

# Science centre's bright spark

THE flame cauldron, lit by the Olympic torch at the opening of the Youth Olympic Games (YOG), was designed by a Singapore Science Centre inventor.

Dr Tsai Her Mann, 56, is the brain behind the Vortex Flame or Fire Tornado which naturally channels airflows to create a swirling column of fire.

The vortex, which will be burning on the floating platform in the Marina Bay throughout the YOG, was adapted from an original tornado, which will be the focus of the Science Centre's fire exhibition which will be opened later this year.

Initially, Dr Tsai wanted to use the same concept to create the Olympic torch. However, the events artistic team decided to use his invention for the cauldron instead.

"I was at the opening ceremony and when the flame was lit, I felt relief more than anything. Although we had tested it so many times, I felt relieved everything worked perfectly," said the aeronautical engineer who used to work for **DSO National Laboratories**.

Over the last two months, the tornado had been tested at the site of the opening ceremony at 4am to "avoid someone stealing our thunder and putting it up on YouTube".

The 8m flame uses about two megawatts of fuel, less than half the amount conventional Olympic flame cauldrons use. Dr Tsai hopes his design could be used in the future for other Olympic events.

Construction of the cauldron took four months. It was assembled in Singapore with parts shipped from Australia.

The idea has been patented in Singapore and the United States.

VICTORIA VAUGHAN

## TOWER OF FIRE

The lighthouse tower and fire tornado seen at the Youth Olympic Games opening ceremony was created by Singaporean engineer Tsai Her Mann. **The Straits Times** looks at how it works.

### Flamelets

80 small flames called "flamelets" are evenly distributed around the central flame. This creates the effect of them seemingly feeding the main vortex.

### Cooling the glass

The tube is made of a series of glass panels to prevent overheating.

The panels are angled so that when air enters, it flows over the inside surfaces of the panels and cools them.

Even so, temperatures can reach up to 200 deg C.

### Creating the tornado

The guide vanes force the air to enter at an angle, creating the spiralling motion of the flame.

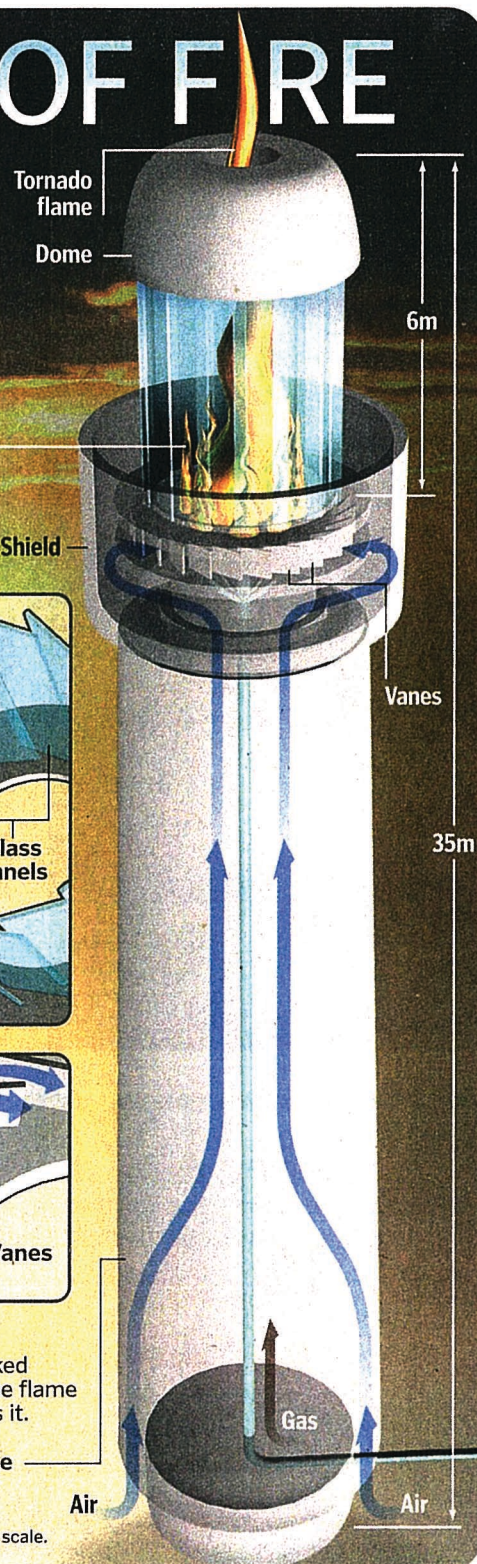
### Fuelling the flame

Air enters the base of the tower, and is sucked upwards. This is because the hot air near the flame rises, and air from inside the tower replaces it.

The entire tower is shielded to protect the flame from ambient wind conditions.

Source: TSAI HER MANN

NOTE: Drawing not to scale.



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