

The Mechanical Engine: A Re-Evolution of Bessler's Wheel

By Peter Lindemann, D.Sc.
January 29, 2007

Forward

The purpose of this article is to put forward a new hypothesis on the possible design of Johann Bessler's self-turning wheel. I wish it were possible to actually reconstruct Bessler's working designs. Unfortunately, they are forever lost to the past. Even if someone came up with a working model, based on all the clues and reports, we would still have no way of knowing, for sure, that the new design was the same, or similar to Bessler's designs, except by inference.

I am also aware, that many people around the world are trying to duplicate Bessler's work. Like Bessler, I believe that the advent of the "self-turning wheel" is a gift from God to everyone, and has the power to change the course of the future. I also believe that Bessler's work belongs to history, and to all of humanity. So, another purpose of this article is to place in the public domain, certain information which I have gathered on this subject, which may be of interest to other researchers.

Finally, it is common knowledge that no Patent Office on this planet will grant a patent on a Perpetual Motion Machine. This is an official bias that cannot be overcome within the patent system. Therefore, any working design cannot be legally protected for commercial purposes. So, another purpose of this article is to disclose a design of a self-turning wheel that is actuated only by moving weights, internal to the wheel, and to claim priority to the design.

References

The best historical information on this subject is found in John Collins' book titled *Perpetual Motion: An Ancient Mystery Solved?* It is the only authoritative book on Bessler's work that treats the subject matter with historic accuracy, integrity and fairness. I have used it as an indispensable reference in my work. This book is available at John Collins' excellent website www.free-energy.co.uk Mr. Collins has also helped me edit portions of this article.

I have also studied, at length, the many designs of machines Bessler published in his *Maschinen Tractate*. The many drawings from this book, redrawn for everyone's learning benefit by Bill McMurtry, and published on www.orffyre.com have been very enlightening. I have built models of quite a few of these designs, and I attest, as Bessler claimed, none of them work. Other websites, such as www.besslerwheel.com have also been helpful.

Features of the designs that don't work

Perpetual Motion Machines that don't turn by themselves usually do one thing very well. They usually invoke extremely strong emotions from their would-be inventors. Of this, I have some first-hand knowledge. Actually, every machine does exactly what it is supposed to do, from a Natural Philosophy point of view. Each new model of a new design is a physical question asked of Nature. The operation of that new, experimental model is Nature's answer to that question. And Nature never lies! So, it can be very important to study the designs of the machines that

don't self-turn, and the features that are involved. If done properly, this study leads directly to an understanding of what cannot be in the working model.

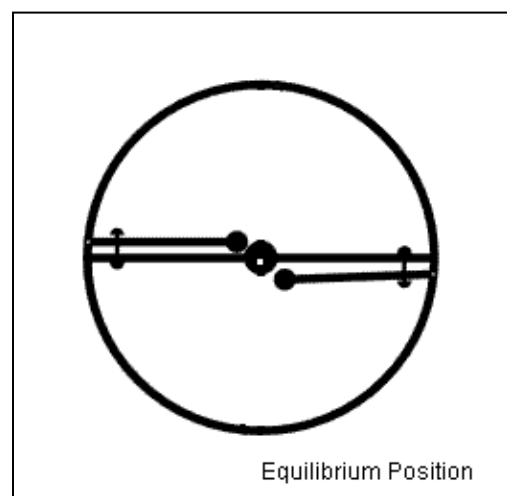
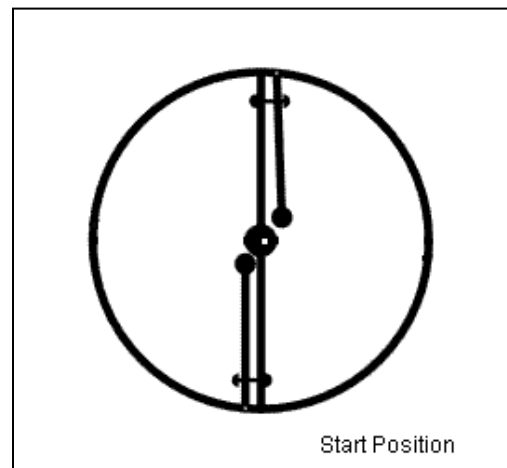
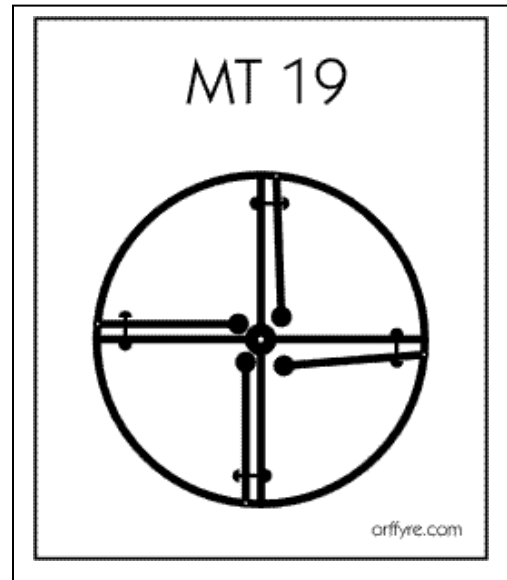
The first great truth about these machines is that the location of the weights, at any given moment, is of primary importance, and how they get there is of no importance. A weight can be hanging on a string, at the end of a long rod, or balancing on a post coming up from the hub of the wheel. It makes no difference how the weight gets to its location. As long as the weight is attached to the wheel and its mass is referenced to the wheel, its *center of gravity* is defined as its location. While this may seem painfully obvious to some, a thorough study leaves nothing assumed. It is said that the "wheel knows" where the weights are. This reality cannot be circumvented by any amount of sneaky weight attachment methods. Believe me, I've tried.

As my research progressed, I found that I kept building different machines that did the same thing! In order to prevent this from continuing, I wrote a small set of notes for myself called "Design Rules". Here's what I came up with for Rule #1: "All designs that are symmetrical and reset their weights by the action of gravity every 180 degrees cannot work."

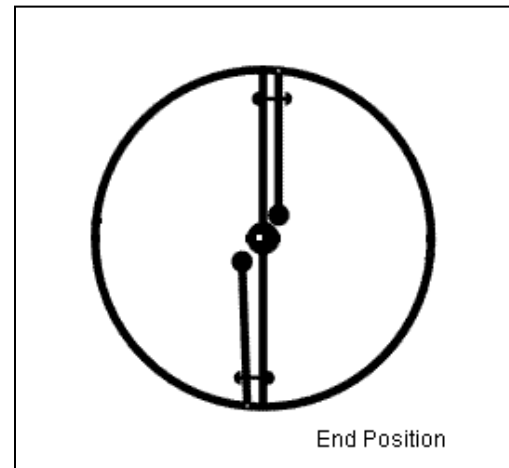
A perfect example of this problem is Bessler's design #19, from the *Maschinen Tractate*. Here we see four pendulums suspended from the perimeter of the wheel, at 90 degree intervals. If we assume the wheel rotates clockwise, as it will from its present position, then each pendulum falls back in its movement going up the left side of the wheel, and falls forward a short distance going down the right side of the wheel.

To better understand how this design works, I have reduced it to just one set of pendulums, as shown in the next three images. In this sequence, I show the process of the wheel going through 180 degrees of rotation in a clockwise direction. The first image is called Start Position. The white dot in the hub represents the location of the combined *center of gravity* for both weights. As you can see, it is just to the right of the center of the hub, or axis, and so from this position, the wheel will rotate clockwise under the power of gravity until it gets to the next position.

The second position is the Equilibrium Position, or what Bessler calls the "punctum quietus". No matter how often you spin the wheel, it always comes to rest in this position. And, it is easy



to see why. The white dot in the hub, the *center of gravity*, is directly below the axis. This is the point from which the weight can fall no further. But, when we start from the Start Position, this is also the point of maximum stored momentum, so the wheel doesn't just stop here, but rotates on to the next position. The momentum gained as the *center of gravity* fell in the first 90 degrees of rotation is now consumed as the *center of gravity* is lifted toward the End Position. If the bearing friction is very low, and the wheel is perfectly balanced, it will reach the end position without the weights shifting to the Start Position again. At this point, the wheel will reverse direction and oscillate back and forth many times before coming to rest at the Equilibrium Position. If the operator has added the slightest momentum to the wheel, the weights will reach the End Position and then shift to the Start Position again to begin another half-cycle of rotation. By tracing the path of the white dot, it is easy to see that the *center of gravity* describes a semi-circle in the bottom quadrant. Regardless of the simplicity or the complexity of the design, all "over-balanced" wheels operate this way.



This leads to my Rule #2: "All designs that move weights by gravity alone produce a *center of gravity* profile that is centered below the axis of rotation." For any set of two weights, the first 90 degrees of rotation produces forward movement and the second 90 degrees of rotation produces reverse movement. The net result is *balance* and a zero net gain of force in either direction.

So, symmetry of design creates balance. What could be more obvious? So, any design that uses gravity to shift the position of a weight from A to B at one location, and then back from B to A 180 degrees later cannot work. Why? The answer is simple and leads to Rule #3: "No design that moves weights by gravity alone can work, since all work done by *falling weights* can only move the *center of gravity* directly down from the axis."

Since none of these weight shifting schemes work, but Bessler's wheel did, my conclusions are as follows. Bessler's wheel was NOT a simple, gravity operated, weight shifting system! It was NOT a classic "over-balanced" wheel, and it was NOT a pure Gravity Engine operated by *falling weights*. Bessler's design must have been asymmetrical in operation, if not in design, and there must have been at least one other force, besides gravity, involved in making the system work.

The other great truth that becomes apparent from building and studying these weight shifting designs is that if there was a way to "reset" the bottom weight to its first position earlier than 180 degrees, the wheel would turn. But gravity alone will not do it.

This leads to my Rule #4: "The ideal movement will move a weight and reset it to its original position, or nearly so, within 90 degrees of rotation or less." As Sherlock Holmes says, "When all of the 'impossibles' and 'improbables' are removed, what's left must be the truth."

Bessler's work on the organ

Sometime around 1709, Bessler became interested in the church organ. He apprenticed himself to a relative who was an organ builder and he helped him build a complete organ. In taking on

this work, he was interested in the income, but mostly, he was looking for a new mechanism or a new movement that would make the wheel turn by itself. In John Collins' book, page 22 has the critical account. "He was certain that in the art of building organs lay the secret. Somewhere amongst all the different stops and registers, chords and key-boards lay a clue. Among the sliders, rods, trundles, levels, stop-knobs, groove-valves, stop-level bars, stickers, backfall bridges, trackers, fulcrums, roller arms and bearing shafts he would find the inspiration necessary to achieve his goal." Despite all of his high hopes, every model Bessler built from the movements he learned about in the organ failed to work. We don't know how many models he built in this period, but none of them worked. After all of this failure, he had a dream which kept him inspired. For weeks, he worked single-mindedly on the project, and then he finally built a model that worked. This first unit was probably just a "bench model", not even a full prototype. It probably had only two weights and was just something that proved to him that he had found the movement. The "real" first unit was still, possibly, a year away. But first, he left on a trip to heal a number of patients, and to earn some badly needed income. The first demonstration of the machine in Gera was June, 1712. So, his initial discovery was probably about a year earlier, or the summer of 1711.

Discovery of the secret

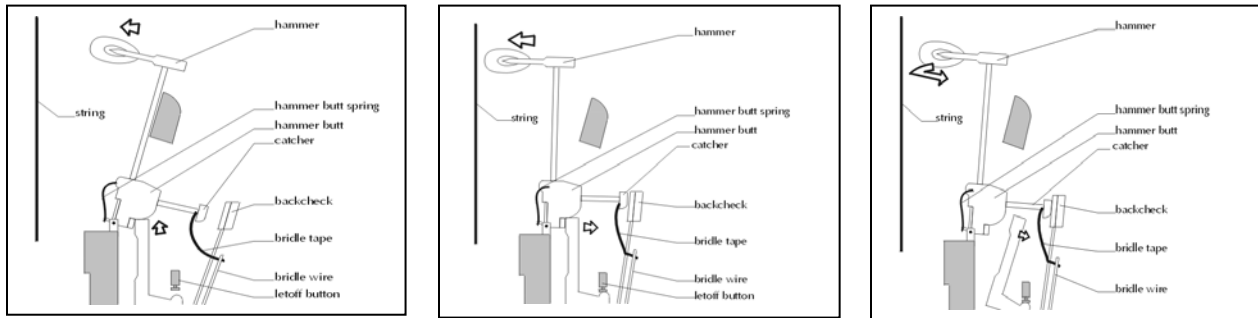
So, what did Bessler discover? Did he invent some totally new mechanical movement, or did he find some other movement and adapt it to his purposes? This question is at the heart of this thesis. I believe that Bessler "found" something in this timeframe and adapted it to his purposes. That something was "new" and it provided a movement that was not found elsewhere. It solved the problem of getting the weight to return to its previous position earlier than gravity alone would allow. As it turns out, it was his work on the organ that put him right where he needed to be to learn the secret.

The invention of the "gravicembali col piano e forte" in 1709

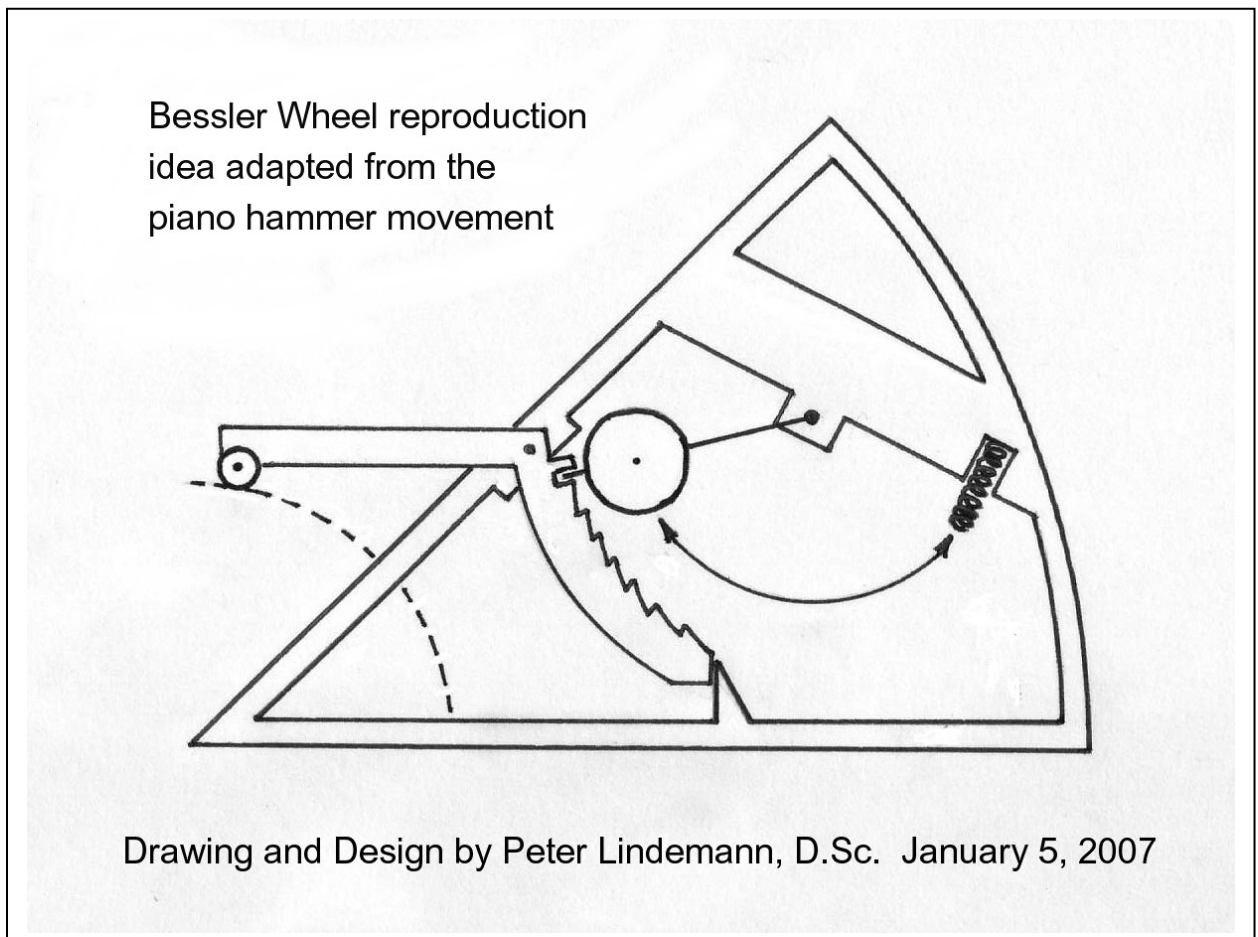
In 1709 Bartolomeo Cristofori (1655-1732) produced his first "harpsichords with soft and loud", the forerunner of the modern piano. This instrument featured the first real escapement mechanism and is often called a "hammer harpsichord." In shape and general construction it resembled a harpsichord, but it differed in its action mechanism. In a Harpsichord, the strings are plucked with a quill. But in the new instrument, deer leather hammers struck the strings, and a primitive escapement or "set off" was employed, enabling the hammer to escape from the string, rather than to fall back on it, thereby damping out the vibrations the hammer itself had originated.

The hammer was launched by striking the key on the keyboard. It moved all the way over to the strings, rapidly struck them, and bounced back 80% of the distance before being "caught" by the escapement mechanism.

The action was thrilling; the movement totally new. This was God's answer to prayer. The piano hammer movement may have been Bessler's best kept secret! Word of this new musical instrument, a keyboard instrument, must have made its way up from Italy to Germany around the time Bessler was working on the organ. At first, it probably seemed obscure and uninteresting. After all, Bessler was not a musician. But when all else failed, a close look at the new movement was all that was needed for Bessler to eventually put all the ideas together.



The adaptation came quickly. The piano hammer was replaced by a weighted pendulum. The string was replaced by a spring mechanism, or something the pendulum could land on and bounce back from at the end of its swing. The escapement became a multi-position spring loaded lever that could “catch” the pendulum as high as possible on its return swing. I call this movement “the transient excursion with spring return and multiple position stop.”



The only other feature necessary for the machine to work is the mechanism to trigger the release of the pendulum at the right time. This can be accomplished with a roller cam release on the catchment device at the right point. If this is the method that Bessler employed for his wheel, and I believe it may have been, then it puts his wheel in the same class of machines with other real engines. It had eight, sequential power strokes for every revolution of the wheel and required critical timing to make it work properly.

This idea for a Bessler Wheel reproduction is still conceptual at this point, and it may yet be improved upon. The curved, dotted line represents the stationary cam wheel that will have a lobe on it at the location where the pendulum is to be released (shown on page 8). The spring loaded landing area for the pendulum could be configured in a wide variety of ways, including strong, like poled magnets. The curved ratchet lever is slightly spring loaded to keep it against its lower stop mechanism, unless lifted by the cam roller or the return of the pendulum moving through the ratchet. Ideally, the pendulum should be released, swing out, bounce back and be caught by the ratchet within 45 degrees of rotation of the wheel.

Statements by Bessler and other witnesses in support of this thesis

There is a very small body of information that describes the internal workings of Bessler's Wheel. Some of these statements were made by Bessler himself. These statements must be considered true and any design which is an attempt to duplicate Bessler's work must conform to these statements. Then there is the one, unimpeachable eye-witness who was shown the inside of the machine, Karl, the Landgrave of Hesse-Kassel. His statements must also be considered true. And finally, there are dozens of other witnesses who saw the Wheel operate, but never saw inside. Most of their statements have auditory clues about the inside, because the Wheel, apparently, made a wide variety of sounds as it operated.

So, here are some statements and my comments:

Bessler said: "The machine is set in motion by weights."

Comment: The machine is purely mechanical and develops its power by the movement of weights. The only natural forces available to drive a purely mechanical system are gravity, inertia, and centrifugal force.

Bessler said: "Weights acted in pairs."

Comment: The minimum design will have two weights and a flywheel, and any other design will have an even number of weights, evenly spaced around the wheel.

Bessler said: "Weights gained force from their own swinging."

Comment: This is the most telling statement by Bessler. Notice that he does NOT say that the wheel gains force by *falling weights*. It is the *swinging* of the weights that drives the wheel. As the weight swings out and back on the transient excursion, its *center of gravity* moves far away from the axis. If all of the other weights are held near the axis by the mechanism and only one weight at a time is released to swing out and back in the horizontal plane (3 o'clock position), then the *center of gravity* for the whole wheel will remain off to that side indefinitely!

Bessler said: "Weights applied force at right angles to the axis."

Comment: As the pendulums swing out and back, they produce two thrusts of centrifugal force downward on that side of the wheel that is not countered by any other force from the other side of the wheel, where the weights are held stationary near the axis. This second driving force on the wheel will be discussed later in this article, when the work of Veljko Milkovic is considered.

Bessler's answer to whether there were springs in the machine was: "not in the way you mean."

Comment: Bessler's detractors accused him of using large clock type springs to power the wheel. Bessler denied this, but seemed to leave open the possibility that springs may have been used in other ways. In the proposed design, springs are used as a landing zone to return the

pendulum quickly to the starting position, and in the ratchet lever to hold its position against the stop. These are necessary features of the design.

Bessler said: “The machine’s power was directly proportional to its diameter.”

Comment: If the machine runs on a combination of gravity, inertia and centrifugal force, then the larger it is, the more power it can develop.

Prince Karl said: “The interior of the machine was simple” and he was amazed that no one had thought of it before.

Comment: In exchange for his patronage, Karl demanded proof that the machine was not a fraud. Bessler probably removed the side panels for Karl, so he could see that the machine was not powered by large springs. He probably did not run the machine for Karl with the side panels off. What Karl saw may have been similar to what our current design shows. Each section of the wheel had a pendulum weight and a lever mechanism for timing and control. Simple enough.

Prince Karl said: “It is so simple a carpenter’s boy could make it, if he was allowed to study it for five minutes.”

Comment: Perhaps in Karl’s day, carpenter’s boys were highly skilled. Bessler’s Wheel was essentially a wooden framework with swinging weights and some sort of simple control mechanism. It was not beyond the ability of a skilled furniture maker to replicate. This is why Bessler so jealously guarded the interior of the machine, and the secret of the design.

There are also these statements by various other eyewitnesses:

“Weights were heard hitting the side of the wheel going down.”

“Weights landed on slightly warped boards.”

Comment: The “slightly warped boards” could be the spring loaded landing zones for the pendulums. The idea is that the pendulum still has some momentum as it reaches the side of the wheel. The spring loaded landing zone can absorb that momentum and return it to the pendulum for its return swing.

“The Machine made scratching noises, as if parts or poles moved over one another.”

Comment: The pendulum catch mechanism moving through the ratchet could make these types of sounds, when made of wood.

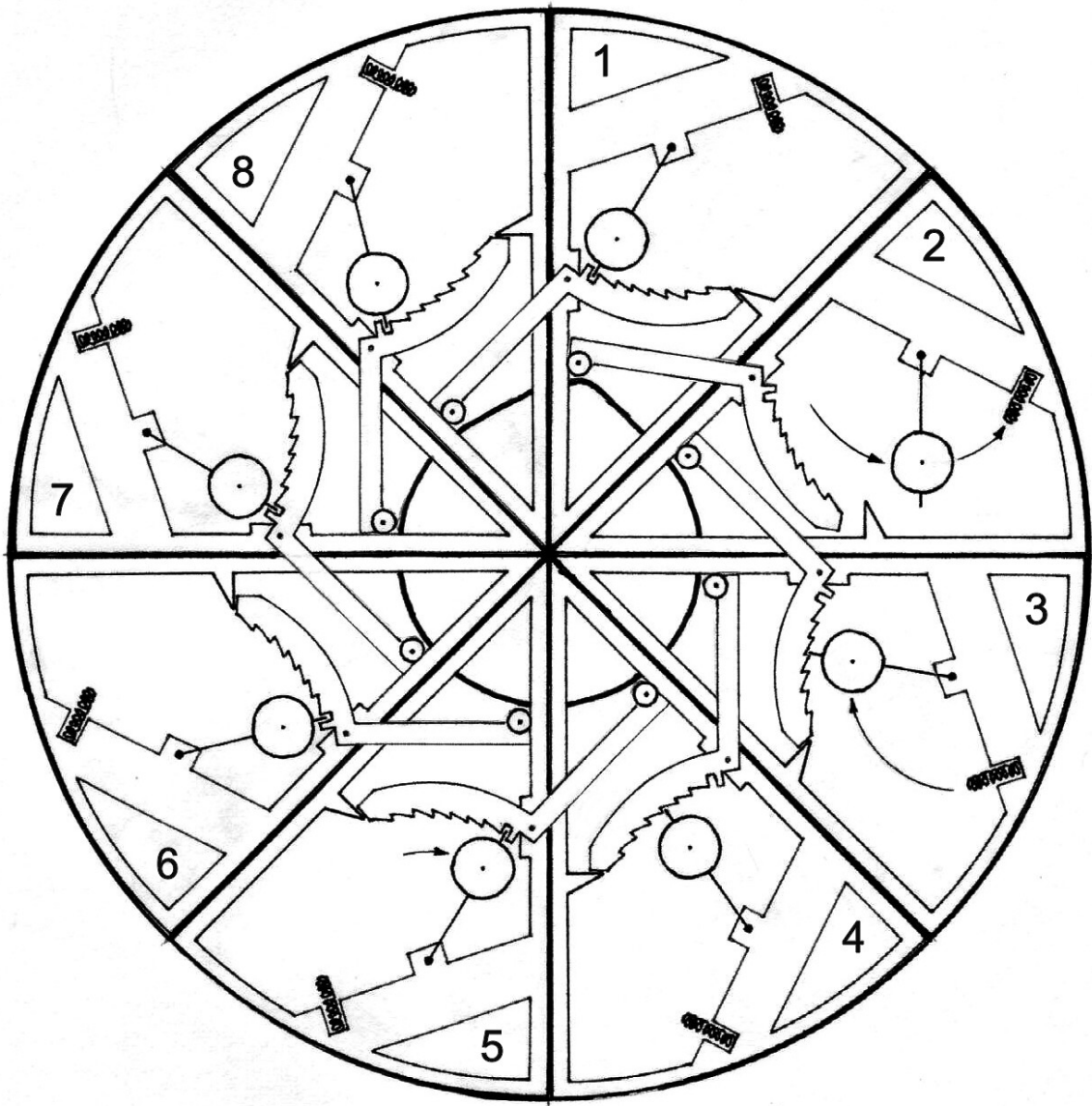
“About 8 weights fell during each revolution of the wheel, which took about 3 seconds.”

Comment: Bessler made four Wheels that we know of. This comment was made about the machine at Weissenstein Castle. All the machines seem to have had an even number of weights, but whether eight weights were used in other machines is not known.

Design features for a complete Mechanical Engine

In spite of all the research, inspiration and design similarities, there is no way to know for sure that this is Bessler’s design. Therefore, I have reluctantly named this design the Lindemann Mechanical Engine. It runs like this. The entire wheel and everything on it, except the central cam wheel, rotates clockwise around the central axis. It should be remembered that the ratchet levers are slightly spring loaded so that they rest against their respective stops. I have numbered the eight sections of the wheel to help with this description. In section #1, the pendulum is being prepared to be released. By section #2, the ratchet lever has risen up the cam lobe and released

The Lindemann Mechanical Engine
(possible Bessler Reproduction)
January 24, 2007



the pendulum to swing out toward the spring landing zone. Once there, it bounces back and is caught by the ratchet lever again after it has cleared the cam lobe. By section #3, the pendulum has been caught by the ratchet at a position somewhat lower than its start position. This is due to the fact that its actual start position is rotating upward relative to the pendulum's pivot point. If the out and back swing of the pendulum can be accomplished within 45 degrees of rotation of the wheel, then the pendulum's recovery position will be at least 45 degrees behind its start position.

By section #5, the pendulum has reset to its start position by the action of gravity. This final reset makes up for the pendulum's small positional loss encountered during the transient excursion between section #2 and section #3. All pendulums in sections #6, #7, #8, and #1 remain at rest, waiting to be released again when they arrive at the section #2 position again.

Since the cam wheel is stationary, a number of features can be employed to control the machine. First, if the cam wheel is slightly smaller than normal, the rollers on the ratchet levers will actually lift away from the surface of the cam as the ratchets come to rest on the stop mechanisms. This relieves the wheel of any unnecessary friction from the cam rollers as the wheel turns. Also, if the cam lobe were moveable up and down, then the engine could be turned on and off at will. When the cam lobe was retracted, the pendulums would not be released in section #2 and the engine would come to a stop. This feature is not shown in the drawing but can be understood as a useful control mechanism for starting and stopping the engine.

Beyond this, in operation, its power and speed are fixed, unless much more elaborate design features are employed.

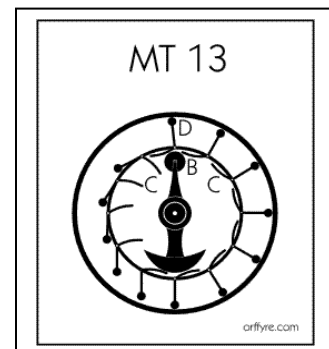
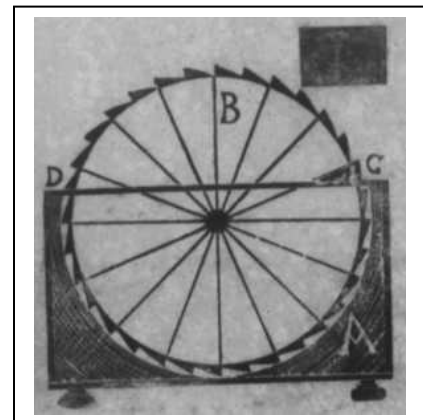
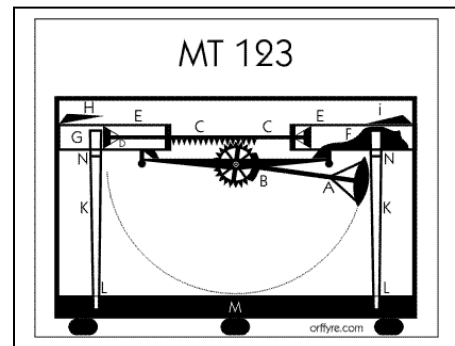
The Maschinen Tractate (Treatise on Mechanics)

Bessler claimed that all of the ideas embodied in the working machine were included within the designs of his *Treatise on Mechanics*. Bessler said, "1st May, 1733. Due to the arrest, I burned and buried all papers that prove the possibility. However, I have left all demonstrations and experiments, since it would be difficult for anybody to see or learn anything about a perpetual motion from them or to decide whether there was any truth in them because no illustration by itself contains a description of the motion; however, taking various illustrations together and combining them with a discerning mind, it will indeed be possible to look for a movement and, finally to find one in them."

So, are the main design features of the proposed Mechanical Engine found in the *Maschinen Tractate*? Yes, I believe they are. Many of the designs show weights hanging from long rods, but only one image shows a pendulum capable of a full swing movement. This is Design #123. Interestingly, the image shows the pendulum all the way over to one side and indicates its possible movement with a curved line.

Another main feature of the Mechanical Engine is the lever mechanism with the curved ratchet. I believe the curved ratchet gear feature can be derived from Design #106. This is one of the more curious drawings, as it is not clear at all what this model is supposed to do. The curved ratchet gear feature is plainly visible though.

A roller cam device can be seen directly in Design #13. This shows a counter-balanced cam mechanism that rolls around on the inside of the wheel. Its position is maintained by the counter-weight on the



bottom. By this method, the roller mechanism on the top can stay in position to flip the weights up as they come around. Bessler could have used a similarly counter-balanced cam mechanism to release the pendulums at the right time and keep the entire stationary reference inside the wheel to avoid detection.

There are numerous designs that show the use of springs and levers, so the reader can easily find them, if interested. So, again, I believe that the design for the current Mechanical Engine is well within the design parameters of Bessler's published work.

The current design is an attempt to redevelop Bessler's first style of machines that only turned in one direction. The cam wheel is stationary and the roller mechanisms on the ratchet levers roll around it as the wheel turns. This is the one design feature that Bessler would not have used. He was trying to conceal everything inside the wheel, so the internal, counter-balanced cam method in Design #13 was necessary. Since I am trying to reveal everything about the design, an external, stationary cam is all that is required.

Operational Efficiency

The Mechanical Engine runs on a combination of gravity, centrifugal force and inertia. The running of the machine constantly puts the weights in an off-balance position that favors the right side of the wheel. This produces a *center of gravity* profile that is predominantly in the mid-to-lower right quadrant. This alone would drive the wheel. But the main power of the wheel is derived from the "swinging of the weights" as Bessler said. Each time a pendulum swings out and back, two thrusts of centrifugal force pull down on the right side of the wheel. The engine's design allows the action of gravity and centrifugal force to be biased to the right side of the wheel, thereby harnessing these natural forces for the production of mechanical energy, without violating any Laws of Physics, except Newton's Third Law of Motion.

The efficiency of the engine should be quite high. The main losses would be air resistance, bearing friction at the axle and pendulum pivot points, and rubbing friction on the ratchet. Over 90% of the energy gained from gravity and centrifugal force should be available for use by the machine. Its "power-to-weight" ratio should be quite low. One horsepower is equivalent to 550 foot-pounds of work per second, so it might require a Mechanical Engine to be 10 feet in diameter and weigh 1000 pounds to produce one horsepower. For continuously charging batteries in an off-grid homestead or pumping water in a third world village, this would not be a problem. But, obviously, you are not going to run your car or fly an airplane with one of these machines. The COP of the machine is *infinite*, meaning that once started, the machine will deliver useful work with no operator input, and no environmental pollution. It produces no heat, consumes no fuel, and produces no greenhouse gases. Regular lubrication should allow a Mechanical Engine to run for many years without maintenance or parts replacement.

The Mechanical Engine is not a Perpetual Motion Machine and it will eventually wear out and stop. In spite of this technicality, the machine does draw from an inexhaustible source of "forces," those being gravity and centrifugal force, and it does convert these forces into useful mechanical energy by way of moving mass through a distance by force. In this way, it is able to cause a set of pendulums to swing out and back on the wheel in a continuously repeating cycle. By so doing, it is able to produce small amounts of energy, wherever the machine is placed, at little or no cost. In 1712, it is no wonder that Bessler called it Perpetual Motion.

Relationship of this design to the work of Veljko Milkovic

Unrelated to the history and recovery of Bessler's work, a quiet revolution in Classical Mechanics has been happening in southern Europe. Veljko Milkovic is a brilliant, original inventor and scientist who lives in Novi Sad, Serbia. His greatest discovery to date is his invention of the "Two-Stage Mechanical Oscillator." The Two-Stage Mechanical Oscillator consists of a balance beam with a pendulum hanging from one side and a fixed weight attached to the other side. When the pendulum is not swinging, the beam is balanced. But when the pendulum starts swinging, huge forces begin operating on the beam in a way that violates Newton's Third Law of Motion. Under rigorous testing procedures, the data collected suggests that up to 12 times more energy can be generated on the balance beam and removed to perform useful work than is required to keep the pendulum swinging. This is contemporary work, and it is shaking the field of Classical Mechanics to its very core. Unfortunately, in the linear oscillator mode, it is impossible to create a mechanical feedback mechanism to keep the pendulum swinging using some of the mechanical energy liberated from the beam. The system only works when the pendulum is in free oscillation, so it can't be mechanically connected back to the beam. It must swing freely. Milkovic has been working on using other means to close the loop and create a self-running system, including electric generators on the beam and electric motors on the pendulum. Therefore, the design of the Mechanical Engine may also solve the current set of problems related to a mechanical feedback mechanism between the beam (wheel) and the pendulum(s) that allows the pendulum to swing freely, but resets each swing to begin at the same height.

When I first began studying Veljko's work, I had an intuitive feeling that he had discovered the essential secret that powered Bessler's Wheel. I wrote my "Design Rules" in late 2005 and had discovered the auspicious 1709 date of the invention of the "piano e forte" by June of 2006. But it was the study of the Two-Stage Mechanical Oscillator that demonstrated the mechanical energy production from "swinging weights." If it were not for the brilliant, original work of Veljko Milkovic and his policy of publishing everything on the internet, I could not be proposing the design for the Mechanical Engine at this time. I owe an incalculable debt of gratitude for the remarkably original work of this gentle and generous genius from Serbia. His complete work can be accessed on his website at: <http://www.veljkomilkovic.com/indexEng.htm>

Conclusions

When I was designing and testing the earlier gravity motor ideas in 2005, I developed a way of doing a *center of gravity* analysis on the design, on paper, to determine if it was worth building the model. This proved very helpful and saved me from building many models that wouldn't work. That analysis on the current Mechanical Engine design strongly suggests that the *center of gravity* remains indefinitely on the mid-to-lower right side of the wheel. Secondly, the fact that the wheel's operation creates the condition where pendulums are continuously swinging back and forth in the 3 o'clock position and producing downward thrusts of centrifugal force on the right side of the wheel, that are not countered by any other force on the left side of the wheel, leads to the inescapable analysis that the wheel will turn clockwise with considerable force. The evidence is very strong and I believe that the design will work as is.

As of this writing, the Mechanical Engine has not been built and tested. The purpose of publishing the design "unproven" is to encourage its broad circulation among researchers, worldwide, without the burden of making claims and presenting proofs. It's a theory. At some

point, the operational status of this design will become known. If you choose to withhold judgment until then, that is fine. But if you see the possibilities, you are invited to get involved by building one, or spreading the word.

There are those who will reject this thesis outright, without even considering the design and the mechanical forces involved. They will cite various Laws of Thermodynamics and be content in their world view. This is not science, but it is typical of human nature.

Civilization began with the taming of fire and progressed with the invention of the wheel. But this planet is not really civilized yet, since as a group, humans have not outlawed war as a means of solving social problems or as an economic tool of oppression. Civility is not yet the birthright of all the children of the world. So, the advent of the “self-turning wheel” can be the beginning of a new epoch in human history. We have all been created by the same God, and He does not want us to fight over our dwindling resources. We must learn to cooperate and share, and be better stewards of what we have. We must tolerate our differences and stop demanding that others think, speak, and behave as we do. We must embrace civility in our human interactions and stop destroying the environment and mixing poisonous waste with our drinking water. One invention cannot change human nature, but hopefully it can inspire us to draw more deeply from our inner Spiritual resources.

I have worked on this project for more than five years at my own expense. Often, I have thought of getting a working model together and quietly selling it for \$1M, like Bessler tried to do, and retiring. But, quite frankly, the state of the world is precarious. We face unprecedented environmental stresses from pollution and climate change, as well as social, economic and political instability in many parts of the world. Trends of globalization are stressing the world's poor as never before. What is needed is a miracle, a gift from God to everyone. So, in my prayers and deep meditations, I have been moved to publish this design and trust God.

(Acknowledgment: A very special thanks to my loving wife, Jackie, whose emotional support, patience and tolerance has provided the necessary space for my creative process, which in turn has made this project possible.)

Resources

Bessler information websites:

www.free-energy.co.uk

www.orffyre.com

www.besslerwheel.com

Sites for information on the history of the piano:

http://www.uk-piano.org/history/history_1.html

<http://www.cantos.org/Piano/PianoHistory.html>

Site for the work of Veljko Milkovic:

<http://www.veljkomilkovic.com/indexEng.htm>

Site for the work of the author:

www.free-energy.ws

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