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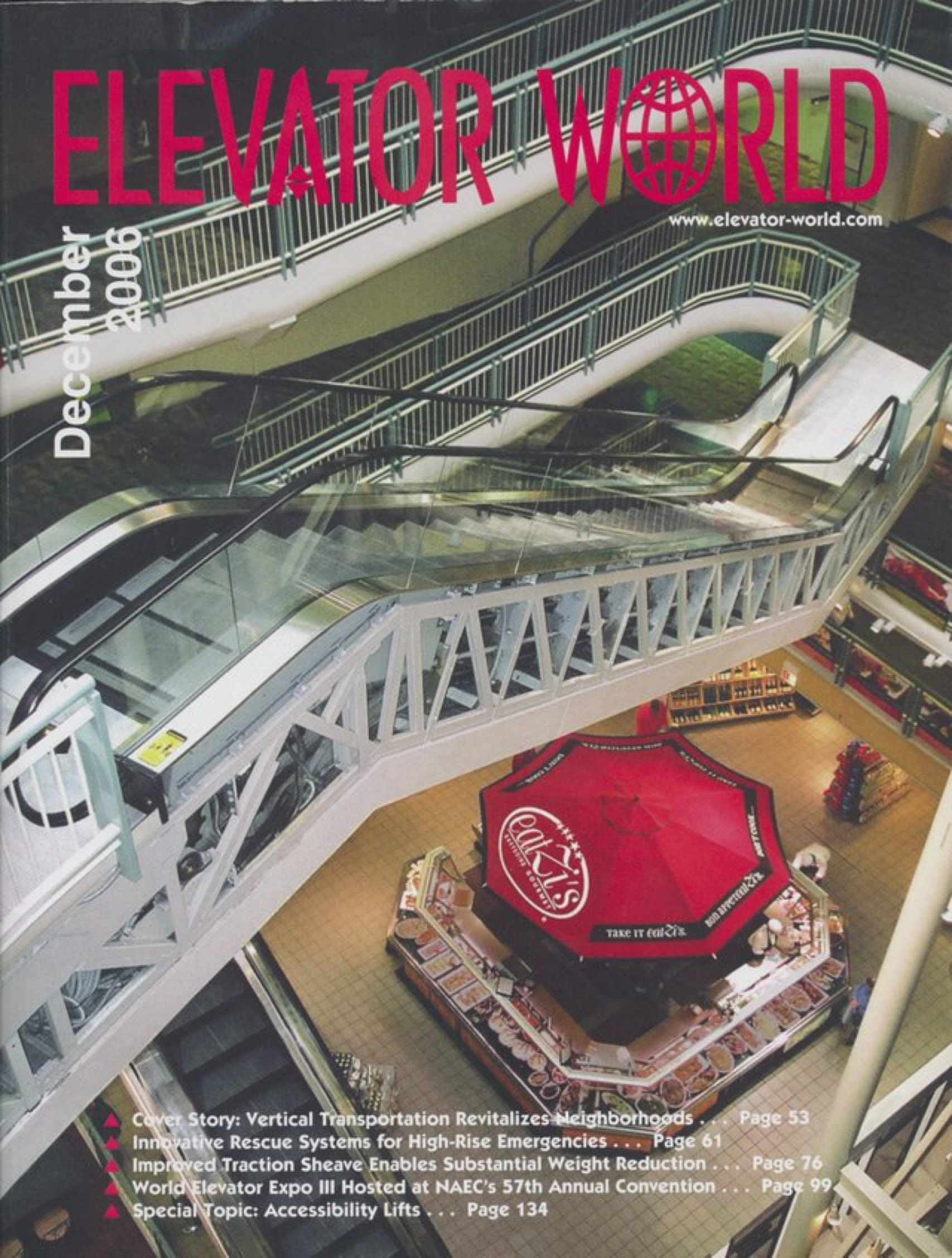
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Figure 1: Rescue efforts illustrated

The fifth anniversary of the September 11, 2001 tragedy in the U.S. has recently passed. In the entire world, there is no single place where people regard it with indifference. The frames of the newsreels replay in our minds again and again, chilling our blood with the visions of aircraft plunging into the Twin Towers – smoke, screams and faces disfigured with horror, of the people calling for help from the windows of the doomed skyscrapers.

When recalling these events, many people surely asked themselves a question: “Was it really impossible to escape?” However, there are individuals who have devoted themselves to seeking an answer.

The catastrophe in Manhattan created a wave of close attention to high-rise buildings and revealed serious problems. In many people’s minds, the collapse of the Twin Towers meant the dissolution of the myth of human safety, even with those high-rise buildings equipped with state-of-the-art facilities. However, we write here not about the emergencies caused by the planned acts of terrorists. No, we address the danger created by common fires.

It must be taken into account that conventional fire escape is normally designed for 12-to-14-story buildings, while the world’s leading telescopic hydraulic ram, the Bronto Skylift F 90 HLA, operates at the maximum height of 90 meters (i.e., 25 floors). For example, the firefighters

Safety of High-Rise Buildings

Should Be up to the Mark!

by Igor Goldstein

in Moscow have as many as two such giants. The inhabitants of high-rise buildings taller than 90 meters can only set their hopes on the reliability of fire-alarm systems and automatic firefighting systems on their upper floors.

Unfortunately, there is not a skyscraper existing today of which its creators could boast of a reliable system of ensuring quick and safe evacuation of a large number of people in an emergency. This is a concern for many people who are involved in any respect with high-rise construction, such as contractors, investors and operators.

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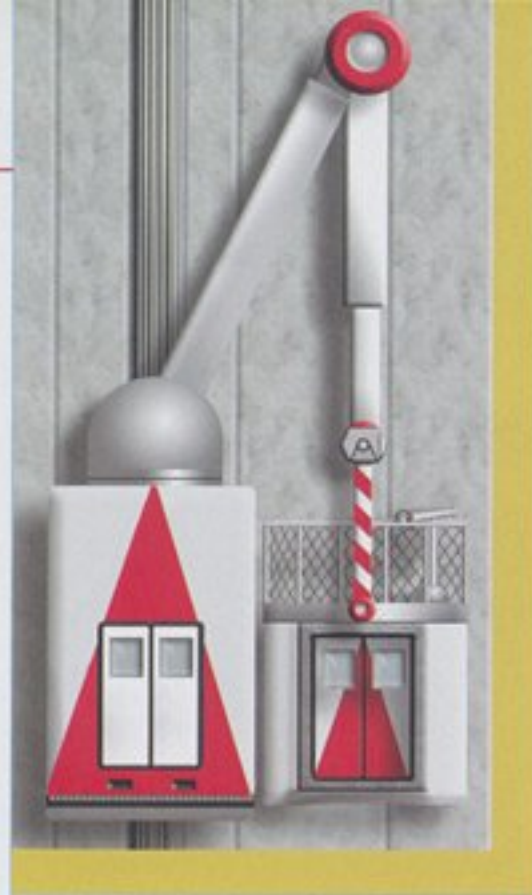


Figure 2: The ARC elevator travels on an H-shaped guide rail.

Safety of High-Rise Buildings

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An original solution for the challenge of evacuation was tested in Israel two years ago. Escape Rescue Systems (ERS) (www.escaperescue.com), an Israeli company specializing in life-saving equipment, presented a system of the same brand name. Its preproduction model, approved by the Standards Institution of Israel and the Ministry of Social Affairs, was mounted in the city of Ramat-Gan with two goals: to test it and to demonstrate it.

The ERS model consists of a rope system, the piers of which are located on the building roof in a folded state. In emergencies, they unfold and lift to the required height with the use of stand-alone motors. The ERS is made of five vertically oriented cabins covered with refractory fabric material. The cabins, designed for 30 persons each, stop directly opposite the windows of five subsequent floors. Beneath the window sills, there are structures that allow the instantaneous unfolding of a ramp and converting the window into a fire escape. Each cabin has two places designed for rescuers or firefighters assisting the evacuation. As the tests demonstrated, a single system of this kind is capable of evacuating up to 140 persons from a 40-floor skyscraper in eight minutes.

It might look as if the solution has been found. However, when ERS CEO Dr. Jonathan (Yoni) Shimshoni offered testing of his creation in Manhattan, he was

opposed by the municipal government. Security expert Joseph O'Donnell expressed concern that as a result of even slight overloading, all five cabins could collapse. Officials encouraged Shimshoni to continue his research.

Many evacuation methods for emergencies in high-rise buildings have been proposed. Moscow inventor Pavel Korchagin has proposed his own alternative, which he calls ARC Technology (www.arcproject.ru).

Similar to the Shimshoni effort, the tragedy in the World Trade Center was the stimulus for the group of designers of this device for rescuing victims. It was in 2002 that Korchagin first applied for a U.S. patent for his invention. The system consists of a rail of a certain profile that is fixed on the surface of a building, along which a hoist can move that is equipped with a telescopic arm. A specially equipped cabin is installed on the end of the telescopic arm. A self-contained power supply, firefighting-agent tanks, the use of heat-resistant materials, and state-of-the-art control and communication devices convert the hoist into a mobile robotic system intended for extinguishing the fire and rescuing people at any height.

During the following four years, the inventor developed a range of modifications and significantly expanded the spectrum of the device's capabilities, thus making it more cost effective. Patents have already been obtained for a number of the innovations, and several dozen inventions await their turn in the offices of patent authorities of different countries.

This is what the inventor says about his works: "Our project did transform during these four years of its existence, but even more, it has taken shape from a concept of a rescue device into the development of a multipurpose system that allows to resolve not only the tasks of mass evacuation, but also many other matters associated with the erection and operation of high-rise buildings."

Figure 3: The guide rail may be hidden behind sliding shutters.

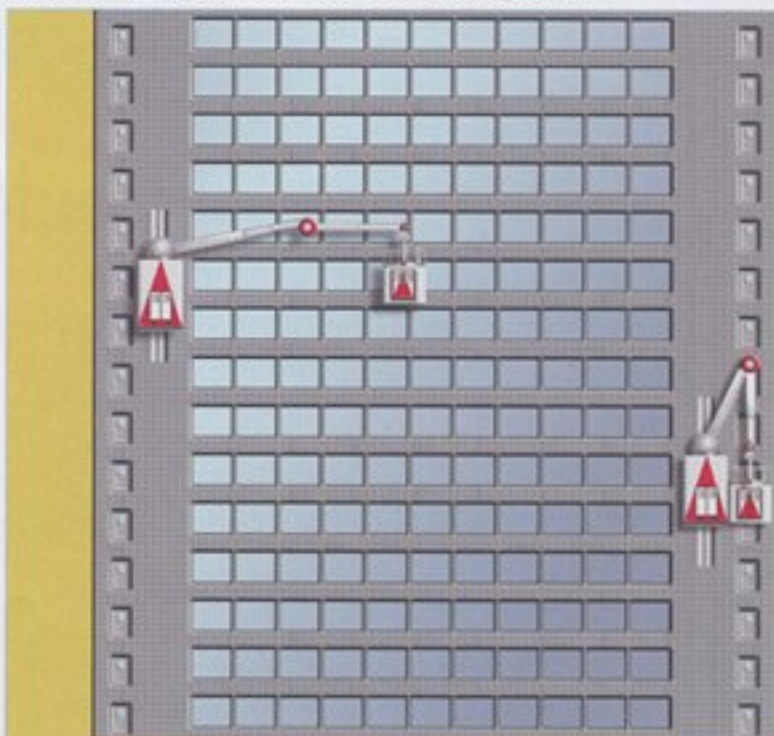




Figure 4: Building-corner application



Figure 5: The ARC system can be equipped with rescue corridors.

Interview with the Inventor of ARC Technology

Igor Goldstein (IG): Do you have a sense that somehow your inventions are far from reality, as they exist only on paper?

Pavel Korchagin (PK): No. At present, some specialists are seriously studying our design. [Their] functions include resolution of concerns of safety and operation of absolutely specific buildings. Not long ago, in response to a request by specialists of ZAO Mirax-City, I developed the concept of an external lifting system for a multipurpose office-and-recreation project that is currently under development in Moscow City called the Federation complex. In addition, the managers of the Moscow Regional Center for Television and Radio turned to us with a request to adapt the ARC system in order to provide for its location on the Ostankino TV Tower. Following the fire that occurred in summer 2000, great attention was paid to the safety of visitors, recognizing that in any emergency it would be necessary to rescue approximately 400 persons from the tower. It is not by accident that, despite promotion on TV promising to start excursions at the tower on March 8, it was until recently that the most popular sites (such as the Sight Ground and the Sedmoye Nebo restaurant) have been closed for visitors. The reason is that the tower has not been equipped sufficiently.

Figure 6 shows the view of the Ostankino TV Tower as equipped with the ARC systems. As one can see in the drawing, the familiar outline would be slightly altered, but

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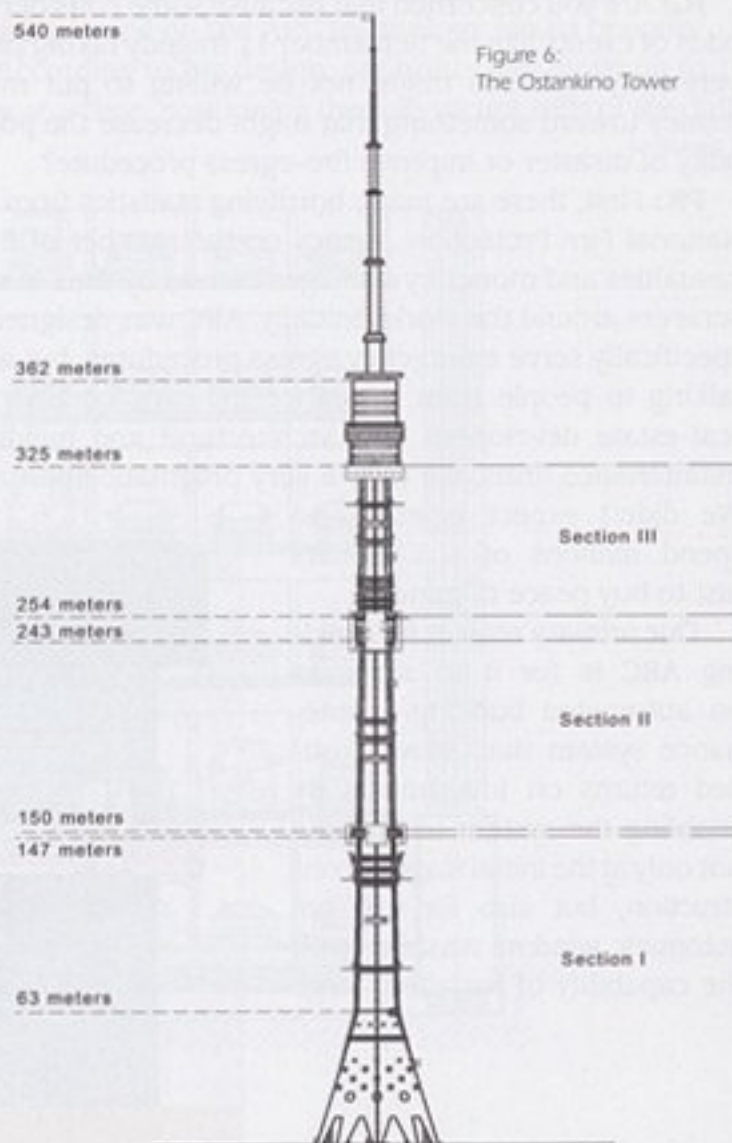


Figure 6:
The Ostankino Tower

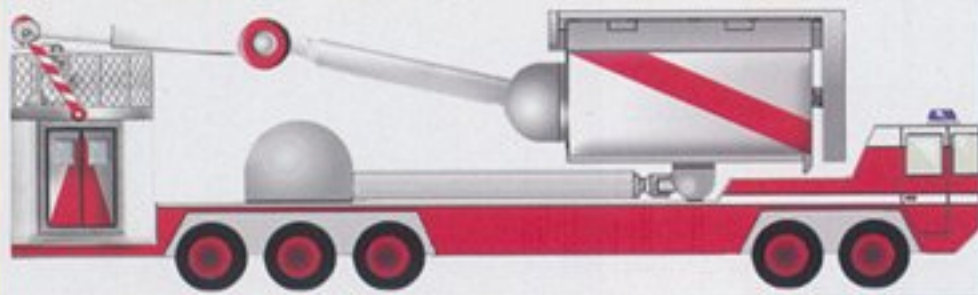


Figure 7

Safety of High-Rise Buildings

Continued

Figure 7: The ARC can be brought to the site of a high-rise emergency on a special transport.

Figure 8: Other uses

Figure 9: Parking solutions

the originator of such alterations, the ARC system, would not only ensure safety for visitors and maintenance personnel of the tower, but can also be used for scheduled repairs of any suspended equipment as well as for placement of advertising and even for carrying out excursions outside of the tower. In the opinion of both Russian and non-Russian experts, the external rescue system I've proposed for the Ostankino TV Tower is the most effective.

IG: Are you concerned that because some consider the odds of events like the September 11 tragedy taking place very low, investors might not be willing to put much money toward something that might decrease the possibility of disaster or improve fire-egress procedure?

PK: First, there are many horrifying statistics from the National Fire Protection Agency on the number of fires, casualties and monetary damages caused by fires in skyscrapers around the world. Initially, ARC was designed to specifically serve emergency egress procedures, but after talking to people from insurance industry, commercial real-estate developers, and architectural and building-maintenance firms, we took a very pragmatic approach. We didn't expect investors to spend millions of U.S. dollars just to buy peace of mind.

Our primary reason for building ARC is for it to serve as an automated building-maintenance system that allows justified returns on investments by enabling the system to be used not only at the initial stage of construction, but also for external automatic window washing with the capability of installing large

neon marketing displays on even the tallest buildings – something that wasn't possible before. ARC is described in detail at our website www.arcproject.ru (in both Russian and English). This should excite investors and make them realize that ARC is first and foremost a day-to-day building-maintenance system that will serve fire management and egress procedure in case of need.

IG: At first sight such innovations look rather odd, but they seem to be in demand. Who else is ready to use your creation?

PK: In February, our design was presented at the Moscow Commission for Architecture, where it gained many positive responses. I think the only obstacle for broad application of the hoist in modern high-rise development consists in absence of a ready preproduction model. The range of capabilities of the ARC system includes a list of other functions in addition to people rescuing. First, the cabin of ARC is equipped with fire-extinguishing devices that allow fighting the fire in the immediate vicinity of its source, which will increase the efficiency of fire-extinguishing efforts. Second, the crane

Figure 8



module would be able to move loads and workers to a required height as the building grows. The same module could help decrease the costs of dismantling a building in future. Third, with the use of a washing unit, it would be possible to conduct cleaning and washing of a building's external surfaces in an automated mode. Fourth, a special device would allow the unfolding of a huge screen to be used for advertising on the façade of the skyscraper. And fifth, our system will help resolve the problem of car parking that is an indispensable scourge in the operation of any high-rise building. Please keep in mind that I have not listed all items here.

IG: You've just mentioned the parking problem. This past year, the chief architect of Moscow, Alexander Kuzmin, rejected plans for the erection of a high-rise municipal building in Mariino when it turned out that based on applicable regulations, a third of the area would have had to be covered with parking sites. It is well known that attempts have been made to meet this challenge; one example is two famous skyscrapers erected in 1964 under the design of architect Bertrand Goldberg in the Marina City of Chicago. Eighteen lower floors of these buildings were occupied by a spiral garage ramp.

PK: Surely, the Marina City represents impressive buildings and an unusual solution for its time, but the concept failed to expand, based on two reasons; first, the streamer and maneuver zones consume expensive square meters of useful area, and second, just imagine overcoming 18 turns of the spiral twice a day. Not many would love the attraction.

In my opinion, parking in the 21st century must be fundamentally different. It is understood that the concept of capturing parking slots generally emerged due to the fact that [designers] could not find an efficient solution to provide the number of parking slots that matched the pace of urban development. We don't know whether the innovation will settle down in Moscow, as many car owners plainly do not imagine a different way to move in the city besides on wheels. Additionally, the very rhythm of the city dictates that after having come to work, a modern businessman can freely give away his car for storage (similarly to how we do it with overcoats at a checkroom) and go onto his business. This is the principle that any parking based on the ARC technology would operate.

According to my design, car hoists can move up to 10 cars at a time, positioning them in vacant cells of specially

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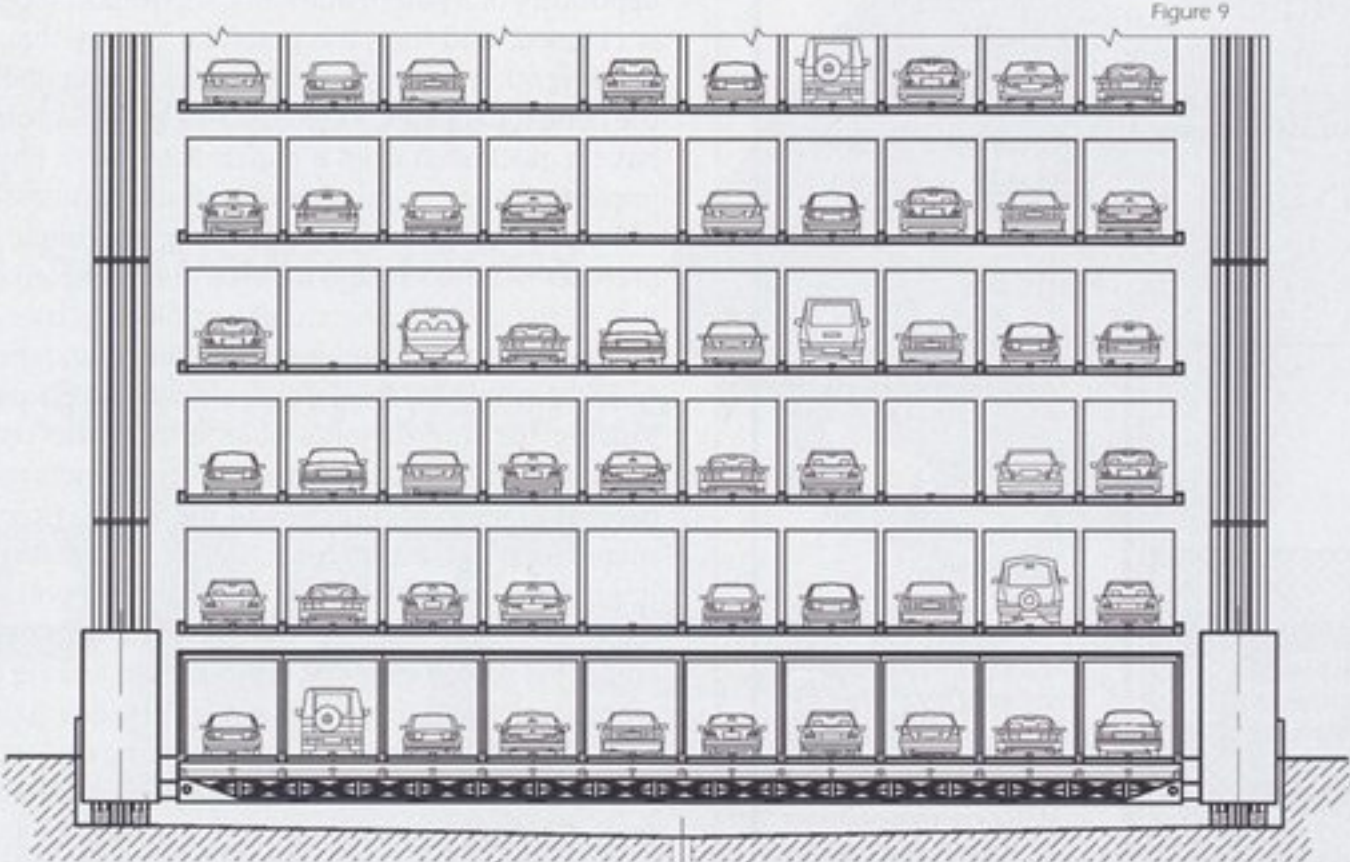


Figure 9

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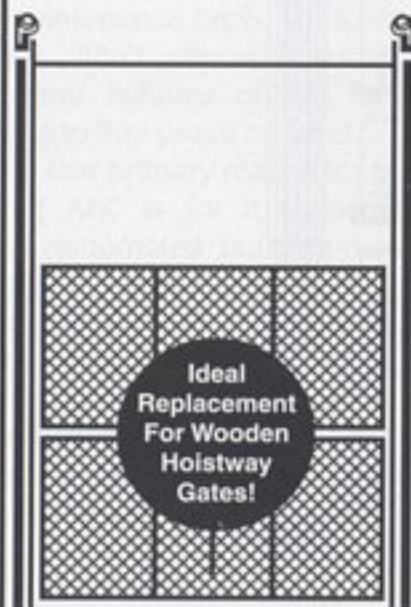
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Safety of High-Rise Buildings

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adapted floors. For the purpose of such a garage, the lower part of a building or an extension can be accommodated. To ensure that the areas are utilized with optimal efficiency, a system of compact placement of vehicles is provided; the useful area of parking makes up to 95% of total area.

It must be noted here that the technology of vehicle transportation for the purpose of storage to the floors is no news. It has been successfully applied by the German firm CarLoft® GmbH (www.carloft.de).

IG: As our conversation is taking place at the eve of the Inventor's Day, let me express my greeting to you on your professional day. What one can wish for an inventor is apparent: new ideas, their recognition and realization. What would you wish to your creation, ARC?

PK: For any invention, it is vital that it will not remain a scheme, just another volume in the endless depository of a patent authority. It is important that it is claimed, and then the potential energy that is in any invention will expand and be used repeatedly for the benefit of people. I would wish the ARC project to have a quick shift from a paper state into a physical implementation. A number of serious manufacturers of lift and handling equipment have confirmed their preparedness to engage themselves in implementation of the project. The stumbling block is trite – the money issue. Several investors in Russia and the U.S. (www.RescueARC.com) have already taken part in funding the international patenting of the project. Together with me, they are the co-owners of my patents in various countries of the world. However, manufacture of a preproduction model is currently impossible without strong financial support from interested organizations. That is why I wish that we could find some farsighted businessmen among those whose activity directly involves high-rise development who would take the risk of implementing our project.

Igor Goldstein is president of Industrial Technologies International, LLC in Minneapolis.