Feedback in Keely's Machines

Acoustic feedback, as we understand it today, was an unknown phenomenon in Keely's time.

So, how does this subject get into the equation?

Looking at Keely's motors there is evidence that acoustic feedback was occurring in his devices and that he tried to deal with the problems created by it without ever completely understanding what he was up against.

In my view his failure to bring the phenomenon under control accounts for most, if not all, of the problems he encountered. But before we look at his machines let us briefly examine what feedback, especially regenerative feedback, is and how it applies here. Acoustic feedback, also known as the Larsen effect, is the result of coupling a portion of the output signal back to the input of an amplifier.

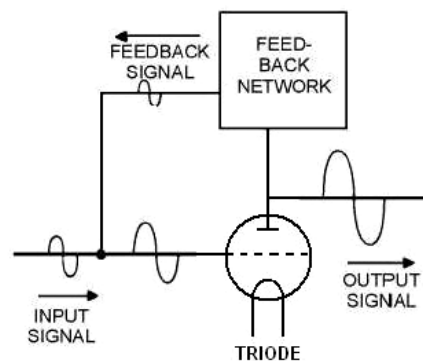


We all have noticed the phenomenon when a microphone is placed too close to a loudspeaker by a musician and the whole system starts to howl in an ever increasing pitch and volume.

What happens is that some frequencies get reinforced by the added input, generating harmonics that were inaudible before to a level where they get also reinforced and so on, creating runaway frequencies that are impossible to control once they have started.

As undesirable as the phenomenon is in, say a concert hall, it has been used beneficially in radio receivers to amplify and enhance the input signal.

When radio first started it was the humble detector circuit complete with a galena crystal that enabled reception. The signal was weak. After Edison discovered that electrons flowed from a heated filament to a positively charged plate in an evacuated light bulb Dr. Lee deForest, successfully introduced a third element -the grid-between the filament and the plate, creating the triode. By feeding the received signal to the grid and applying a voltage between the filament and



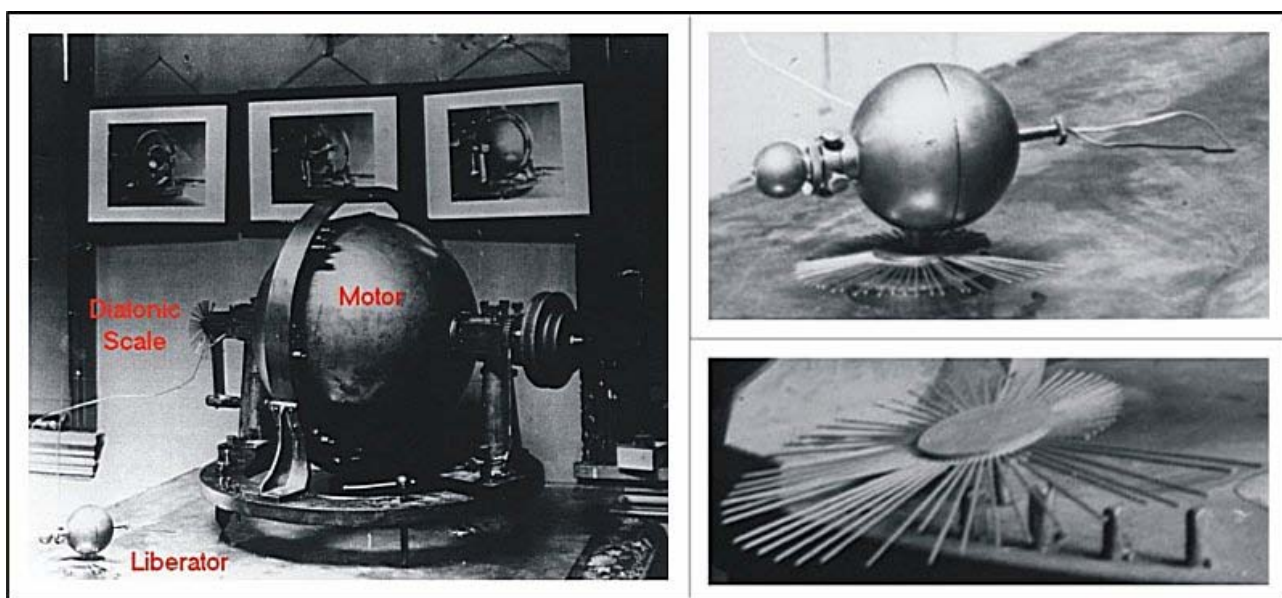
the plate the stronger flow could be controlled by the weak input signal (hence the word valve), which made it possible to amplify the incoming radio signal.

In 1913 the brilliant Edwin Howard Armstrong, while still a student, fed part of the output of the triode back into its input in an effort to improve radio reception. He called the process he called "regenerative feedback." It greatly amplified the signal and, if enough feedback was applied to the input, it also acted as an oscillator.

Keely did not use valves, they were not even on the horizon then, so how could he have struck acoustic feedback?

The clue lies in the construction of his motors.

His motor consists, as you can see in the photograph, of two devices, the liberator and the motor proper which are connected by a wire made from silver, gold and platinum. Both devices, as well as the wire were tuned to a specific frequency with almost unbelievable precision. In addition special resonators were mounted on the devices to ensure maximum resonance. These resonators he calls his diatonic scale. They are clearly visible here. Below are close ups of the liberator with the diatonic scale and the scale on its own.



Now we have both, the equivalent of a microphone (liberator) connected a loudspeaker (motor). All we need is some additional energy feeding into the system and we have a closed feedback loop.

Keely claimed that his liberator provided that additional energy, after all that was the whole idea of the thing.

If the arrangement performs the way Keely claimed we have now a real feedback problem. The uncontrolled runaway frequencies created by this arrangement would account for Keely's inability to control the speed of his motor and the sudden reversals. From what I can make out his motors only ever ran for very short periods of time.

Keely was not unaware of the problem, though in my estimation never understood what he was up against and only partially controlled the phenomenon in a somewhat crude fashion.

In one explanation of the procedure required to get his motor to run he says:..... *The localization to the neutral centre is then established by dampening the steel rods, on the scale at the back, representing the thirds, sixths, and ninths, drawing a piece of small gum tube over them, which establishes harmony to the chord mass of the instrument. Concordance is thus effected between the disintegrator and the ninths of the scale at base of transmitters with telephonic head.*

In my view dampening the resonators with gum tubing was his attempt to reduce the feedback without eliminating it, thereby gaining the advantage of further amplification and achieving enhanced amplitude for the higher frequencies.

NOTE: For the amplification to occur the signal that is fed back into the circuit must be in phase with the incoming signal. That means that in Keely's arrangement the length of the wire or tube connecting the two devices is critical. Because the incoming signal travels along the waveguide there is a time delay before it reaches the motor. The feedback signal travels along the same waveguide in the opposite direction also incurring a time delay. The length of the wire or tube must be so calculated that the two signals are in phase at all times at the point of origin.

Keely and Theosophy

It is impossible to talk about the Theosophical Society without mentioning Helena Blavatski , the two being virtually synonymous.

There are a number of biographies of her available that appear to have only one thing in common. They all vary wildly from each other in important detail. I quote here Matthew Mulligan Goldstein, University of Texas, who seems to put it into a nutshell in his introduction.

Although familiar to Yeats scholars for the impression made on the young poet by her peculiar brand of occultism, Helena Petrovna "Madame" Blavatsky (1831-1891) remains for most critics and historians an obscure, if vaguely absurd, figure. The Ukrainian-born aristocrat, accounts of whose life prior to her 1873 arrival in the US are notoriously unreliable, founded the Theosophical Society in New York on September 18, 1875. The charter of the Theosophical Society, the brainchild of Blavatsky and an American traveling companion, Henry Steel Olcott, established the group to teach westerners the value of Asian religions, promote worldwide brotherhood, and "collect and diffuse knowledge of the laws which govern the universe."

And further in his paper:

The adventures Blavatsky is said to have had before passing through Ellis Island include a brief hitch with Garibaldi's troops in Sicily during Italy's war of unification, an adulterous affair with the great Russian tenor Mitrovich, and an apprenticeship with a shadowy band of Egyptian mystics known as the Brotherhood of Luxor.



**Helena Blavatsky and Henry Steele Olcott
1888**

*Blavatsky returned from her globetrotting with a philosophy cobbled together from, among other places, pharaonic wisdom texts, Sanskrit poetry, and renaissance neoplatonist tracts, and attempted to launch a movement of intellectuals and religious thinkers devoted to truth-seeking through supernaturalism. Her exotic, Orientalized approach to spiritualist teachings went over exceptionally well, for a while, in both the US and, later, England, where by the 1870s table-rapping, materializations, and planchette-manipulation were rapidly falling out of fashion with the darkened-parlor set. Her massive 1877 treatise on occult knowledge, *Isis Unveiled*, most of which Blavatsky claimed to have channeled while in a trancelike state, went through three press runs of a thousand copies apiece the year it was published, and it has since sold half a million copies to date. Well substantiated charges that Blavatsky plagiarized much of the work has done little over the course of the last century to slow its sales.*

She moved to India, landing at Bombay Feb 16 1879. By 1882 the Theosophical Society became an international organization, and it was at this time that she moved the headquarters to Adyar near Madras, India.

The following quote is from a pamphlet of the Theosophical Society (undated):

In 1884, while Blavatsky was traveling in Europe, disgruntled TS employees in India went to the missionaries with forged documents, bringing charges of fraud against her. The Society for

Psychical Research (SPR) then sent Richard Hodgson to investigate the charges, and subsequently published an unfavorable report.

*Under the strain, Blavatsky's health had broken down, and in 1885 she left India for Europe, where she continued to write *The Secret Doctrine*, her masterwork. In 1887 she settled in London, and began a new magazine *Lucifer* ("Light-bringer"). In 1888 *The Secret Doctrine* was published and, in the same year, aided by W. Q. Judge, she formed the Esoteric Section of The Theosophical Society. Shortly afterwards she wrote *The Key to Theosophy* and *The Voice of the Silence*. In 1890 she became head of a newly-established European Section. She died in London on May 8, 1891 after many years of chronic illness.*

This is a rough and ready biography cobbled together from the bits where most biographers agree.

It is fair to say that even in the most sympathetic biographies Helena Blavatsky does not come across as a very nice person. She was ruthless, autocratic, secretive, power hungry, manipulative and outright dishonest. She was also articulate and highly intelligent. Her command of English was excellent, considering she learned the language in a later stage of her life.

She swore like a trooper, chain-smoked cigarettes, indulged in marijuana frequently and was prone to throw temper tantrums and suffer psychotic or neurotic episodes. Although she was known to have affairs, some adulterous, was married twice and had a child, a hunchbacked son who died at the age of five, by her lover she maintained in later years that she was still a virgin.

Just shy of sixty, she died on May 8, 1891, after years of chronic illness caused by her obesity and lifestyle.

In Keely's time she was the undisputed leader of the Theosophical Society. Her word was law and in many ways still is after all these years.

She preyed on the gullible, the desperate and the confused who saw in her the master who would lead them out of strife and into enlightenment.

If her followers were wealthy, so much the better. They were singled out for special treatment.

For Blavatsky occultism was the road to unimaginable power and eventual immortality. It is evident from her writings that she felt that there was occult knowledge "out there" that would open that road for her if only she could get her hands on it.

Her approach was simple and brilliant. She appointed the Theosophical Society, and thereby herself, as the guardian of occult knowledge on Earth. Using the organisation and the wherewithal of her wealthy clients she acquired by any means possible anything that was deemed of interest.

The Theosophical Society has one of the largest collections of occult material on the planet, possibly rivalling the collection held by the Vatican.

Some of this collection is available to members for study. Much of it, the really interesting stuff, is only accessible to members that are deemed sufficiently advanced and worthy of specific materials that are strictly controlled by the inner group. I have it on good authority that there is also one section that is locked up for all until some awaited cosmic event takes place, perhaps the return of Helena Blavatsky.

The masses are fed the usual garbage, mostly writings by Blavatski herself, Charles Leadbeater, who was for sometime exiled to Ceylon because of his naughty habit of introducing little boys to the art of masturbation and was later readmitted to the society for whatever reason I cannot make out, Alice Bailey, whose voluminous incomprehensible works bear the following disclaimer "*The books that I have written are sent out with no claim for their acceptance. They may, or may not, be correct, true and useful. It is for you to ascertain their truth by right practice and by the exercise of the intuition*", Annie Besant, ex Women's Liberationist, Fabianist and Marxist who turned to Theosophy in 1889 after meeting Blavatsky and became her successor after Blavatsky's death in 1891, and of course Clara Bloomfield Moore.

Keely was a God-sent for Blavatski. His machines and his explanations were in line with her own thinking and she firmly believed he was uncovering the secret of ultimate power. This she wanted for herself.

It would appear that Kinraide did not want to risk his reputation and his thriving business by being associated with what had become a major scandal.

He evidently did what he had said for nothing more is heard of him in connection with the Keely affair as it would have been had he kept what was clearly not his property.

The newspaper clippings and photograph published here come from Jeff Behary who has done a lot of excellent research on Kinraide and his achievements.

More on this amazing man can be found on Jeff's site: [The Turn Of The Century Electrotherapy Museum](#) Thanks Jeff.

After that nothing more is heard about the 20 boxes except some rumour that they had been shipped to London.

This is perfectly believable since Clara Bloomfield-Moore had an obvious claim on them and she was resident in London at the time.

From there they would have been locked up by the Theosophical Society on the direction of Annie Besant as being too dangerous for public disclosure. The society would have also collected by one means or another any other original work by Keely they could lay their hands on. They must have done an excellent job world wide for there is hardly anything left.

At that time Annie Besant was the well established head of the organisation. In spite of her cute name and her innocent looks she was high spirited, pragmatic and radical in her views and very effective in everything she did. Totally ruthless when it came to her convictions she used her position in the Theosophical Society to the limit.

She was also a fighter, creating India's first political party called the Home Rule League, organised demonstrations, public meetings and political agitations and subsequently spent some time in gaol, locked up by the British for her activities in the independence movement.

Because of a massive outcry, led by, amongst others, Mahatma Ghandi, the British were forced to release her, sparking massive jubilations all over India. She actually was president of India's Congress Party for a year, not bad going for an Irish girl who had avocated home rule for Ireland all her life and had done all she could to foster a similar idea in India.

It is a little known fact that Ghandi was given the title Mahatma, meaning Great Soul, by Annie Besant, a name by which he will be forever known to history. So is the fact that Nehru, India's first Prime Minister was educated by a theosophist tutor.

Annie Besant died in Adyar, India in 1933.

Sonoluminescence

The following article I found on the net. Unfortunately I have not yet been able to find out its author and cannot give credit, which is evidently due, because the article is telling and accurate. It is true that Keely does talk about the phenomenon, which is interesting, because it was not until 1934 that it was re-discovered at the University of Cologne as a result of work on sonar. But no more comment, here it is:

SONOLUMINESCENCE

Keely's work also involved the idea that when water was vibrated at certain frequencies, visible light would emerge within it. He tied this in with the properties of sound to harness the aetheric energies. This phenomenon has now been duplicated through an experiment that is known as "Sonoluminescence." In this experiment, a spherical flask that is filled with water is vibrated at a certain frequency, low in pitch but very high in strength. In the below image we see a simple laboratory setup for this process, with the spherical flask in a clamp and high-intensity speakers mounted to either side of the sphere, with red power wires attached.

Photo from William Andrew Steer's laboratory research.

When the speakers are running, this arrangement causes a sonic force to be directed towards the exact center of the sphere that the



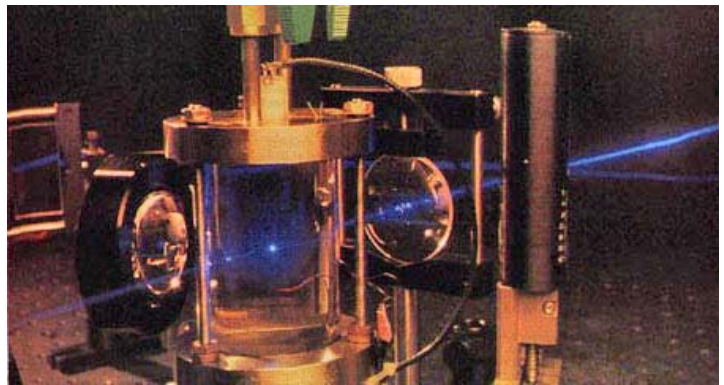
flask makes. Then, the scientist must introduce an air bubble into the water and carefully try to manipulate it into the center that the sound forces are pressing towards. Once an air bubble is properly fixed into the center, the vibrations will allow it to stay there, and an amazing thing happens; it starts emitting light.

At first, the scientists studying this believed that the light was constant, but now it has been shown through delicate measurements to be pulsating at a very rapid speed. The next image below shows a much more high-tech setup, where the spherical flask is housed within a special apparatus that obscures most of the flask from view.

No conventional explanation for why this might be happening exists, and many scientists have tried to explain it in conventional models. The most popular idea is that the extreme forces of sound create nuclear fusion, thus leading to the humorous term "the Star in a Jar." However, this flies completely in the face of the experiment itself, since the more that the water is cooled, the more light you get! By cooling the water, the amount of molecular vibration in it decreases, thus making it even easier for the sound vibrations to resonate purely.

Other conventional explanations for sonoluminescence sound equally absurd. However, we do know for a fact that the bubble inside shrinks significantly in size every time that a pulse of light is released, and this is occurring at extremely fast rates of speed. It is believed that this collapse creates such intense pressure that great energy is released, but the source of this energy remains a mystery to the mainstream.

Photo from an article by Aaron Levinson.



Although John Keely mentioned this phenomenon in his own work, general credit is given to H. Frenzel and H. Schultes at the University of Cologne in 1934 as being the first to discover this. They were using very strong ultrasonic fields in water as part of their wartime research in marine acoustic radar. Although they were not looking for or expecting such results, they discovered to their surprise that clouds of unpredictable and non-synchronous flashing bubbles of light were formed in the water in front of them. This is now known as "multi-bubble sonoluminescence" or MBSL. Little was done to advance this study until 1988, when D. Felipe Gaitan was able to trap a single bubble at the center of a flask that was vibrating at its own acoustic resonance level, and sonoluminescence was then seen.

Once Gaitan accomplished this effect, he became rather disinterested in pursuing it further, and Dr. S. Putterman et al. subsequently picked it up at UCLA, California. It was Putterman et al.'s research that determined that the internal bubble compresses to 1 / 100,000th of its original size due to the pressure of the sound, during which time the light is released. The flash of light is shorter than 100 picoseconds (or trillionths of a second) in duration, vibrating with extreme regularity every 100 millionths of a second. Putterman's studies eventually made it into Scientific American in February 1995, which dramatically increased public awareness and interest in the phenomenon.

An article excerpt from the Wall Street Journal on October 15, 1991 helps us to truly understand how significant this is: A photon of blue light given off by a single atom carries an energy of 3.5 electron volts. This is a trillion times more energy than any single atom in the tiny bubbles could have gained from the sound waves. He [Putterman] speculates that as each bubble implodes to about 1/100,000 of its original [size] volume, the energy and atoms in the bubble are concentrated to a tiny point.

The flash occurs when a million atoms simultaneously release this concentrated energy by giving off photons of blue light. So, we can see that if we are producing a trillion times more energy than exists in the sound waves themselves in this experiment, then quite an incredible amount of energy is coming through from "nowhere." This is typically seen as a fusion reaction. However, as

we have already said, by concentrating sound waves in such a fashion as this we can open up a "gateway" for the high-pressured aetheric "fluid" to flow into our physical reality, forming light, heat and energy.

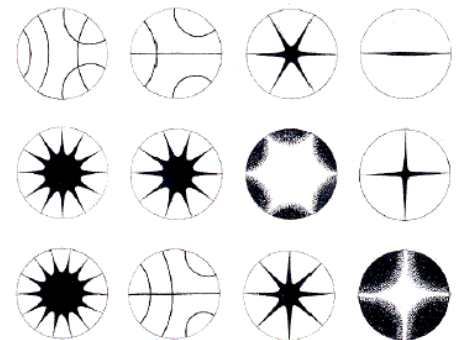
Furthermore, the shape of the sphere is very important in all of this, as it helps to centralize the vibrations. An article by William Andrew Steer, working in the undergraduate teaching laboratory in the Physics Department of University College London, reveals that: millimeter difference between polar and equatorial diameters, then the sphericity of the flask is very important. If there is more than a he resonance becomes very much broader and less strong, requiring more electrical drive to achieve the same sound intensity in the flask.

Cymatics, a Way of Looking at Wave Propagation

The word cymatics (from the Greek kyma, meaning wave) is of fairly recent origin. The technique is not. It was Ernst Chladni who conducted the first experiments and published his findings in 1787 in a book called: *Entdeckungen ueber die Theorie des Klanges* (Discoveries Concerning the Theory of Music). This and other pioneering works by him laid in effect the foundation for that part of physics that we now call acoustics.

One of his major successes, the one that is relevant here, was to make sound waves visible. He did this by clamping a metal plate, scattering fine sand over the surface and vibrating the plate by drawing a rosined violin bow over the edge.

Depending on the size of the plate, where it was clamped, its composition, thickness and shape and where on the edge the bow was drawn, different patterns emerged in the sand, concentrating the sand on the nodal points where there was no vibration and drawing it away from the vibrating sections.



Typical Examples of Chladni Figures

Chladni plates had a distinct disadvantage. They could not be used to analyse different frequencies as the working of the device depended on the frequency of the metal plate which was dependent on its construction. To overcome this restriction a device was created that allowed a wide range of frequencies to become visible on the same apparatus. In Keely's time Rudolf Koenig offered such a device for sale that he called the paper membrane.

The concept was simple. A paper or thin rubber sheet was drawn over a wooden ring, a second ring was drawn over the first trapping the paper or rubber between them and tightened by wooden screws. Similar to a skin on a drum.

Koenigs Apparatus

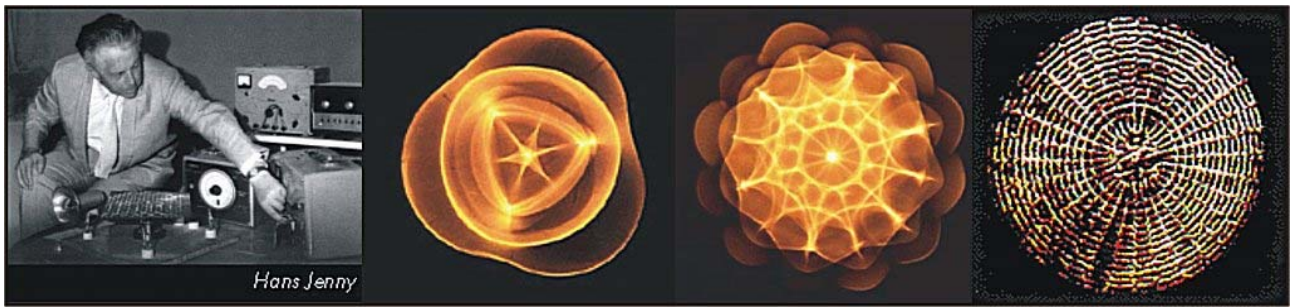
It was designed to be used in conjunction with an elliptical bell over which a rosined bow was drawn. Depending on which part of the rim the bow was drawn a number of different sounds could be produced. As before the membrane was covered with a thin layer of fine sand and the emerging patterns studied.

I believe Keely used a similar device to study the effects of a combination of resonators. He talks all the time about nodal points and that was the way to make them visible at the time.

Hans Jenny, the Swiss medical doctor and researcher who coined the term cymatics did little more than to adapt Koenigs membrane to modern technology by using loudspeakers and crystal oscillators instead of resonators. That way he could produce precise wanted frequencies at will. He then photographed and filmed the emerging patterns using the latest photographic techniques.

Some of the photographs and films he produced are stunning. Here is a small selection of photos:





In 1967 he published a book, curiously written as a bilingual volume with the cumbersome title: *Kymatik -Wellen und Schwingungen mit ihrer Struktur und Dynamik/ Cymatics - The Structure and Dynamics of Waves and Vibrations*.

In spite of the many excellent and readily repeatable experiments he documents one gets the feeling that his writings and his experiments serve a different agenda.

He cannot help himself to foray into religion with his explanations and elucidations and appears to advocate the idea of "Intelligent Design" only thinly veiled in scientific jargon. The idea of Intelligent Design of course is simply an attempt to make Creationism palatable to a modern society.

The following quotes (in italics) are from an article by Peter Pettersson, translated by Yarrow Cleaves entitled "Cymatics - The Science of the Future?" which is an excellent and accurate precis of Jenny's work and more suitable here than direct passages from his book.

Jenny noticed that when the vowels of the ancient languages of Hebrew and Sanskrit were pronounced, the sand took the shape of the written symbols for these vowels, while our modern languages, on the other hand, did not generate the same result! How is this possible? Did the ancient Hebrews and Indians know this? Is there something to the concept of "sacred language," which both of these are sometimes called? What qualities do these "sacred languages," among which Tibetan, Egyptian and Chinese are often numbered, possess? Do they have the power to influence and transform physical reality, to create things through their inherent power, or, to take a concrete example, through the recitation or singing of sacred texts, to heal a person who has gone "out of tune"?

Trinity

In the closing chapter of the book Cymatics, Jenny sums up these phenomena in a three-part unity. The fundamental and generative power is in the vibration which, with its periodicity, sustains phenomena with its two poles. At one pole we have form, the figurative pattern. At the other is motion, the dynamic process.

These three fields - vibration and periodicity as the ground field, and form and motion as the two poles - constitute an indivisible whole, Jenny says, even though one can dominate sometimes.

Be that as it may he nevertheless describes some interesting phenomena. One experiment in particular stands out.

An interesting phenomenon appeared when he took a vibrating plate covered with liquid and tilted it. The liquid did not yield to gravitational influence and run off the vibrating plate but stayed on and went on constructing new shapes as though nothing had happened. If, however, the oscillation was then turned off, the liquid began to run, but if he was really fast and got the vibrations going again, he could get the liquid back in place on the plate. According to Jenny, this was an example of an antigravitational effect created by vibrations.

This is in effect something that Keely talks about when he tells us that gravity can be influenced by sonic vibrations.

It is a pity that the good doctor did not investigate complex sounds such as chords. This is an area I feel that needs looking into.

I will include in the experimenters section the design of some simple devices capable of demonstrating these phenomena for those that wish to look into the matter further.

NOTE:

An interesting observation is described by a cymatics experimenter on one of the cymatics websites. Unfortunately he does not give his name. (highlighting is mine):

If the piezo transducer is driven at very high, or ultrasonic frequencies, and with a large amplitude it is possible to 'atomize' liquids such as water. This creates a fine mist that resembles steam in appearance. Such mists are actually tiny droplets suspended in the [air yet they behave as if they were all part of a single dense fluid medium](#).

Is this a precondition that has to be created to achieve the dissociation of water?

Where do we go from here?

Well, there will be a lot more on the subject in the coming months, most of what I want to say has been written and edited (well, sort of).

I will post these chapters one by one as I manage to put them in HTML form. The coming chapters will provide a lot more detail, but the fundamental assessment of mine you already have. I hope it will help you with your understanding of what Keely was all about.

I will also give detailed instructions in how in my view a workable model can be built using microprocessors and specially written computer programmes. Much of what is needed is already available but I will not say too much at this stage.

If you find some interest in what I have written so far I would love it if you dropped me a note.

Hans von Lieven

APENDIX

A short Biography compiled by Mark Baker

John Ernst Worrell Keely
1827-1898

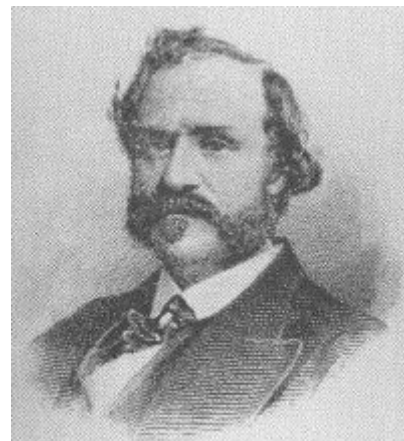
The inventor John Worrell Keely was a carpenter by trade, born in Philadelphia on September 3rd 1837 and who died there on November 18th 1898. Though not a highly educated man, he was a competent mechanic and a very clever talker.

Keely's parents died in an epidemic when he was still a boy and he was raised by grandparents. His grandfather Ernst had been a composer who led the Baden-Baden orchestra in Germany before immigrating to Philadelphia. Ernst quickly found that his grandson was a prodigy on the violin and gave him much help in learning the fundamentals of music.

A musical career did not appeal to the adventuresome genius as he found the science of vibrations upon which music is based a much greater attraction. Keely was particularly intrigued with the famous statement by Paganini that he could, given the mass chord of a bridge, destroy it by playing the mass chord on his violin.

He built his first free-energy motor while still a young boy. It was a series of 17 conch shells, 8 of them affixed to a small wheel forming the rotor. The stator consisted of 9 conches affixed around the outer periphery of the wheel but not attached to the rotating wheel. Keely had ground the shells so that they were all attuned to the same frequency. When the "motor" was put together the wheel slowly rotated on its axis, clunking and clicking because of imbalances, but nevertheless self-operative. Keely's enterprising nature led him to the idea of putting the entire assembly into a box and charging his neighbours and friends a penny to look inside to see the wheel turning.

While yet a young man, Keely learned carpentry and used his income to pursue his experiments in sound vibrations. About 1866 while he was pursuing a line of experimentation in sonic vibrations, he discovered a hitherto unknown energy. He was subjecting water to sonic vibrations and had an explosion which wrecked his apparatus. Six years of intensive experiments



passed before he was able to produce this energy at will. He found that 42,800 vibrations per second would vaporise water instantly into energy. He named this energy Etheric Force and the process of changing the substance of water into etheric force Dissociation.

With this claim to have discovered a new force in mechanics which was to work wonders, he succeeded in inducing a dozen engineers and venture capitalists to organize a Keely Motor Company in New York in 1872, and to subscribe ten thousand dollars to begin the construction of the motor. He immediately applied this money to the purchase of material and the construction of machinery, setting up a laboratory at 1420 North Twentieth Street in Philadelphia. On 10th November 1874 he gave a demonstration of the motor before a small company of prominent citizens of Philadelphia.

At the first demonstration of the machine in 1874, or so much of it as was exhibited, it was called a "vibratory-generator"; in a later demonstration it was referred to as a "hydro-pneumatic-pulsating-vacuum-engine". Equally 'flexible' was Keely's technical jargon for describing how his machine worked: the New Science Review for April 1895 has an article discussing the action of the motor, entitled "The Operation of the Vibratory Circuit", by Mr. Keely himself. It is an almost incredible jumble of technical terms: 'molecular vibration', 'sympathetic equilibrium', 'oscillation of the atom', 'etheric disintegration', 'quadruple negative harmonics', 'atomic triplets'.

What did remain constant was Keely's method for activating the device. Understanding the power of showmanship, he would run a tuning fork across the strings of a violin to generate the right acoustic resonance to fire the motor.

He anchored his analysis of nature to a fundamental "trinity." Every force and practically everything else was "triune." For him the sacred number was not seven but three. The basic idea of Keely's theory was that if one could catch and impose upon matter, by sympathetic vibration, the extremely rapid vibration that characterises every atom and molecule, then, by the resonance of atoms, he could effect a recombination that would liberate an incalculable amount of energy.

Keely declared that with one quart of water, he would be able to send a train of cars from Philadelphia to San Francisco, and that to propel a steamship from New York to Liverpool and return would require just about one gallon of the same." (Julius Moritzen, in the *The Cosmopolitan* for April 1899.) One spectator at a demonstration said that a pint of water poured into a cylinder seemed to work great wonders. "The gauge showed a pressure of more than fifty thousand pounds to the square inch. Great ropes were torn apart, iron bars broken in two or twisted out of shape, bullets discharged through twelve inch planks, by a force which could not be determined.

Through the twenty-seven years that he ran the company, John Keely was dogged by legal problems with his investors and accusations of fraud. As Mr. Park Benjamin wrote in 1886, "a power-creating machine of no known form or mode of operation, when based on notions upset eighty years ago, is a wonderful thing. To the confusion of the skeptics, the Keely motor is here, that is, not here but to be here three weeks hence. It has been going to be here three hence for twelve years." ("The Persistence of the Keely Motor", by Park Benjamin, *The Forum* for June 1886.)

Quite how fraud was being performed was a matter for much conjecture: the *New York Times* and *Electricity* magazine believed that his demonstrations were really pneumatic or electrical effects respectively. There were even stories of sorcery being involved in his demonstrations. It has been suggested that John Keely was a prominent member of the Theosophic Society founded by the spiritualist Madame Blavatsky in 1875. In the mid 1890's it was speculated that he was the mahatma (or master) of the Philadelphia lodge.

While Keely had his detractors, he had supporters as well. Major Ricarde-Seaver, Fellow of the Royal Society of Edinburgh, went to visit Keely in Philadelphia to convince himself as to the real nature of Keely's accomplishments. After thoroughly examining his system Ricarde-Seaver returned to England saying that "Keely was working with, and had apparent command over forces, the nature, or even the very existence of which, was absolutely unknown to him, and so far as he is aware to modern science."

Other supporters of distinction included Professor Joseph M. Leidy, M.D., of Pennsylvania University, awarded Lyell Medal in 1884 when in London and the Cuvier Award in 1888 from the French Academy of Science when in France. Also James M. Wilcox, M.D., author of "Rational Cosmology". They witnessed Keely's demonstrations of sending etheric force through wires of gold, silver, and platinum.

When the inventor's funds began to run low, he succeeded in keeping afloat financially with further investments of capital from his most ardent supporter, Mrs. Clara Jessup Bloomfield-Moore, widow of a wealthy paper manufacturer and writer. By 1890 Keely declared he was on the eve of success; he had arrived at that crucial stage, lacking just the one slight adjustment.

He never achieved that final adjustment: John Worrell Keely died in Philadelphia in 1898 after being knocked down by a streetcar. After his death the motor was taken to Boston and set up, but it failed to exhibit any "etheric force" when subjected to any vibratory influence, after its removal from the laboratory in Philadelphia.

Harmonics.

What are they and how do they behave?

Let us look at a simple instrument with a single string. (Fig. 1)

Assuming that the string is taut it will emit a sound when plucked. The frequency of the sound depends on the distance between A and B, the diameter and composition of the string and the amount of tension on the string.

Let us assume we have tuned the string to A = 440, we hear the note A or, in musical notation:

But is that all we hear? In this arrangement it is not. You see the note A = 440 is generated by a movement between the nodes (or endpoints in this case) that looks like this: (Fig 2)

But that is not all that it does.

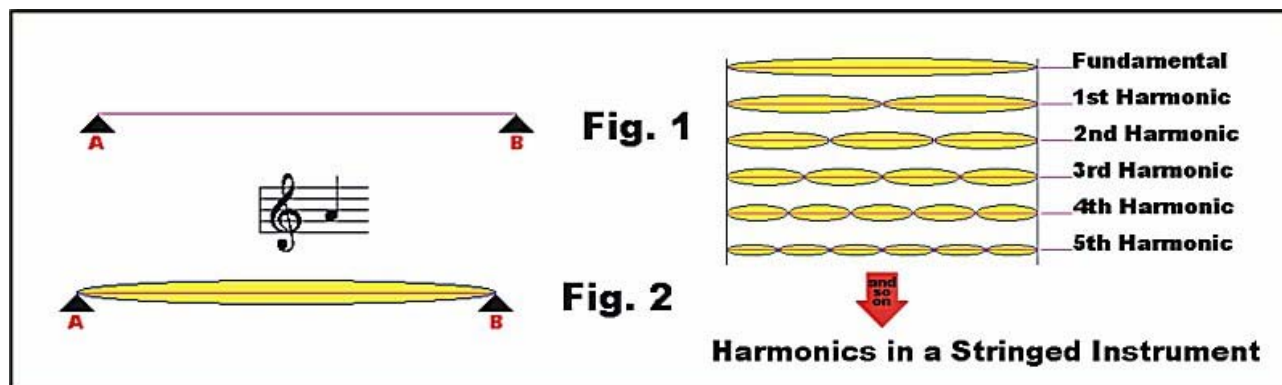
Parts of the string or better, equal subdivisions of the string take on a life of their own and resonate together with the fundamental note. These notes produced by those sections are known as overtones or harmonics

The laws governing harmonics are unbelievably precise. If for instance we have a string tuned to A = 440 and we halve it, both halves will sound at the frequency of 880 which is A one octave higher.

Assuming the tuning of 440 is precise, the halving of the string accurate and the string is of equal diameter and composition over the entire length, the resultant harmonic is precisely 880, not anywhere between 880.1111 and 879.9999. It is important to remember this.

So let us have a look at a few harmonics of a string.

Remember that the sections involved are always precise subdivisions of the entire length.



The harmonics reach quickly frequencies that pass into the inaudible and beyond. They are believed to extend into infinity.

The amplitude (volume) of the harmonics is always smaller than the amplitude of the fundamental.

Now, all this happens as it is stated here only in a pure system. Using a drawn wire for instance we have a fairly pure resonator as in a drawn wire the molecules have been aligned in the direction of the wire in the drawing process and the thickness is even. If you were to use a rubber band for instance the results would be quite different.

Because of variation in thickness and composition along the length of a rubber band the subdivisions produce a variety of harmonics that differ from each other, thus cancelling each other out or creating beat frequencies.

That is why you cannot create with a stretched rubber band the same quality of sound as with a stretched wire, even though the fundamental note of both is precisely the same

Enharmonic and Microtonal Scales.

Keely time and again uses the term enharmonic. From what I have read in comments about Keely's work it is clear the term is poorly understood. Most commentators appear to understand the term to mean disharmonic. It means quite the opposite.

The term enharmonic comes from the Greek and means "of one harmony". An enharmonic major third are two notes that have the precise relationship of 5/4 in any key. We are talking of pure natural harmonics of course, not some scale contrived to make playing a tune easier.

In the equal tempered scale commonly used today the notes C-sharp and D-flat are the same, both being represented by the black key between C and D. This is achieved by elevating the flat and diminishing the sharp. For most purposes this is an adequate arrangement.

In reality C-sharp and D-flat are not the same note. They are separated by the famous Pythagorean comma or 23 cents (100 cents equals one semitone).

By putting two black keys between C and D and any other two notes that are separated by a full tone we can now play pure enharmonic thirds in any key on the diatonic scale.

For that purpose keyboards were built for organs and other keyboard instruments that used this arrangement.

I have ever only seen two organs who had two black keys for every black key in the conventional layout. Unfortunately I could not obtain permission to play either instrument so I have to rely on musical literature as to the audible difference in playing a major third.

When the music is written in, say the key of B-flat or F-sharp, a further subdivision becomes necessary in order to preserve the correct relationship between notes. The interval C - D is then subdivided into

C - D-double flat - D-flat - C-sharp - C-double sharp - D

Also the notes separated by a semitone, such as B and C, require two subdivisions:

B - C-double flat - B-double sharp - C.

In other words four black keys for notes separated by a full tone and two black keys for notes separated by a semitone, all separated by a Pythagorean comma.

Such a keyboard is capable of playing pure major thirds in all chromatic keys. Instruments with 31 notes to the octave, like this, have actually been built.

So, what would happen if we decided to play in the key of B-double flat?

I am afraid further subdivisions are required, but this would bring us into the realm of microtonal music, a subject that far exceeds the scope of this paper. For those that are interested, there is excellent literature available on the net and in libraries.

So, what is Keely talking about when he talks about "antagonistic enharmonic thirds"?

At this stage I cannot definitively say what "antagonistic" refers to, my best guess is that the chord is antagonistic to certain discordant molecular aggregations within a given chord mass and is capable of aligning these elements for his purposes. Keely leads us to assume this, some further research is evidently needed here.

The knowledge of enharmonic scales is really only important to gain an understanding of what Keely is talking about, for he speaks in those terms. When dealing with precise harmonic relationships in terms of frequency we do not need to know all the ins and outs of enharmonic and microtonal scales. I have only included this here to enable the reader to understand that, difficult though it might be to understand Keely's terminology, the man was talking perfect sense and not the pseudo-scientific gibberish that he was so often accused of.

Keely's Forty Laws of Sympathetic Vibratory Physics

(1) Law of Matter and Force

"Coextensive and coeternal with space and duration, there exists an infinite and unchangeable quantity of atomoles, the base of all matter; these are in a state of constant vibratory motion, infinite in extent, unchangeable in quantity, the initial of all forms of energy."

(2) Law of Corporeal Vibrations

"All coherent aggregates when isolated from like bodies, or when immersed or confined in media composed of matter in a different state, vibrate at a given ascertainable pitch."

(3) Law of Corporeal Oscillations

"All coherent aggregates not isolated from like bodies, oscillate at a period-frequency varying with the tensions that augment and diminish the state of equilibrium."

(4) Law of Harmonic Vibrations

"All coherent aggregates are perpetually vibrating at a period-frequency corresponding to some harmonic ratio of the fundamental pitch of the vibrating body; this pitch is a multiple of the pitch of the atomole."

(5) Law of Transmissive Vibratic Energy

"All oscillating and vibrating coherent aggregates create, in the media in which they are immersed, outwardly propagated concentric waves of alternate condensation and rarefaction, having a period-frequency identical with the pitch of the aggregate."

Scholium: All forms of transmissive energy can be focussed, reflected, refracted, diffracted, transformed, and diminished in intensity inversely as the square of the distance."

(6) Law of Sympathetic Oscillation

"Coherent aggregates immersed in a medium pulsating at their natural pitch simultaneously oscillate with the same frequency, whether the pitch of the medium be a unison, or any harmonic of the fundamental pitch of the creative aggregate."

(7) Law of Attraction

"Juxtaposed coherent aggregates vibrating in unison, or harmonic ration, are mutually attracted."

(8) Law of Repulsion

"Juxtaposed coherent aggregates vibrating in discord are mutually repelled."

(9) Law of Cycles

"Coherent aggregates harmonically united constitute centers of vibration bearing relation to the fundamental pitch not multiples of the harmonic pitch, and the production of secondary unions between themselves generate pitches that are discords, either in their unisons, or overtones with the original pitch; from harmony is generated discord, the inevitable cause of perpetual transformation."

(10) Law of Harmonic Pitch

"Any aggregate in a state of vibration develops in addition to its fundamental pitch a series of vibration in symmetrical sub-multiple portions of itself, bearing ratios of one, two, three, or more times its fundamental pitch."

(11) Law of Force

"Energy manifests itself in three forms: Creative, the vibrating aggregate; Transmissive, being the propagation of isochronous waves through the media in which it is immersed; Attractive, being its action upon other aggregates capable of vibrating in unisons or harmony."

(12) Law of Oscillating Atomic Substances

"Coherent atomic substances are capable of oscillating at a pitch varying directly as the density, and inversely as the linear dimensions from one period of frequency per unit of time to the 21st octave above, producing the creative force of Sonity, whose transmissive force (Sound) is propagated through the media of solids, liquids, and gases, and whose static effect (Sonism) produces attractions and repulsions between sympathetically vibrating bodies according to the Law of Harmonic Attraction and Repulsion."

(13) Law of Sono-thermity

"Internal vibrations of atomic substances and atomic molecules are capable of vibrating at a period-frequency directly as their density, inversely as their linear dimensions, directly as the coefficient of their tension from the 21st to the 42nd octaves, producing the creative force (Sono-thermity), whose transmissive force (Sono-therm) is propagated in solid, liquid, gaseous, and ultra-gaseous media, statically producing adhesions and molecular unions, or disintegration, according to the Law of Harmonic Attraction and Repulsion."

(14) Law of Oscillating Atoms

"All atoms when in a state of tension are capable of oscillating at a pitch inversely as the cube of their atomic weights, and directly as their tension from 42 to 63 octaves per second, producing the creative force (Thermism), whose transmissive force (Rad-energy) propagated in solid, liquid, and gaseous ether, produces the static effects (Cohesion and Chemism) on other atoms of association, or dissociation, according to the Law of Harmonic Attraction and Repulsion."

Scholium: Dark radiant heat begins at absolute zero temperature, and extends through light, chemical rays, actinic rays, and infra-violet rays, up to the dissociation of all molecules to the 63rd octave."

(15) Law of Vibrating Atomolic Substances

"Atoms are capable of vibrating within themselves at a pitch inversely as the Dyne (the local coefficient of Gravity), and as the atomic volume, directly as the atomic weight, producing the creative force (Electricity), whose transmissive force is propagated through atomolic solids, liquids, and gases, producing induction and the static effect of magnetism upon other atoms of attraction or repulsion, according to the Law of Harmonic Attraction and Repulsion."

Scholium: The phenomenon of Dynamic Electricity through a metallic conductor and of induction are identical. In a metallic conductor, the transmission is from atom to atom, through homologous interstices, filled with ether, presenting small areas in close proximity. In crystalline structures, heat, which expands the atoms, by twisting them produces striae, increases the resistance, etc. Between parallel wires and through air the induction takes place from large areas through a rarefied medium composed of a mixture of substances, whose atoms are separated by waves of repulsion of various pitches, discordant to electric vibrations; the said atoms sympathetically absorb the vibrations and dissipate from themselves, as centers, concentric waves of electric energy which produces heat and gravism."

(16) Law of Oscillating Atomoles

"Atomoles oscillating at a uniform pitch (determined by their uniform size and weight) produce the creative force Atomolity, whose transmissive form, Gravism, is propagated through more rarefied media, producing the static effect upon all other atomoles, denominated Gravity."

(17) Law of Transformation of Forces

"All forces are different forms of Universal Energy unlike in their period- frequency, merging into each other by imperceptible increments; each form representing the compass of 21 octaves. Each form or pitch may be transformed into an equivalent quantity of another pitch above or below it in the scale of 105 octaves. The transformation can occur only through its static effect, developing vibrations of harmonic pitches above or below their fundamental vibration, or developing with juxtaposed aggregates, resultant and difference, or third order, as the case may be."

Scholium: A table of the intervals and harmonics of the normal harmonic scale will indicate the ratios in which the transformation of forces will occur."

(18) Law of Atomic Pitch

"Atoms have each a different and definite pitch, at which they naturally vibrate.

Scholium: Atomic pitch is determined directly from its simple spectrum.

Scholium: Atomic pitch is determined by computations from its associate spectrum with all other atoms, as in known spectra. Scholium: Atomic pitches are more important working data than atomic weights; tables of atomic pitches must be precise."

(19) Law of Variation of Atomic Pitch by Rad-energy

"The higher harmonics and overtones of projected rad-energy are of a pitch sufficiently high to cause the atom to expand; by causing the atomoles to vibrate systematically the same influence will cause the atom to contract, and thus by changing the volume, atomic pitch is varied."

(20) Law of Variation of Atomic Pitch by Electricity and Magnetism

"Electricity and Magnetism produce internal vibrations in the atom, which are followed by proportional changes in volume and, therefore, pitch."

(21) Law of Variation of Atomic Pitch by Temperature

"Atoms in chemical combination oscillate with increasing amplitude directly as the temperature, and simultaneously absorb overtones of higher harmonics, producing expansion of volume and diminution of pitch.

Rule: The gradual approach of the temperature of harmonic combination can be observed by mutually comparing superimposed spectra; chemical combination commences when the fundamental lines of each spectrum bear harmonic ratios by linear measurement."

(22) Law of Pitch of Atomic Oscillation

"Atoms not isolated and in a state of tension between forces that oppose and increase the equilibrium oscillate bodily at a pitch that is a resultant of the atomic weight, atomic volume, and tension."

(23) Law of Variation of Pitch of Atomic Oscillation by Pressure

"The frequency of atomic oscillation increases and diminishes inversely as the square of the pressure."

(24) Law of Variation of Atomic Oscillation by Temperature

"The force of cohesion diminishes inversely as the square of the distance the atoms are apart, and the force of the chemical affinity diminishes in the same ratio. Heat increases the amplitude of the oscillations in a direct ratio to the temperature of the natural scale. Scholium: New thermometers and accurate thermometric tables, on the natural base, wherein doubling the temperature doubles the pitch of the transmissive energy, are required. Such a table of temperature will bear natural relations to atomic weights, pitches, specific heats, chemical affinities, fusions, solubilities, etc., and will disclose new laws. One table for each must be constructed."

(25) Law of Variation of Atomic Oscillation by Electricity

"The electric current destroys cohesion and chemical tension directly as square of current in amperes, inversely as the resistance in ohms, inversely as the chemical equivalent, and conversely as the coefficient of the difference between the freezing and volatilizing temperature of mass acted upon."

(26) Law of Variation of Atomic Oscillation by Sono-thermism

"Diminishes the tensions directly as the quantity of heat developed, and in antithetical proportion to the harmonics absolved."

(27) Law of Chemical Affinity

"Atoms whose atomic pitches are in either unison, harmonic or concordant ratios, unite to form molecules.

Corollary: When two atoms are indifferent, they may be made to unite by varying the pitch of either, or both.

Scholium: This necessitates the construction of tables, representing variation of atomic pitches by temperature, pressure, etc.

Scholium: Tables of all harmonics and concords, and harmonics founded upon a normal harmonic scale, are equally essential.

Scholium: Optical instruments may be made to measure pitches of energy."

(28) Law of Chemical Dissociation

"If the pitch of either atom, in a molecule, be raised or lowered; or, if they both be unequally raised or lowered in pitch until the mutual ratio be that of a discord; or, if the oscillation amplitude be augmented by heat until the atoms are with the concentric waves of attraction, - the atoms will separate."

(29) Law of Chemical Transposition

"New molecules must be harmonics of the fundamental pitch."

(30) Law of Chemical Substitution

"(too complex for brief statement)"

(31) Law of Catalysis

"The presence of harmonics and discords."

(32) Law of Molecular Synthesis and Combination (Organic)

"The molecular pitch must be a derived harmony of the radicals."

Scholium: Reconstruction of electric units to represent pitches and amplitudes."

(33) Law of Chemical Morphology

"The angle of crystallization is determined by the relation between the molecular pitch of the crystallizing substance to the variation- density of the liquid depositing it."

(34) Law of Atomic Dissociation

"Overtones of high rad-energy pitches produce separation of the atomoles and recombinations among the atomolic molecules of the atoms."

(35) Law of Atomolic Synthesis of Chemical Elements

"Harmonic pitches of atomolity produce association of etheric-atomolic particles to form atoms; the kind of atom is determinable by the pitches employed."

(36) Law of Heat

"Atoms under the tension of chemical combination oscillate with an amplitude directly as the temperature, inversely as the pressure, and as the square of the specific heat. Diminishing the pitch of oscillation inversely as the square of the distance of the atoms apart, and simultaneously increasing the vibrating pitch of the atom by absorption of overtones and higher harmonics."

(37) Law of Electro-Chemical Equivalents

"An atom vibrates sympathetically under the influence of electric energy, such undertones of which are absorbed as are a harmonic or harmony of the electric pitch; the amount of energy absorbed being directly as the arithmetical ratio of the undertone of the fundamental electric pitch."

Scholium: A table of electro-chemical equivalents on the normal basis will indicate the electrical conditions and amount of chemical change."

(38) Law of Cohesion

"The cohesion between atoms diminishes directly as the square root of the pressure and temperature, and as the square of electric intensity."

(39) Law of Refractive Indices

"A table of the refractive indices of substances indicates their molecular pitch; and in connection with crystalline form the phase of molecular oscillation."

(40) Law of Electric Conductivity

"Electric energy is transmitted through homogeneous bodies with a completeness in direct proportion as the atoms are more or less perfect harmonics of the electric pitch, but not at all through substances whose atoms are discordant to the electric pitch; also through molecular substances, when their resultant notes are harmonics of the electric pitch, - the transmissions being inversely as the temperature, directly as the density diminished in proportion to the amount of crystallization, and inversely as the cube of the dyne, also directly as the reciprocal of the local magnetic intensity."

SCALE OF THE FORCES IN OCTAVES

This is a compilation by Dale Pond as published on his website SVPVRIL.COM. I have included it here without editing and without comment other than this.

Text: "First octave (unity of sound) is approximately the lowest frequency capable of producing waves of rarefaction and condensation in the air. The atomic aggregate oscillating at this pitch can be experimentally determined, and the aggregate vibrating at a pitch one octave higher will have a mass lying between 1/8 and the cube root of the mass of the first mentioned aggregate; the exact relation under varying conditions of gravity, magnetic saturation, and pressure, can be determined only by accurate measurements.

But assuming a body of a size represented by x, with a pitch represented by 1024 per second, then a pitch of 2048 per second will be produced by a body having a volume of some mean between 1/8 of x and the cube root of x.

By accurately determining the pitch of a volume of any metallic sphere capable of oscillating at the pitch of, e.g., the eleventh octave of sonity (1024 per second), under normal conditions of gravity, pressure, magnetism, and then successively diminishing its size by 1/8 of itself, we get the successive octaves of pitches higher and higher in period-frequency until we pass the domain of sonity and enter the domain of sono-thermity.

The point where the one form of energy merges into the other lies approximately at the twenty-first octave, and this pitch also marks the point where the air is no longer capable of vibrating at that pitch in waves of transverse form. The first gamut of 21 1/2 octaves consists of three forms; viz. sonity, sound, and sonism. The following is a tabulation of the pitches of sonity in octaves from one vibration per second to where the next form of energy commences."

FIRST CLASS Sonity, Sound, and Sonism begins Unison 1

1st Octave 2

2nd 4

3rd 8

4th 16

5th 32

6th 64

7th 128

8th 256

9th 512 Keynote Molecular Chord 620 First Octave, Keynote Atomic Chord 630 Second Octave

10th 1,024

11th 2,048

12th 4,096

13th 8,192 Keynote etheric Chord 12,000 Third Octave Heat (highest rate of) 14,000 Vibro-Atomic

14th 16,384 Lowest Molecular Vibration 20,000 Harmonic Thirds

15th 32,768 42,000 Modern Ultrasonic Jewelry Cleaner 42,800 Disintegration of Water

16th 65,536

17th 131,072 Transmission of Odor in Molecules 220,000 Sympathetic Negative

18th 262,144 First Inter-Atomic Lowest 300,000 Full Harmonic Chord

19th 524,288 First Inter-Atomic Highest 780,000 Full Harmonic Chord

20th 1,048,576 1,620,000 Ninths

21st 2,097,152 Major 5th 3,145,728 Sono-thermity, Sono-therm, Sono-thermism begins

22nd 4,194,304

23rd 8,388,606

24th 16,777,216
 25th 33,554,432
 26th 67,108,864 Highest Molecular Vibration 100,000,000 Harmonic 3rds
 27th 134,217,728
 28th 268,435,456 Highest Inter-Molecular 300,000,000 Enharmonic 6ths Atmospheric
 519,655,633 Highest made in air
 29th 536,870,912 Atomic Vibration 900,000,000 Diatonic 9ths
 30th 1,073,741,824
 31st 2,147,483,648
 32nd 4,294,967,296 Highest etheric 8,100,000,000 Dominant etheric 6ths
 33rd 8,589,934,592
 34th 17,179,869,184 Highest Inter-etheric 24,300,000,000 Inter-etheric 9ths
 35th 34,359,738,368
 36th 68,719,476,736
 37th 137,438,953,472
 38th 274,877,906,944
 39th 549,755,813,888
 40th 1,099,511,627,776
 41st 2,199,023,255,552
 42nd 4,398,046,511,104 SECOND CLASS VIBRATIONS begin Thermism, Rad-energy,
 Chemism begins
 43rd 8,796,093,022,208 Dark heat begins
 44th 17,592,186,044,416
 45th 35,184,372,088,832
 46th 70,368,744,177,664 Chemism begins
 47th 140,737,488,355,328 Infrared (Light begins)
 48th 281,474,976,710,656 Major 4th (above)
 49th 562,949,953,421,312 Below Major 4th
 50th 1,125,899,906,842,624 (Light ends)
 51st 2,251,799,813,685,248
 52nd 4,503,599,627,370,496 Limit Actinic
 53rd 9,007,199,254,740,992
 54th 10,814,398,509,481,984
 55th 36,028,797,018,963,968 Chemism ends
 56th 72,057,594,037,927,936 actienic rays
 57th 144,115,188,075,855,872 actienic rays Full Ninths 156,057,552,198,220,000
 58th 288,230,376,151,711,744 actienic rays
 59th 576,460,752,303,423,488 actienic rays
 60th 1,152,921,504,606,846,976 actienic rays
 61st 2,305,843,009,213,693,952
 62nd 4,611,686,018,427,387,904
 63rd 9,223,372,036,854,775,808
 64th 18,446,744,073,709,551,616 Major 5th 27,670,116,110,564,327,424 Limit of thermism
 Electricity, Induction, Magnetism begins
 65th 36,893,488,147,419,103,232 66th 73,786,976,295,838,206,464
 67th 147,573,952,591,676,413,928
 68th 295,147,905,183,352,827,856 Copper-zinc couple
 69th 590,295,810,366,705,655,712
 70th 1,180,591,620,733,411,311,424
 71st 2,361,183,241,466,822,622,848 50,000 volts
 72nd 4,722,366,482,933,645,245,696
 73rd 9,444,732,965,867,290,491,392

74th 18,889,465,931,745,580,982,784
 75th 37,778,931,863,469,161,965,568
 76th 75,557,863,726,938,323,931,136
 77th 151,115,727,453,875,647,862,772
 78th 302,231,454,907,753,295,724,544
 79th 604,462,909,815,506,591,449,088
 80th 1,208,925,819,631,013,182,898,176
 81st 2,417,851,639,762,026,365,796,352
 82nd 4,825,703,278,524,052,731,592,702
 83rd 9,671,406,557,048,105,463,185,408
 84th 19,342,813,114,096,210,926,370,816
 85th 38,685,626,228,192,421,852,741,632
 86th 77,361,252,456,384,843,705,483,204

The limit of electricity and the beginning of atomolity.

Chapter X of The Secret Doctrine by Madame Blavatsky



Helena Blavatsky

THE COMING FORCE. ITS POSSIBILITIES AND IMPOSSIBILITIES.

Shall we say that Force is "moving matter," or "matter in motion," and a manifestation of energy; or that matter and force are the phenomenal differentiated aspects of the one primary, undifferentiated Cosmic Substance?

This query is made with regard to that Stanza which treats of FOHAT and his "Seven brothers or Sons," in other words, of the cause and the effects of Cosmic Electricity, the latter called, in Occult parlance, the seven primary forces of Electricity, whose purely phenomenal, and hence grossest effects are alone cognizable by physicists on the cosmic and especially on the terrestrial plane. These include, among other things, Sound, Light, Colour, etc., etc. Now what does physical Science tell us of these "Forces"? SOUND, it says, is a sensation produced by the impact of atmospheric molecules on the tympanum, which, by setting up delicate tremors in the auditory apparatus, thus communicate themselves to the brain. LIGHT is the sensation caused by the impact of inconceivably minute vibrations of ether on the retina of the eye.

So, too, we say. But this is simply the effect produced in our atmosphere and its immediate surroundings, all, in fact, which falls within the range of our terrestrial consciousness. Jupiter Pluvius sent his symbol in drops of rain, of water composed, as is believed, of two "elements," which chemistry dissociates and recombines. The compound molecules are in its power, but their atoms still elude its grasp. Occultism sees in all these Forces and manifestations a ladder, the lower rungs of which belong to exoteric physics, and the higher are traced to a living, intelligent, invisible Power, which is, as a rule, the unconcerned, and exceptionally, the conscious cause of the sense-born phenomenon designated as this or another natural law.

DIVINE, INFERNAL, OR TERRESTRIAL FORCE?

We say and maintain that SOUND, for one thing, is a tremendous Occult power; that it is a stupendous force, of which the electricity generated by a million of Niagaras could never counteract the smallest potentiality when directed with occult knowledge. Sound may be produced of such a nature that the pyramid of Cheops would be raised in the air, or that a dying man, nay, one at his last breath, would be revived and filled with new energy and vigour.

For Sound generates, or rather attracts together, the elements that produce an ozone, the fabrication of which is beyond chemistry, but within the limits of Alchemy. It may even resurrect a man or an animal whose astral "vital body" has not been irreparably separated from the physical

body by the severance of the magnetic or odic chord. As one saved thrice from death by that power, the writer ought to be credited with knowing personally something about it.

And if all this appears too unscientific to be even noticed, let Science explain to what mechanical and physical laws known to it, is due the recently produced phenomena of the so-called "Keely motor?" What is it that acts as the formidable generator of invisible but tremendous force, of that power which is not only capable of driving an engine of 25 horse-power, but has even been employed to lift the machinery bodily? Yet this is done simply by drawing a fiddle-bow across a tuning fork, as has been repeatedly proven. For the etheric Force, discovered by the well-known (in America and now in Europe) John Worrell Keely, of Philadelphia, is no hallucination. Notwithstanding his failure to utilize it, a failure prognosticated and maintained by some Occultists from the first, the phenomena exhibited by the discoverer during the last few years have been wonderful, almost miraculous, not in the sense of the supernatural but of the superhuman. [Had Keely been permitted to succeed, he might have reduced a whole army to atoms in the space of a few seconds as easily as he reduced a dead ox to the same condition.](#)

The reader is now asked to give a serious attention to that newly-discovered potency which the discoverer has named "Inter-Etheric Force and Forces."

In the humble opinion of the Occultists, as of his immediate friends,

Mr. Keely, of Philadelphia, was, and still is, at the threshold of some of the greatest secrets of the Universe; of that chiefly on which is built the whole mystery of physical Forces, and the esoteric significance of the "Mundane Egg" symbolism. Occult philosophy, viewing the manifested and the unmanifested Kosmos as a UNITY, symbolizes the ideal conception of the former by that "Golden Egg" with two poles in it. It is the positive pole that acts in the manifested world of matter, while the negative is lost in the unknowable absoluteness of SAT -- "Be-ness." Whether this agrees with the philosophy of Mr. Keely, we cannot tell, nor does it really much matter. Nevertheless, his ideas about the ethero-material construction of the Universe look strangely like our own, being in this respect nearly identical. This is what we find him saying in an able pamphlet compiled by Mrs. Bloomfield-Moore, an American lady of wealth and position, whose incessant efforts in the pursuit of truth can never be too highly appreciated: -- "Mr. Keely, in explanation of the working of his engine, says: 'In the conception of any machine heretofore constructed, the medium for inducing a neutral centre has never been found. If it had, the difficulties of perpetual-motion seekers would have ended, and this problem would have become an established and operating fact. It would only require an introductory impulse of a few pounds, on such a device, to cause it to run for centuries. In the conception of my vibratory engine, I did not seek to attain perpetual motion; but a circuit is formed that actually has a neutral centre, which is in a condition to be vivified by my vibratory ether, and, while under operation by said substance, is really a machine that is virtually independent of the mass (or globe), and it is the wonderful velocity of the vibratory circuit which makes it so. Still, with all its perfection, it requires to be fed with the vibratory ether to make it an independent motor'"

"All structures require a foundation in strength according to the weight of the mass they have to carry, but the foundations of the universe rest on a vacuous point far more minute than a molecule; in fact, to express this truth properly, on an inter-etheric point, which requires an infinite mind to understand it. To look down into the depths of an etheric centre is precisely the same as it would be to search into the broad space of heaven's ether to find the end, with this difference: that one is the positive field, while the other is the negative field"

AN UNCONSCIOUS OCCULTIST.

This, as easily seen, is precisely the Eastern doctrine. His inter-etheric point is the laya-point of the Occultists, which, however, does not require "an infinite mind to understand it," but only a specific intuition and ability to trace its hiding-place in this world of matter. Of course, the laya centre cannot be produced, but an inter-etheric vacuum can -- as proved in the production of bell-sounds in space. Mr. Keely speaks as an unconscious Occultist, nevertheless, when he remarks in his theory of planetary suspension: --

"As regards planetary volume, we would ask in a scientific point of view, How can the immense difference of volume in the planets exist without disorganising the harmonious action that has always characterised them? I can only answer this question properly by entering into a progressive analysis, starting on the rotating etheric centres that were fixed by the Creator with their attractive or accumulative power. If you ask what power it is that gives to each etheric atom its inconceivable velocity of rotation (or introductory impulse), I must answer that no finite mind will ever be able to conceive what it is. The philosophy of accumulation is the only proof that such a power has been given. The area, if we can so speak, of such an atom, presents to the attractive or magnetic, the elective or propulsive, all the receptive force and all the antagonistic force that characterises a planet of the largest magnitude; consequently, as the accumulation goes on, the perfect equation remains the same. When this minute centre has once been fixed, the power to rend it from its position would necessarily have to be so great as to displace the most immense planet that exists. When this atomic neutral centre is displaced, the planet must go with it. The neutral centre carries the full load of any accumulation from the start, and remains the same, for ever balanced in the eternal space."

Mr. Keely illustrates his idea of "a neutral centre" in this way: --

"We will imagine that, after an accumulation of a planet of any diameter, say, 20,000 miles, more or less, for the size has nothing to do with the problem; there should be a displacement of all the material, with the exception of a crust 5,000 miles thick, leaving an intervening void between this crust and a centre of the size of an ordinary billiard ball, it would then require a force as great to move this small central mass as it would to move the shell of 5,000 miles thickness. Moreover, this small central mass would carry the load of this crust for ever, keeping it equidistant; and there could be no opposing power, however great, that could bring them together. The imagination staggers in contemplating the immense load which bears upon this point of centre, where weight ceases. . . . This is what we understand by a neutral centre." And what Occultists understand by a "laya centre."

The above is pronounced "unscientific" by many. But so is everything that is not sanctioned and kept on strictly orthodox lines by physical science. Unless the explanation given by the inventor himself is accepted -- and his explanations, being, as observed, quite orthodox from the spiritual and the Occult stand-points, if not from that of materialistic speculative (called exact) Science, are therefore ours in this particular -- what can science answer to facts already seen which it is no longer possible for anyone to deny? Occult philosophy divulges few of its most important vital mysteries. It drops them like precious pearls, one by one, far and wide apart, and only when forced to do so by the evolutionary tidal wave that carries on humanity slowly, silently, but steadily toward the dawn of the Sixth-Race mankind. For once out of the safe custody of their legitimate heirs and keepers, those mysteries cease to be occult: they fall into the public domain and have to run the risk of becoming in the hands of the selfish -- of the Cains of the human race -- curses more often than blessings. Nevertheless, whenever such individuals as the discoverer of Etheric Force -- John Worrell Keely -- men with peculiar psychic and mental capacities are born, they are generally and more frequently helped than allowed to go unassisted; groping on their way, though, if left to their own resources, falling very soon victims to martyrdom and unscrupulous speculators. Only they are helped on the condition that they should not become, whether consciously or unconsciously, an additional peril to their age: a danger to the poor, now offered in daily holocaust by the less wealthy to the very wealthy. This necessitates a short digression and an explanation.

Some twelve years back, during the Philadelphia Centennial Exhibition, the writer, in answering the earnest queries of a theosophist, one of the earliest admirers of Mr. Keely, repeated to him what she had heard in quarters, information from which she could never doubt.

It had been stated that the inventor of the "Self-Motor" was what is called, in the jargon of the Kabalists, a "natural-born magician." That he was and would remain unconscious of the full range of his powers, and would work out merely those which he had found out and ascertained in his own nature -- firstly, because, attributing them to a wrong source, he could never give them full sway; and secondly, because it was beyond his power to pass to others that which was a capacity inherent

in his special nature. Hence the whole secret could not be made over permanently to anyone for practical purposes or use.

THE FIRST-BORN OF ETHER.

Individuals born with such a capacity are not very rare. That they are not heard of more frequently is due to the fact that they live and die, in almost every case, in utter ignorance of being possessed of abnormal powers at all. Mr. Keely possesses powers which are called "abnormal" just because they happen in our day to be as little known as blood circulation was before Harvey's time. Blood existed, and it behaved as it does at present in the first man born from woman; and so does that principle in man which can control and guide etheric vibratory force. At any rate it exists in all those mortals whose inner selves are primordially connected, by reason of their direct descent, with that group of Dhyan-Chohans who are called "the first-born of Ether." Mankind, psychically considered, is divided into various groups, each of which is connected with one of the Dhyanic groups that first formed psychic man; (see paragraphs 1, 2, 3, 4, 5 in the Commentary to Stanza VII.) Mr. Keely being greatly favoured in this respect, and moreover, besides his psychic temperament, being intellectually a genius in mechanics, may thus achieve most wonderful results. He has achieved some already -- more than any mortal man, not initiated into the final mysteries, has achieved in this age up to the present day. What he has done is certainly quite sufficient "to demolish with the hammer of Science the idols of Science" -- the idols of matter with the feet of clay -- as his friends justly predict and say of him. Nor would the writer for a moment think of contradicting Mrs. Bloomfield-Moore, when in her paper on "Psychic Force and Etheric Force," she states that Mr. Keely, as a philosopher, "is great enough in soul, wise enough in mind, and sublime enough in courage to overcome all difficulties, and to stand at last before the world as the greatest discoverer and inventor in the world."

And again she writes: -- "Should Keely do no more than lead scientists from the dreary realms where they are groping into the open field of elemental force, where gravity and cohesion are disturbed in their haunts and diverted to use; where, from unity of origin, emanates infinite energy in diversified forms, he will achieve immortal fame. Should he demonstrate, to the destruction of materialism, that the universe is animated by a mysterious principle to which matter, however perfectly organized, is absolutely subservient, he will be a greater spiritual benefactor to our race than the modern world has yet found in any man. Should he be able to substitute, in the treatment of disease, the finer forces of nature for the grossly material agencies which have sent more human beings to their graves than war, pestilence and famine combined, he will merit and receive the gratitude of mankind. All this and more will he do, if he and those who have watched his progress, day by day for years, are not too sanguine in their expectations."

Writing in the T. P. S. ("Theosophical Publication Society") series (No. 9), the same lady, in her pamphlet, "Keely's Secrets," brings forward a passage from an article, written a few years ago by the writer of the present volume, in her journal, the Theosophist, in these words: --

"The author of No. 5 of the pamphlets issued by the Theosophical Publication Society, 'What is Matter and What is Force,' says therein, 'The men of science have just found out "a fourth state of matter," whereas the Occultists have penetrated years ago beyond the sixth, and therefore do not infer, but know of, the existence of the seventh, the last.' This knowledge comprises one of the secrets of Keely's so-called 'compound secret.' It is already known to many that his secret includes 'the augmentation of energy,' the insulation of the ether, and the adaptation of dynaspheric force to machinery."

It is just because Keely's discovery would lead to a knowledge of one of the most occult secrets, a secret which can never be allowed to fall into the hands of the masses, that his failure to push his discoveries to their logical end seems certain to Occultists. But of this more presently. Even in its limitations this discovery may prove of the greatest benefit. For: --

"Step by step, with a patient perseverance which some day the world will honour, this man of genius has made his researches, overcoming the colossal difficulties which again and again raised up in his path what seemed to be (to all but himself) insurmountable barriers to further progress: but

never has the world's index finger so pointed to an hour when all is making ready for the advent of the new form of force that mankind is waiting for. Nature, always reluctant to yield her secrets, is listening to the demands made upon her by her master, necessity. The coal mines of the world cannot long afford the increasing drain made upon them. Steam has reached its utmost limits of power, and does not fulfil the requirements of the age. It knows that its days are numbered. Electricity holds back, with bated breath, dependent upon the approach of her sister colleague. Air ships are riding at anchor, as it were, waiting for the force which is to make aerial navigation something more than a dream. As easily as men communicate with their offices from their homes by means of the telephone, so will the inhabitants of separate continents talk across the ocean. Imagination is palsied when seeking to foresee the grand results of this marvellous discovery, when once it is applied to art and mechanics. In taking the throne which it will force steam to abdicate, dynaspheric force will rule the world with a power so mighty in the interests of civilization, that no finite mind can conjecture the results. Laurence Oliphant, in his preface to 'Scientific Religion,' says: 'A new moral future is dawning upon the human race -- one, certainly, of which it stands much in need.' In no way could this new moral future be so widely, so universally, commenced as by the utilizing of dynaspheric force to beneficial purposes in life. . . ."

ETHERIC WAVES.

The Occultists are ready to admit all this with the eloquent writer. Molecular vibration is, undeniably, "Keely's legitimate field of research," and the discoveries made by him will prove wonderful -- yet only in his hands and through himself. The world so far will get but that with which it can be safely entrusted. The truth of this assertion has, perhaps, not yet quite dawned upon the discoverer himself, since he writes that he is absolutely certain that he will accomplish all that he has promised, and will then give it out to the world; but it must dawn upon him, and at no very far distant date. And what he says in reference to his work is a good proof of it: --

"In considering the operation of my engine, the visitor, in order to have even an approximate conception of its *modus operandi*, must discard all thought of engines that are operated upon the principle of pressure and exhaustion, by the expansion of steam or other analogous gas which impinges upon an abutment, such as the piston of a steam-engine. My engine has neither piston nor eccentrics, nor is there one grain of pressure exerted in the engine, whatever may be the size or capacity of it.

"My system, in every part and detail, both in the developing of my power and in every branch of its utilization, is based and founded on sympathetic vibration. In no other way would it be possible to awaken or develop my force, and equally impossible would it be to operate my engine upon any other principle. This, however, is the true system; and henceforth all my operations will be conducted in this manner -- that is to say, my power will be generated, my engines run, my cannon operated, through a wire.

"It has been only after years of incessant labour, and the making of almost innumerable experiments, involving not only the construction of a great many most peculiar mechanical structures, and the closest investigation and study of the phenomenal properties of the substance 'ether,' per se, produced, that I have been able to dispense with complicated mechanism, and to obtain, as I claim, mastery over the subtle and strange force with which I am dealing."

The passages underlined by us, are those which bear directly on the occult side of the application of the vibratory force, or what Mr. Keely calls "sympathetic vibration." The "wire" is already a step below, or downward from the pure etheric plane into the terrestrial. The discoverer has produced marvels -- the word "miracle" is not too strong -- when acting through the inter-etheric Force alone, the fifth and sixth principles of Akasa. From a "generator" six feet long, he has come down to one "no larger than an old-fashioned silver watch;" and this by itself is a miracle of mechanical (but not spiritual) genius. But, as well expressed by his great patroness and defender, Mrs. Bloomfield-Moore, "the two forms of force which he has been experimenting with, and the phenomena attending them, are the very antithesis of each other." One was generated and acted upon by and through himself. No one, who should have repeated the thing done by himself, could

have produced the same results. It was "Keely's ether" that acted truly, while "Smith's or Brown's" ether would have remained for ever barren of results. For Keely's difficulty has hitherto been to produce a machine which would develop and regulate the "force" without the intervention of any "will power" or personal influence, whether conscious or unconscious of the operator. In this he has failed, so far as others were concerned, for no one but himself could operate on his "machines." Occultly this was a far more advanced achievement than the "success" which he anticipates from his "wire," but the results obtained from the fifth and sixth planes of the etheric (or Astral) Force, will never be permitted to serve for purposes of commerce and traffic. That Keely's organism is directly connected with the production of the marvellous results is proven by the following statement emanating from one who knows the great discoverer intimately.

At one time the shareholders of the "Keely Motor Co." put a man in his workshop for the express purpose of discovering his secret. After six months of close watching, he said to J. W. Keely one day: "I know how it is done, now." They had been setting up a machine together, and Keely was manipulating the stop-cock which turned the force on and off. "Try it, then," was the answer. The man turned the cock, and nothing came. "Let me see you do it again," the man said to Keely. The latter complied, and the machinery operated at once. Again the other tried, but without success. Then Keely put his hand on his shoulder and told him to try once more. He did so, with the result of an instantaneous production of the current. This fact, if true, settles the question.

We are told that Mr. Keely defines electricity "as a certain form of atomic vibration." In this he is quite right; but this is electricity on the terrestrial plane, and through terrestrial correlations. He estimates --

Molecular vibrations at 100,000,000 per second.

Inter-molecular vibrations at 300,000,000 per second

Atomic vibrations at 900,000,000 per second

Inter-atomic vibrations at 2,700,000,000 per second

AEtheric vibrations at 8,100,000,000 pper second

Inter-AEtheric vibrations at 24,300,000,000 per second

This proves our point. There are no vibrations that could be counted or even estimated at an approximate rate beyond "the realm of the fourth son of Fohat," using an occult phraseology, or that motion which corresponds to the formation of Mr. Crookes' radiant matter, or lightly called some years ago the "fourth state of matter" -- on this our plane.

A PREMATURE DISCOVERY.

If the question is asked why Mr. Keely was not allowed to pass a certain limit, the answer is easy; because that which he has unconsciously discovered, is the terrible sidereal Force, known to, and named by the Atlanteans MASH-MAK, and by the Aryan Rishis in their Ashtar Vidya by a name that we do not like to give. It is the vril of Bulwer Lytton's "Coming Race," and of the coming races of our mankind. The name vril may be a fiction; the Force itself is a fact doubted as little in India as the existence itself of their Rishis, since it is mentioned in all the secret works.

It is this vibratory Force, which, when aimed at an army from an Agni Rath fixed on a flying vessel, a balloon, according to the instructions found in Ashtar Vidya, reduced to ashes 100,000 men and elephants, as easily as it would a dead rat. It is allegorised in the Vishnu Purana, in the Ramayana and other works, in the fable about the sage Kapila whose glance made a mountain of ashes of King Sagara's 60,000 sons, and which is explained in the esoteric works, and referred to as the Kapilaksha -- "Kapila's Eye."

And is it this Satanic Force that our generations were to be allowed to add to their stock of Anarchist's baby-toys, known as melenite, dynamite clock-works, explosive oranges, "flower baskets," and such other innocent names? Is it this destructive agency, which, once in the hands of some modern Attila, e.g., a blood-thirsty anarchist, would reduce Europe in a few days to its primitive chaotic state with no man left alive to tell the tale -- is this force to become the common property of all men alike?

What Mr. Keely has already done is grand and wonderful in the extreme; there is enough work before him in the demonstration of his new system to "humble the pride of those scientists who are materialistic, by revealing those mysteries which lie behind the world of matter," without revealing it *nolens volens* to all. For surely Psychists and Spiritualists -- of whom there are a good number in the European armies -- would be the first to experience personally the fruits of such mysteries revealed. *Thousands of them would find themselves (and perhaps with the populations of whole countries to keep them company) in blue Ether very soon, were such a Force to be even entirely discovered, let alone made publicly known. The discovery in its completeness is by several thousand -- or shall we say hundred thousand? -- years too premature.* It will be at its appointed place and time only when the great roaring flood of starvation, misery, and underpaid labour ebbs back again -- as it will when happily at last the just demands of the many are attended to; when the proletariat exists but in name, and the pitiful cry for bread, that rings throughout the world unheeded, has died away. This may be hastened by the spread of learning, and by new openings for work and emigration, with better prospects than exist now, and on some new continent that may appear. Then only will "Keely's Motor and Force," as originally contemplated by himself and friends, be in demand, because it will be more needed by the poor than by the wealthy.

Meanwhile the force discovered by him will work through wires, and this, if he succeeds, will be quite sufficient in the present generation to make of him the greatest discoverer of this age.

What Mr. Keely says of Sound and Colour is also correct from the Occult stand-point. Hear him talk as though he were the nursling of the "Gods-revealers," and had gazed all his life into the depths of Father-Mother AEther.

In comparing the tenuity of the atmosphere with that of the etheric flows, obtained by him from his invention for breaking up the molecules of air by vibration, Keely says that: --

. . . "It is as platina to hydrogen gas. Molecular separation of air brings us to the first sub-division only; inter-molecular, to the second; atomic, to the third; inter-atomic, to the fourth; etheric, to the fifth; and inter-etheric, to the sixth sub-division, or positive association with luminiferous ether. In my introductory argument I have contended that this is the vibratory envelope of all atoms. In my definition of atom I do not confine myself to the sixth sub-division where this luminiferous ether is developed in its crude form as far as my researches prove. I think this idea will be pronounced by the physicists of the present day, a wild freak of the imagination. Possibly, in time, a light may fall upon this theory that will bring its simplicity forward for scientific research. At present I can only compare it to some planet in a dark space, where the light of the sun of science has not yet reached it. . . ." "I assume that sound, like odour, is a real substance of unknown and wonderful tenuity, emanating from a body where it has been induced by percussion and throwing out absolute corpuscles of matter, inter-atomic particles, with velocity of 1,120 feet per second; in vacuo 20,000. The substance which is thus disseminated is a part and parcel of the mass agitated, and, if kept under this agitation continuously, would, in the course of a certain cycle of time, become thoroughly absorbed by the atmosphere; or, more truly, would pass through the atmosphere to an elevated point of tenuity corresponding to the condition of sub-division that governs its liberation from its parent body." . . . "The sounds from vibratory forks, set so as to produce etheric chords, while disseminating their tones (compound), permeate most thoroughly all substances that come under the range of their atomic bombardment. The clapping of a bell in vacuo liberates these atoms with the same velocity and volume as one in the open air; and were the agitation of the bell kept up continuously for a few millions of centuries it would thoroughly return to its primitive element; and, if the chamber were hermetically sealed, and strong enough, the vacuous volume surrounding the bell would be brought to a pressure of many thousands of pounds to the square inch, by the tenuous substance evolved. In my estimation, sound truly defined is the disturbance of atomic equilibrium, rupturing actual atomic corpuscles; and the substance thus liberated must certainly be a certain order of etheric flow. Under these conditions, is it unreasonable to suppose that, if this flow were kept up, and the body thus robbed of its element, it would in time disappear entirely? All bodies are formed primitively from this highly tenuous ether, animal, vegetable, and

mineral, and they are only returned to their high gaseous condition when brought under a state of differential equilibrium." . . .

THE SECRETS OF SOUND AND ODOUR.

"As regards odour, we can only get some definite idea of its extreme and wondrous tenuity by taking into consideration that a large area of atmosphere can be impregnated for a long series of years from a single grain of musk; which, if weighed after that long interval, will be found to be not appreciably diminished. The great paradox attending the flow of odorous particles is that they can be held under confinement in a glass vessel! Here is a substance of much higher tenuity than the glass that holds it, and yet it cannot escape. It is as a sieve with its meshes large enough to pass marbles, and yet holding fine sand which cannot pass through; in fact, a molecular vessel holding an atomic substance. This is a problem that would confound those who stop to recognize it. But infinitely tenuous as odour is, it holds a very crude relation to the substance of sub-division that governs a magnetic flow (a flow of sympathy, if you please to call it so). This sub-division comes next to sound, but is above sound. The action of the flow of a magnet coincides somewhat to the receiving and distributing portion of the human brain, giving off at all times a depreciating ratio of the amount received. It is a grand illustration of the control of mind over matter, which gradually depreciates the physical till dissolution takes place. The magnet on the same ratio gradually loses its power and becomes inert. If the relations that exist between mind and matter could be equated and so held, we would live on in our physical state eternally, as there would be no physical depreciation. But this physical depreciation leads, at its terminus, to the source of a much higher development -- viz., the liberation of the pure ether from the crude molecular; which, in my estimation, is to be much desired." -- (From Mrs. Bloomfield-Moore's paper, "The New Philosophy.")

It may be remarked that, save a few small divergencies, no Adept nor Alchemist could have explained the above any better, in the light of modern Science, however much the latter may protest against the novel views. This is, in all its fundamental principles, if not details, Occultism pure and simple, yet withal, modern natural philosophy as well.

This "New Force," or whatever Science may call it, the effects of which are undeniable -- admitted by more than one naturalist and physicist who has visited Mr. Keely's laboratory and witnessed personally its tremendous effects -- what is it? Is it a "mode of motion," also, "in Vacuo," since there is no matter to generate it except Sound -- another "mode of motion," no doubt, a sensation caused like colour by vibrations? Fully as we believe in these vibrations as the proximate -- the immediate -- cause of such sensations, we as absolutely reject the one-sided scientific theory that there is no factor to be considered as external to us, other than etheric or atmospheric vibrations.

There is a transcendental set of causes put in motion -- so to speak -- in the occurrence of these phenomena, which, not being in relation to our narrow range of cognition, can only be traced to their source and their nature, and understood by the Spiritual faculties of the Adept. They are, as Asclepios puts it to the King, "incorporeal corporealities" -- such as "appear in the mirror," and "abstract forms" that we see, hear, and smell, in our dreams, and visions. What have the "modes of motion," light, and ether to do with these? Yet we see, hear, and smell, and touch them, ergo they are as much realities to us in our dreams, as any other thing on this plane of Maya.

Note by the author: Colour highlighting is mine.

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