MINITRACK LX2: The portable tracker that is eco-compatible!

I believe many astronomy lovers have always dreamed of having an instrument to track the celestial dome that is light and easy to transport, as well as ready to go and easy to use, especially when

they are forced to go ever-greater distances to find dark skies where they can take astronomy photographs.

It was certainly among my own dreams until a few weeks ago when a colleague of mine showed me a nice little object that made the "light bulb" turn on in my head.
The object in question was a small rotating support that could be manually recharged. It made a full rotation in one hour and when a small camera or smartphone was mounted on it, was able to take time-lapse photographs with the frame in movement.
As soon as I saw it, my immediate response was: "too bad that it makes the rotation in just 60 minutes and not in 24 hours... then it could be an excellent and very small star tracker!"
However, the germ was in my mind. The virus had worked its way into my pathological passion for do it yourself. Almost subconsciously, I had begun to work out how to achieve something similar with modifications that would allow the movement I longed for: **one rotation per day to match sidereal time.**
After a few days, I found that the clockwork mechanism for my colleague's time lapse support was exactly the same as those used in the commonly sold self-wound kitchen timers, used to advise when food is properly cooked with the ringing of a bell.
Once I had acquired one of these clockwork timers and had removed its external casing (in the unprofessional shape of an egg, or perhaps a cook, an alarm clock, a strawberry, little piggy, etc.), I started to study how to reduce the gear down the small 21 tooth central gear 24 times.

Calculations lead to the conclusion that in order to obtain the correct speed I would need an enormous gear wheel of about 260 mm in diameter and 500 cogs. Any instrument built around a cogwheel of such a size could certainly never be easy to transport.
After briefly being discouraged, an idea struck me!
Could the timer track for one hour? Why then would one make a corona that would be able to function on its own for 24 hours?
I did not need the entire cogwheel, since it would mostly remain unused. Only a small "slice" of 21 cogs (the same as those in the kitchen timer), or maybe a few more to have some margin in the positioning, would suffice. It was the right idea!
Right away I designed the heart of the idea on the computer. Then developed the rest of the object around this "toothed arm", based on a solid single piece aluminium support that is able to hold the ball head (where the camera is mounted) on one end and the timer housing on the opposite end.
I later added a hole to the design for polar alignment and a threaded insert for mounting the tracker on any camera tripod.
Once I had completed the design, I sent the CAD files to a large, local mechanics workshop in the area furnished with tunnelling and laser cutting machines able to create the two fundamental pieces of the project: the 1 mm thick steel toothed arm and the aluminium block with the timer housing along with the various holes and inserts (for the ball head, wire attachments and polar alignment sight).
In the meantime, I got a medium sized ball head to use to both mount and change the direction of the camera.
After having made the bolt for the ball head with my lathe, I put everything together and started testing it.
Very soon I found some aspects that needed to be fixed. Limits had to be imposed on the clockwork mechanism in certain parts in order to facilitate the movement of the toothed arm. Also, I found the screws that held it could not be overly tightened since there was a risk of deforming the timer's plastic structure, which would lead to a loss of precision.
It was then I discovered a rather devious characteristic of these timers, namely that the speed of their rotation is not always of the utmost precision. I examined many different timers and found they make the full rotation in a time varying from 58 to 62 minutes.
To compensate for this error and bring the system to the correct speed of one hour, each single timer must be calibrated appropriately (in my project this was achieved by varying the radius of the toothed arm's arc).
My enthusiasm at approaching the finish line gave me the strength and ideas needed to overcome these obstacles and in just a few days, I was able to start having fun with the first prototype.
MINITRACK, as I christened it, has a maximum load capacity of 2 kg, weighs about 1 kg, remains relatively compact (circa 200 x 100 x 80 mm) and, what I believe makes it truly innovative, it does not require any electrical power to function.
The first model of the "MINITRACK" needed only wait for the full moon period to pass for the final tests under a cloudless sky, hopefully in the mountains.
The test runs so far showed sufficient precision to move optics of focal lengths of up to 100 mm (set to approximately 1 minute), with 50 mm lengths requiring 2-3 minutes, and wide angle, 24 mm, lenses requiring 4-5 minutes.
Taken from suitable locations and using fast lenses, these times were sufficient to achieve images of the Milky Way, the Constellations or a general broad field of view with many more stars, images I hope to offer to you soon!
Many of my astronomy loving friends liked the practical nature of the idea, which has encouraged me to make a small series of "MINITRACK" devices.

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We are pleased to inform that the Minitrack LX2 is now licensed and sold under Omegon© brand worldwide. More information here: www.omegon.eu

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