

BELOW  
A scale model  
of Al-Jazari's  
13th century  
Scribe Clock.



Recently named Best Touring Exhibition, the 1001 Inventions exhibition has gone from strength to strength. **Ali Khimji** looks at its development, highlights and purpose in the world today.

Over time, the beacon of discovery and invention has been passed between civilisations. The Mayans, Ancient Greeks and Babylonians all made their fair share of contributions to society, leading to improvements in the general welfare of the population. From the seventh to the 17th century, the Muslim civilisation undertook this responsibility and made breakthroughs in areas ranging from academia, science and architecture.

As there were no great discoveries in Europe during this time, the western public has been led to believe this was the Dark Ages,

where the whole world was in a period of stagnation. In their book, *The People Who Made Technology from Earliest Times to Present Day*, Anthony Feldman and Peter Ford jump from the Ancient Greeks to Gutenberg and Da Vinci, blithely skipping over 1000 years of amazing technological inventions. It was this revelation that historians had simply accepted a period of scientific blackout that led Professor Salim Al-Hassani down the path to create the 1001 Inventions exhibition.

In Professor Al-Hassani's own words, "All students are trained to think critically; yet when faced

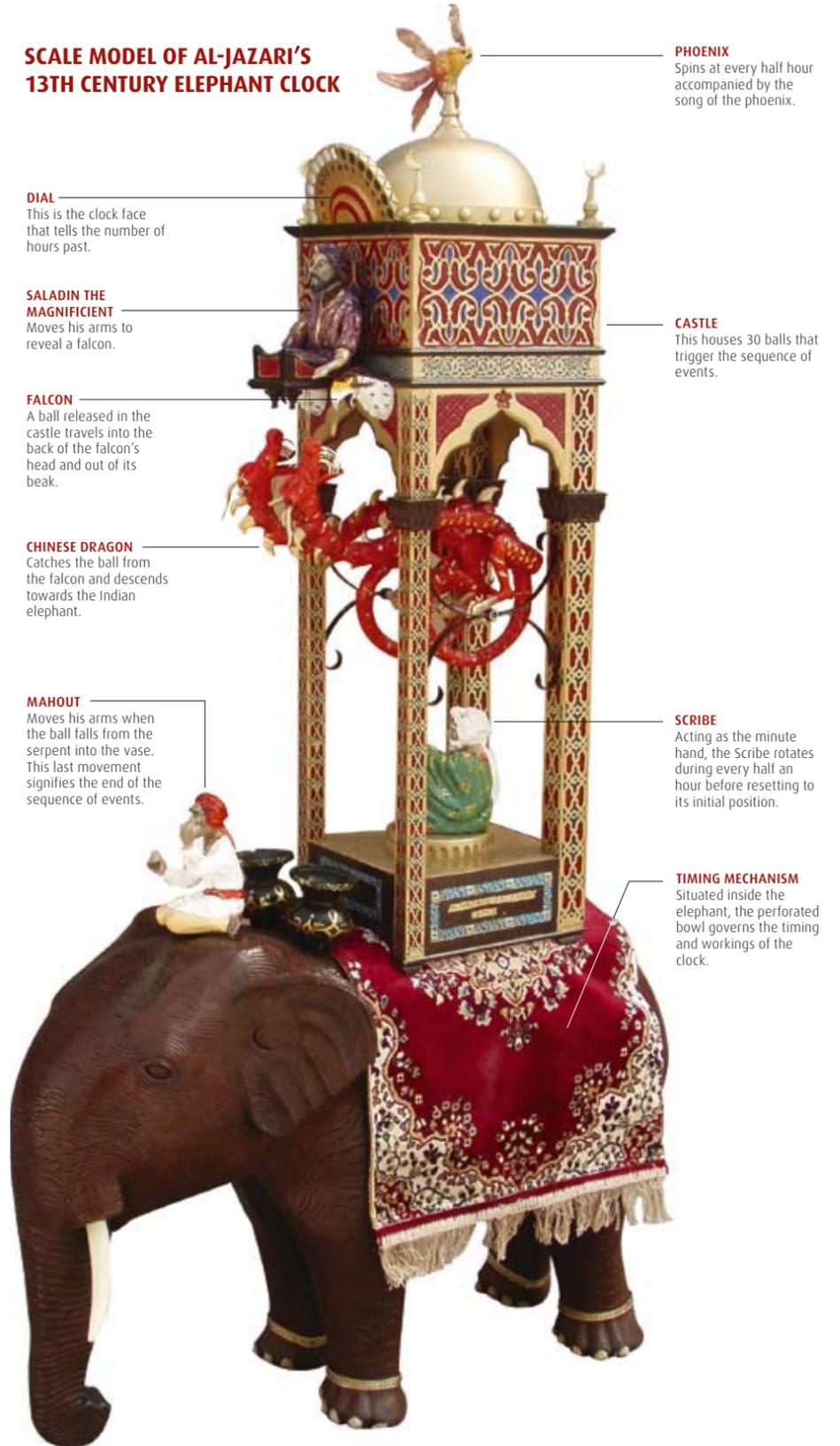
with the darkness of ten centuries in Europe they are told things appeared, as if by miracle, all at once during the Renaissance. This defies logic. Discoveries, inventions and further developments that alter the course of humanity, as any scientist knows, do not appear by chance! Continuity is fundamental, especially in the birth and rise of the sciences."

Professor Al-Hassani gathered like-minded academics and professionals, which then led to the establishment of the Foundation for Science, Technology and Civilisation (FSTC). His ambition to write a book on the Muslim world's contributions to the world around us gave way to 'Muslim Heritage' a website which then became a magnet for educational institutions and media groups.

After the success of the website, the initiative was taken to create an interactive, educational, non-political and non-religious touring exhibition to display the Muslim world's contributions to civilisation. Beginning life in 2006 as a travelling exhibition around the UK, it was hosted by the Manchester Museum of Science and Industry, Birmingham Thinktank, Glasgow Science Centre, National Museum Cardiff, and the Museum of Croydon. It also made appearances in Parliament in London, the European Parliament in Brussels, and the United Nations in New York.

In 2010, a bigger exhibition was launched, starting at the Science Museum in London. During its five-month run, it attracted over 400,000 visitors, one of whom was the Turkish Prime Minister, Recep Tayyip Erdogan, who requested the exhibition be displayed in Istanbul during Ramadan that year. His wish was fulfilled as the exhibition opened in August 2010 in Istanbul's Sultanahmet Square for seven weeks during which over 400,000 people attended.

**SCALE MODEL OF AL-JAZARI'S 13TH CENTURY ELEPHANT CLOCK**



**DIAL**  
This is the clock face that tells the number of hours past.

**SALADIN THE MAGNIFICENT**  
Moves his arms to reveal a falcon.

**FALCON**  
A ball released in the castle travels into the back of the falcon's head and out of its beak.

**CHINESE DRAGON**  
Catches the ball from the falcon and descends towards the Indian elephant.

**MAHOUT**  
Moves his arms when the ball falls from the serpent into the vase. This last movement signifies the end of the sequence of events.

**PHOENIX**  
Spins at every half hour accompanied by the song of the phoenix.

**CASTLE**  
This houses 30 balls that trigger the sequence of events.

**SCRIBE**  
Acting as the minute hand, the Scribe rotates during every half an hour before resetting to its initial position.

**TIMING MECHANISM**  
Situating inside the elephant, the perforated bowl governs the timing and workings of the clock.

BELOW  
The workings of  
Ibn Al-Haitham's  
pinhole camera.

The exhibition was hosted by the New York Hall of Science for five months from December 2010, where 250,000 people visited from all over the tri-state area. In May 2011, it opened at the California Science Center in Los Angeles, where it will be hosted for seven months. Secretary of State Hillary Clinton opened the exhibition and remarked, "The Muslim world has a proud history of innovators."

The exhibition has been arranged into seven different sections to categorise the range of inventions and discoveries: Home, School, Market, Hospital, Town, World and Universe. The main feature in the Home section is al-Jazari's

elephant clock. Standing 20 feet tall, it incorporates traditions from the many cultures that influenced and made up the Islamic empire. As the water filled up in the elephant, it would set off a mechanism that would trigger all the elements to move around and make a sound every half hour. You can also see the workings of the camera obscura, invented by Ibn Al-Haitham, which was the first working pinhole camera. Other discoveries include coffee — uncovered by an Arab farmer who found his goats became livelier after eating a particular berry; toiletries, attributed to

al-Zahrawi, a physician  
from Cordoba,  
who wrote

about nasal sprays, mouthwashes and hand creams; and the fashion seasons, introduced by Ziryab, who set the exact dates and also identified dresses which could be worn between seasons.

In the School section, you can see the obvious similarities in the numerical characters used in Arabic and Latin. We learn that the first university was founded by a Muslim woman. In 859, Fatima al-Fihri, a young princess in Morocco, used her inheritance to build a grand college-mosque complex, known as al-Qarawiyyin in Fez, which taught theology, science and rhetoric.

Another notable academic institution was the House of Wisdom in Baghdad, which was the authority on the arts, sciences and letters during the 9th century. Scholars present would study Persian, Indian and Greek texts to develop new ideas and concepts about the world around them.



The Market section is where the development of many goods that we use today can be seen. Whilst some of the ideas behind them may not have originated with Muslims, they were able to make best use of them and create industrial processes to take them to the mass market. For example, paper manufacturing originally came from China, but Muslims learnt the secrets of the trade and paper mills spread across Islamic lands.

Of course, it is not possible to trade goods without currency. Across the Muslim world, a single currency of dinars and dirhams was used to allow universality of payments between the bustling cities

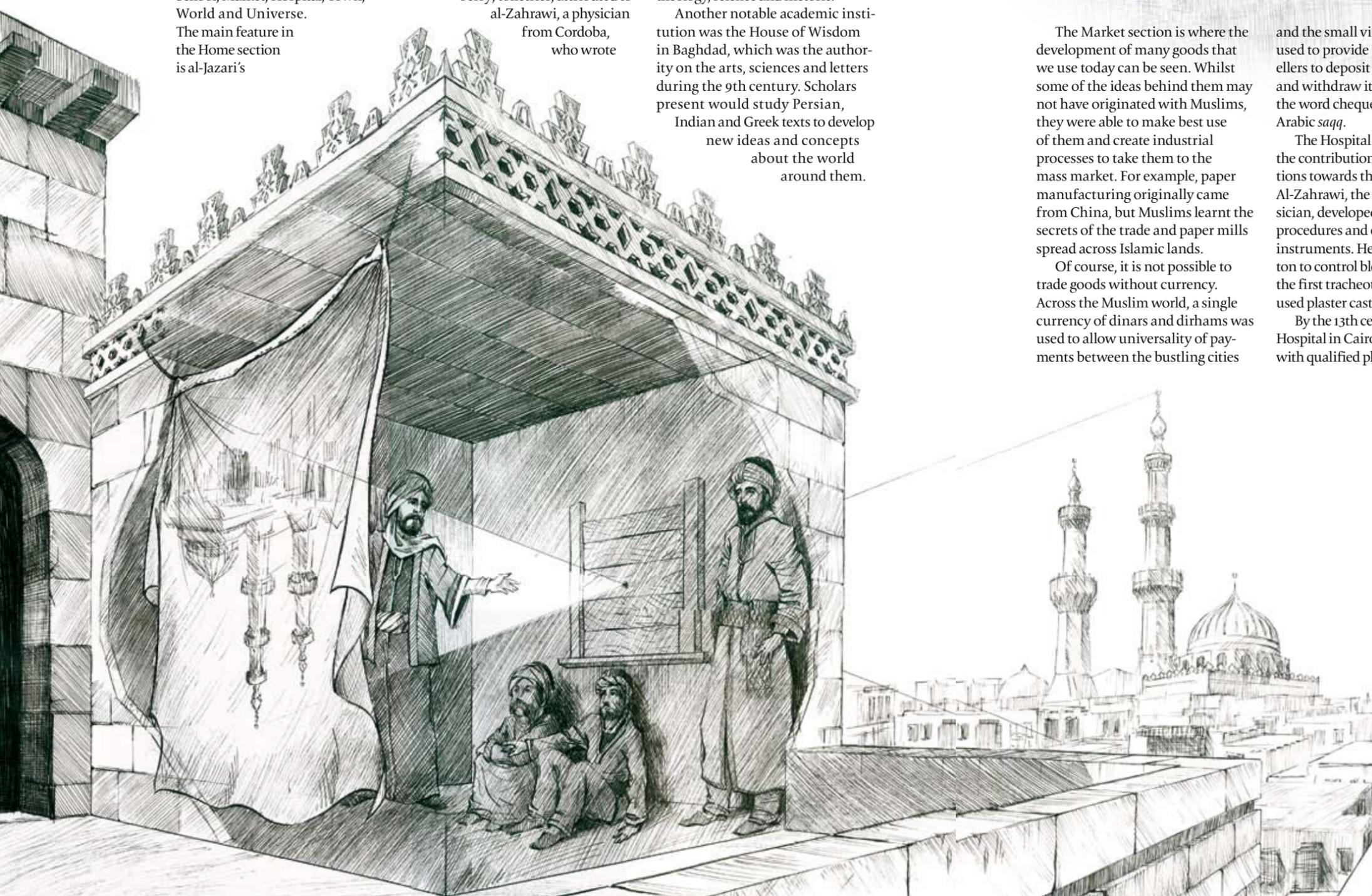
and the small villages. Cheques were used to provide the option for travellers to deposit money in one city and withdraw it in another. In fact, the word cheque comes from the Arabic *saqq*.

The Hospital section highlights the contributions of Muslim civilisations towards the fields of medicine. Al-Zahrawi, the 9th century physician, developed new surgical procedures and over 200 surgical instruments. He also introduced cotton to control bleeding; performed the first tracheotomy, and regularly used plaster casts.

By the 13th century, the Mansuri Hospital in Cairo was fully equipped with qualified physicians, attendants

ABOVE  
The life-size model  
of Abbas ibn Firnas'  
flying machine.

BELOW  
One of the ships in  
Zheng He's fleet.





**THIS PAGE**  
Childrens interact with various displays of the 1001 Inventions exhibition; the founder Professor Salim Al-Hassani.

to serve male and female patients in separate wards, and running water in all areas of the hospital.

The Town section explains how the concept of town planning came to influence our surroundings. As religion was central to cultural life, Muslims would place the mosque at the centre of town. Narrow streets would lead from there to residential areas, separate from the public areas, which were reserved for economic activity. Even the heights of walls were set above the height of camel riders, so that passers-by could not see into private property.

The city would employ people to maintain oil burners and lanterns, which would function as street-lights, and litter was collected on the back of donkeys and transported to special dumps outside the city walls. This was the norm in cities across the Muslim world in the 9th century, and is even more admirable given that Paris was known as The Muddy because of the heaps of garbage blocking the streets, with pigs scavenging through courtyards.

The World section is where some of the greatest achievements are displayed, and a particular focus is a model of Zheng He's ship. Zheng He was a Chinese Muslim who

went on to become the Admiral of the Chinese Fleet. In the 28 years between 1405 and 1433, he visited 37 countries and made seven monumental voyages for the purposes of trade and diplomacy. At his command, he had 27,780 men across 317 ships. Sixty-two of the largest ships were 440 feet long, and dwarfed the ship of Christopher Columbus in comparison, which stood at a mere 75 feet in length.

The Universe section features discoveries related to astronomy and the expanse that lies beyond the planet Earth. Muslims had to observe the daily ritual of prayer, thus it was essential to be able to

determine the time and direction in any location. Astrolabes were used for this and whilst they were recorded as being used in Ancient Greece, Muslim civilisation's astronomers explored their functions more fully. Muslims also took a keen interest in the night skies and were able to make use of the observatories that popped up across the land. As a result, over 165 stars still have names with Arabic origin.

There is also a life-size model of Abbas ibn Firnas, the first person to have flown with wings. His two most famous flying attempts came in Cordoba. The first, in 852 CE, was unsuccessful when he wrapped



himself in a loose cloak, stiffened with wooden struts and tried to para-glide from the minaret of the Great Mosque of Cordoba. He was fortunate to escape with minor injuries. In his second attempt, he mounted a hill on the outskirts of Cordoba, as a 70-year old man with a flight machine made from silk and eagle feathers. After taking off, he flew to a great height and stayed in the air for over ten minutes in front of many spectators, before plummeting to the ground, breaking the machine and injuring his vertebrae in the process.

This did not defer him, however, as the accident caused him to realise the role of a bird's tail when it

lands. Birds land on their tail first, and ibn Firnas was obviously unable to do this. Nevertheless, his lesson was incorporated into modern aeroplanes, in the way they land on their rear wheels first.

An accompanying film to the exhibition, entitled 1001 Inventions and the Library of Secrets, stars Oscar-winning actor Sir Ben Kingsley. He plays a librarian who takes a group of schoolchildren on a journey back in time to meet some of the scientists and engineers from the history of Muslim civilisation. This short film won the Gold Award for Best Education Film at the Cannes Film Festival in 2010. It also picked

up five Gold Winners at the New York Film Festival in 2010.

To date, the 1001 Inventions exhibitions has managed to reach out to millions of people, through the exhibition itself and the accompanying book, film and website. It has enlightened all to the vast contributions that Muslims have made in the fields of science and technology through an engaging and interactive experience.

Whilst it is important to recognise the great achievements of scientists and scholars during the Islamic Golden Age, the exhibition is careful not to encourage pomposity. Rather, it is a means to inspire young people to go in to the fields of science and engineering in the hope that they will strive to achieve similar great things.

But more significantly, it is an indication that the history of one group of people is intertwined within the history of the world. The advances made by Muslim civilisation went on to spark further findings during the Renaissance and the subsequent eras. We begin to realise the evident mesh of historical achievements, and this should lead to a strengthening of bonds between communities and nations today, thereby creating much-needed empathy and understanding in our rather fraught world. ●

**ABOVE**  
Sir Ben Kingsley as Al-Jazari in the film, '1001 Inventions and the Library of Secrets.'

**BELOW**  
The Abbas ibn Firnas Experience, a thrill ride that gave visitors a birds-eye view of Istanbul in Summer 2010.

