Designing of hydraulic lifts and their impact on the scenography of theatrical performances

Dr. Aya Mohamed Kamal Eldean Amean
Lecturer -Faculty of fine arts at Alexandria University
ayaMohamed.Kamal@alexu.edu.eg

Abstract:

The designer's ability to create theatrical scenes to impress the audience is reflected in the challenges of using and designing hydraulic lifts. It is what gives the theater audience a sense of life on this stage, in addition to integrating them with characters, backgrounds, and movements that make the scene seem animated, realistic, and magical, and around the world many theaters are using hydraulic lifts as one of the main elements of theatrical performances.
The design of hydraulic lifts is based on understanding the special needs of theatrical performance through design vocabulary and thinking about its problems, and looking at it from the shape and functional point of view on the basis that it is an integrated chain that moves in a sequential or successive manner in addition to addressing all possible mechanical solutions, whether they are simple or complex, identifying guidance systems, defining methods of control and movement, the possibility of determining their movement sequence, exploiting the interconnectedness in movement, which is pre-determined, understanding the effects of the entire system, and preparing operating systems that include the application of design standards in all its stages, this in addition to finding solutions that enable us to rearrange the design vocabulary to maintain diversity in the form of presentation through reuse in a different way or upgrade and renewal, and thus hydraulic platforms are among the most important scenographic elements that distinguish theatrical architecture, as they provide scenography with the ability to provide an action and a response to the action through its relationship with the rest of the elements to achieve the desired scene, as the director and scenographer are being able to present moving paintings on stage to take the actions of scenes to the necessary and impossible fabrication, allowing the ability to implement scenes that were not available before, and showing skill in achieving mechanical and electronic design requirements by creating kinetic environments that depend on creating an unexpected shock.

Keywords:

Reflections, Challenges, hydraulic lifts, theatrical scenography

Introduction:

Our use of the term challenges does not depend on the method of implementing the scenes used as a background for the design only but extends to include costumes, lighting, effects, tricks, theatrical architecture, and even audience seats, and the reflection of all these elements on the designer’s inspiration for his design vocabulary using the movement mechanics of some design elements, for example, the designer’s inspiration for movement in the design is from one of the creatures in nature or dependence on the shape and features of one of the creatures in the design, even if there is no theatrical text that imposes the shape of the character or the features of the costume.

DOI: 10.21608/MJAF.2021.103207.2526

Sometimes the exploitation of structures based on nature or one of its elements in the design and moving even if on the street turns into a theatrical show and the character, in turn, turns into one of the elements of scenography, such as the movement of an insect's wing and the way it is exploited in designing the movement of one of the design elements. Inspiration from nature is not only limited to the mechanics of movement, but also goes beyond that to the inspiration of the forms of units of nature or the combination of the possibilities of two or more creatures to create new technology motivated by understanding human needs and finding solutions to design problems based on nature, and looking at living organisms as a series of interconnected systems that have the appropriate solutions to the problems we face in various fields by finding the optimal function, and these solutions vary to include (mechanical solutions - design solutions - industrial solutions - architectural solutions..... .) This is due to the flexibility and adaptability of nature without violating the ecosystem, by identifying jobs and integrating them with the existing technology at that time.

Problem:

-How to present the most effective set design depending on the complex electronic, mechanical, technological systems in professional theatres?

-How to provide theater productions with intelligent ideas depending on using theatrical elevators?

- How can Scenography present evolution in theater engineering techniques to create imaginary worlds through the interaction of technology with humans and how to provide artistic ideas to enable us for moving to new dimensions?

Research importance:

Shedding light on the technology of exploiting elevators and moving platforms, which is the main source that provides modern theatrical designs with the ability to act and react, and to show the skill in achieving the requirements of mechanical and electronic design, which enables the designer to formulate and build models to simulate them by building devices and machines designed to achieve the theatrical scene by relying on what lighting and effects can provide and the ability to combine them with the mobile platforms to achieve the aesthetics of creative design, which was not available before in theatrical design, as it is variable in terms of the nature of theatrical performance between performances; Dramatic, circus, musical...etc. According to what it bears of a dramatic and narrative nature, despite the change of the performances.

Goal:

- Prove that the design of a scenography does not necessarily depend on the presence of many elements, but may depend on only one.

- Clarifying that the integration between three-dimensional projection and the movement of human groups and their relationship with modern technology is the main focus in scenography design.

-Proving that preparing the display area, designing elevators and moving platforms, and providing kinetic technology for theatrical elements has become one of the main axes of the design.

Search limits:

The research is based on the study of some theatrical architectural models and the challenges on which the design of elevators and moving platforms depended as one of the scenography elements of the presented performances, and its reflection on the way that was used since the beginning of their construction until the present. In this research, we cannot specify a period of time, we have discussed the beginnings of theaters in the design and construction of elevators so far, and the relationship of all this to the future of design.

Research Methodology:

The research depends on the descriptive and analytical approach for some of the theatrical spaces for which the architectural construction relied on the movement of elevators and theatrical platforms.

introduction:

The design begins with a specific purpose by understanding the movement requirements for the first scenographic elements and their relationship to the shape and design of elevators, identifying problems related to the system and operation, and thinking about movement sequences through design that enable us to invent new movement patterns to maintain the principle of innovation in design, in addition to the ability till integrate platforms and elevators and creating common artistic values between it and the moving elements of performers, effects, and lighting to emphasize the interaction between all of them.

We can divide the machines of elevators and theatrical platforms into two categories: the permanent category, which is built as a part of the theatrical architecture, the mobile platforms with elevators which are designed and their movement design, whether they are theatrical platforms or the audience seating platforms, and they are built during the construction of the theater architecture (so that they become part of the architectural building), and another category is the elevators that are designed for a specific theatrical show and have special requirements for designing a specific theatrical show, and they change according to the change of the presented theatrical show, whether it is (regular proscenium theater or open theater, circus show or opening show.... ...etc.).

After that, all flying systems are identified for the rest of the scenography components and their compatibility with the moving platforms is determined. Flight systems are one of the most important systems after hydraulic lifts because they are responsible for lifting and flying the elements within the theatrical scene. The movement of actors and scenes above and below the stage also depends on the use of elevators and moving platforms and integrating all of this with the levers above the stage.

Safety and security Challenges requirements:

Safety and security requirements must be maintained for hydraulic lift systems on stage that operate under hydraulic pressure controlled either electrically or hydraulically, which is often connected to the stage floor (below the stage) bearing in mind the perception of the repetition of elevator movements during the theatrical performance according to the sequence of events within the theatrical performance, and we must realize that the stage floor is not flexible enough to accommodate undefined movements that may occur as a result of any improper malfunction,

elevators move through vertical, or horizontal, movement, either by rising and fall or horizontal or circular movements or movements that push the viewers or that push the design elements and actors up and down or to the sides.

Although the horizontal movements on the stage are unlimited, there are many other configurations such as the carriage, in which the scene is built on a low platform mounted on wheels that can be rolled from side to side or can rotate around itself, this reminds us of what was happening in the ancient Greek theater when performances were initially presented in public places such as squares, they used a chariot called "Thespis carriage", (which belongs to the Greek actor and playwright) that moved from one square to another, or the shape of a semi-circle fixed by an axis at one end that can move from one side to the other, or the Eqostra machine, which is similar to the previous one, but it is rectangular and moves on wheels and the Mechanic hoisting machines.

Theater Royal Drury Lane

This theatre is one of the oldest theaters that used elevators and hydraulic bridges which allow quiet movement for theatrical scenes, these elevators were installed on the Dory Lane Theater, which was built in 1898, using electric power to help create elaborate scenes (at the time), using wires which were made of steel to control the movement of bridges.

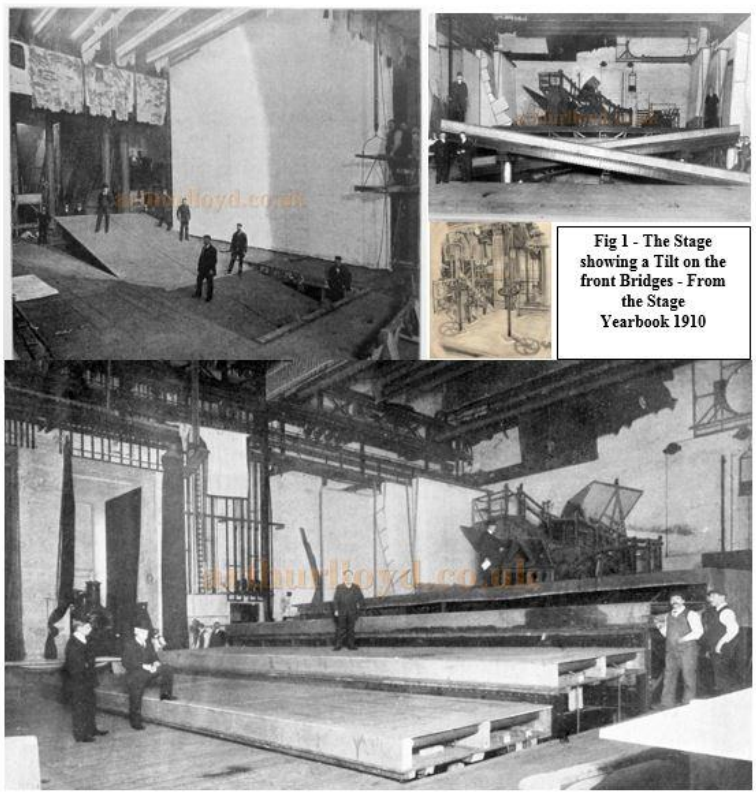


Fig 1 - The Stage showing a Tilt on the front Bridges - From the Stage Yearbook 1910

The Building News and Engineering Journal reported that the hydraulic elevators designed to exceed an area stage are mechanically powered by a series of bridges that move in seconds to go up and down the stage by simply pressing a button to lower or raise the scene in a few seconds with the greatest ease.

Fig 2 Each bridge is 40 feet long and 6 feet wide. To form an area of 240 feet that can be vertically heightened by 8 feet, in addition to the possibility of moving each bridge independently, providing complete flexibility, and one of the parts of the bridge can be tilted from the other part to serve the dramatic event on the stage.

The two rear bridges are not sloped, they are moved with electric power up and down, which gives a stable surface for maximum bearing heavyweights, and the systems of these bridges are balanced using steel ropes, which connect the bridges using rotating pulleys, allowing the use of small pilgrim engines and less electric current. As for the engine room, it consists of a room built of fire-resistant bricks and located at the bottom of the back of the stage.

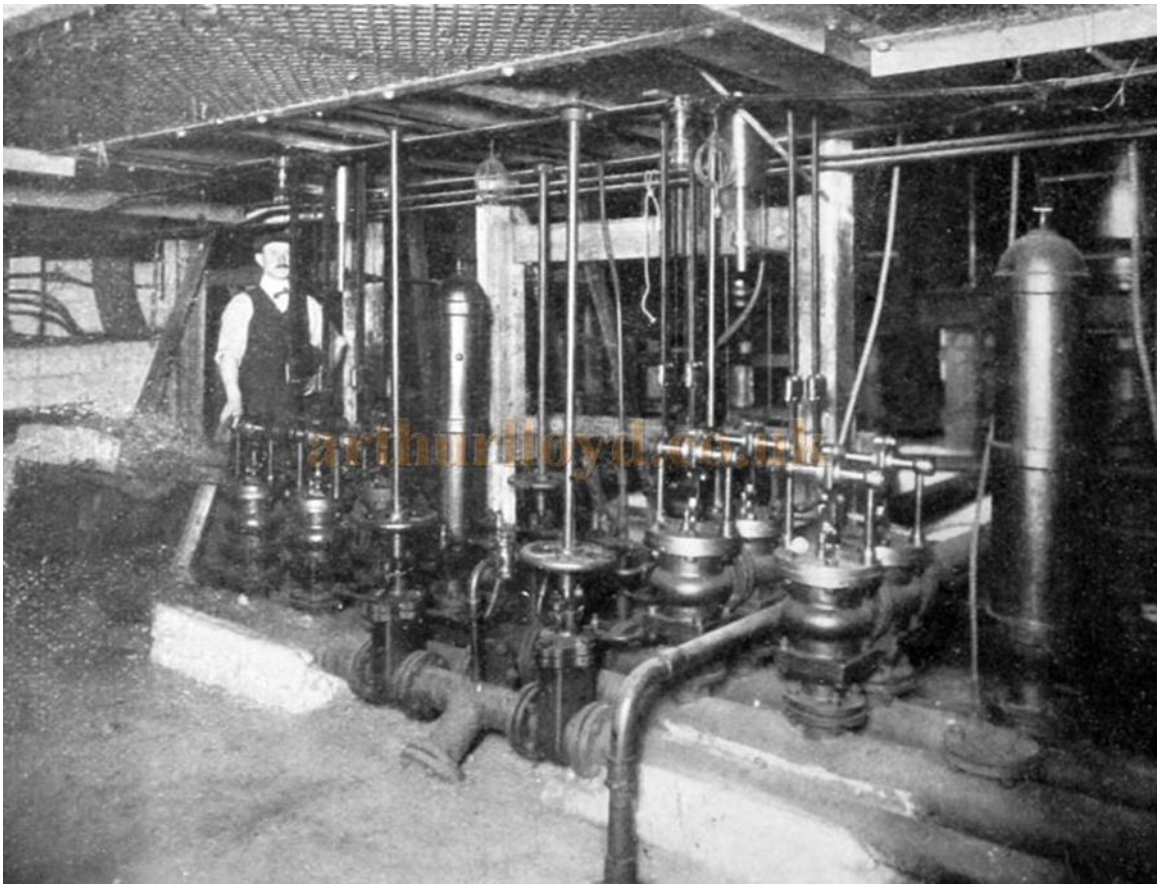


Fig 3 The Control Valves for the Bridges, which admit water below the massive plungers - From the Stage Yearbook 1910

As for the two front bridges, they are powered by water energy through a system that relies on vertical iron cylinders dug in the foundations. High-pressure water pipes are connected to the bottoms of the cylinders and the water flow is controlled by valves. It is also possible to control the raising or lowering of one of the sides of these bridges so that they tend in one of the directions by controlling the amount of water.

Several modifications have been added to the system concerning adding parts to the engines to implement certain scenes, the movable platforms were very complex and were built as part of the theater architecture at Dory Lane Theatre, and although the theater had not been operating for decades, when The Lord of the Rings was presented in 2008, the system for the elevators on stage had to be repurposed. The theater (exploiting parts and deleting other parts and being able to restart again, the elevators used were built in 1898, and until 2008 they have operated again until 2019).

Backstage at Radio City Music Hall 1932:

Radio City Music Hall Showplace of the Nation, which was built by Peter Clark in 1932 it was the largest moving theater in the world and was implemented using hydraulic equipment and controls and was opened in 1932. The stage system was divided into four movable platforms, one of them carries the orchestra chariot, and the other three move using hydraulic force, which can move these cranes, which weigh tons.

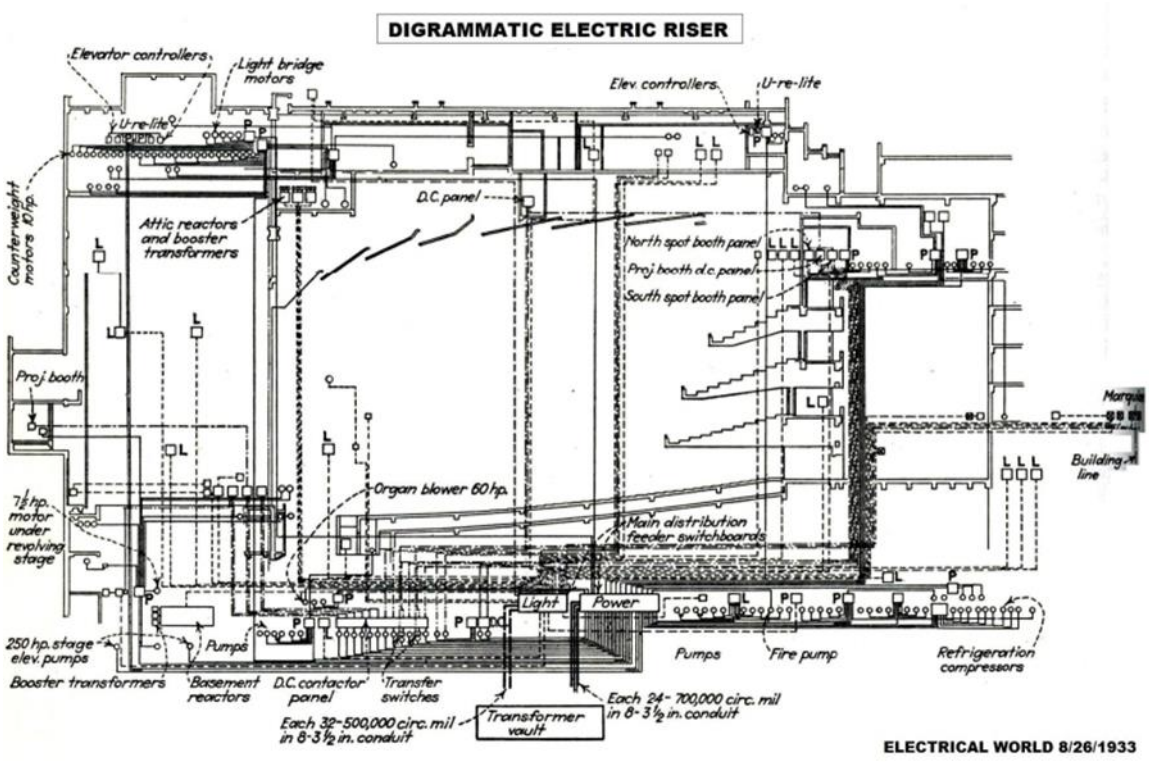
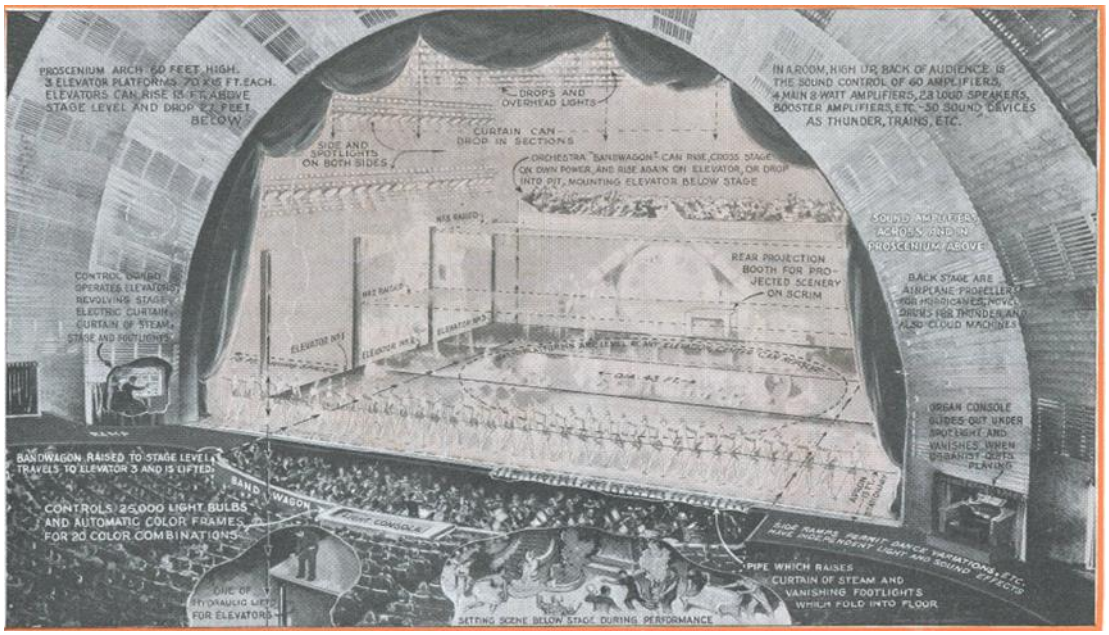


Fig 4 Elevation for Radio City Music Hall Showplace of the Nation

Peter Clark, the designer and founder of this place, created a stage that contains a hydraulic elevator for the orchestra, which has been considered a distinct masterpiece since its time until the present time, as it is independent, but he unified the design of the elevators for the stage and orchestra together to meet the requirements of the scenic and complex design at the same time.



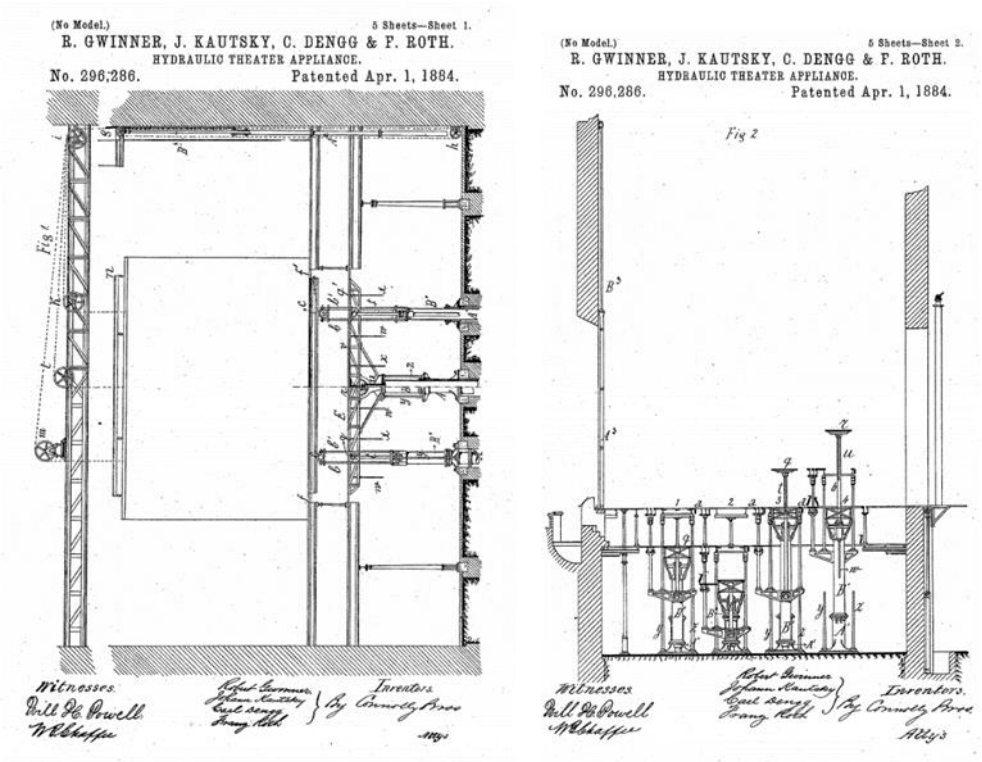


Fig 5 The flying hydraulic system was previously built by Fritz Brandt, who works as Mechanical Director at Wagner's Bayreuth Opera House, who invented the aperture orchestra hydraulic system, which remained unique until it was installed on Broadway in 1922

These innovations were exploited after nearly twenty years by Peter Clark, who re-exploited this system in addition to what he invented of ropes made of steel that were used in movement instead of combustible ropes, and not only inventing and developing the hydraulic system but also invented another lighting system that still exists today.

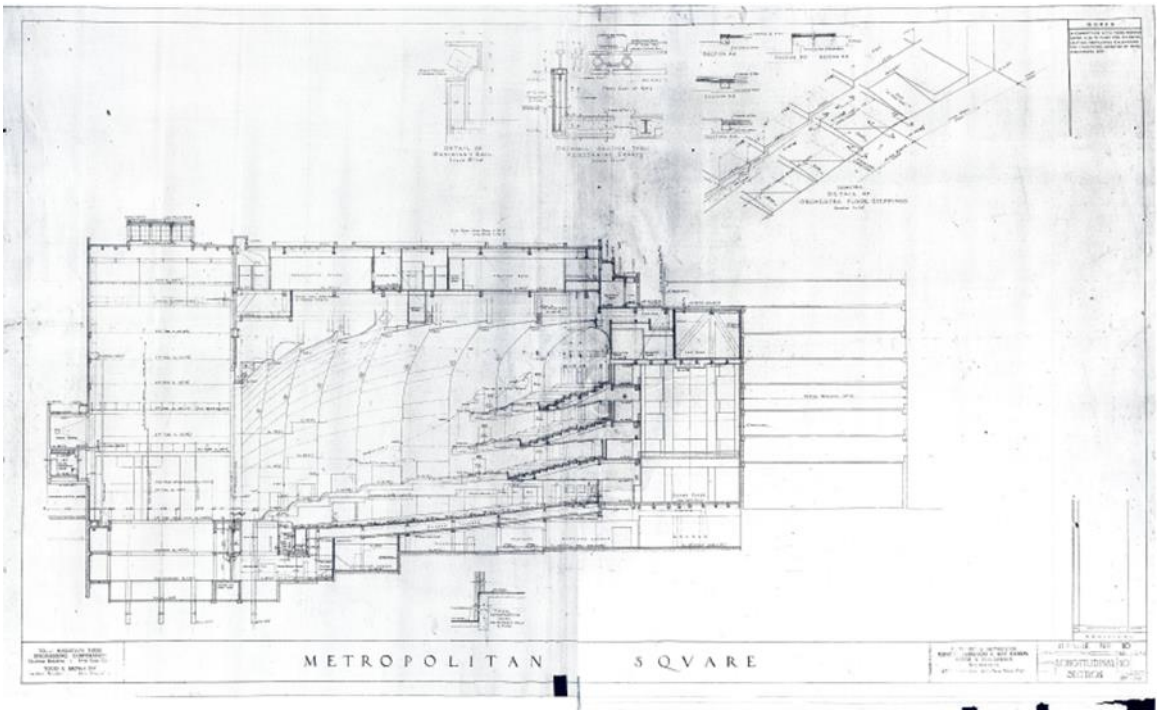


Fig 6, elevation for the hydraulic system and the lighting system that still exists today.

The many systems that Peter Clark has introduced into various theaters have become a broad base for theatrical innovations from that time until now. Gears of the hydraulic system, which remained in use even after his death through his foundation. Clark designed and built a fully functioning stereoscopic model for Radio City Music Hall. The 6,200-seat building was inaugurated by a crew of five hundred artists. The front curtain was a three-ton heavy golden satin that was lifted by thirteen motors. They are controlled individually from the control panel, the building contained magical control panels that could control everything.

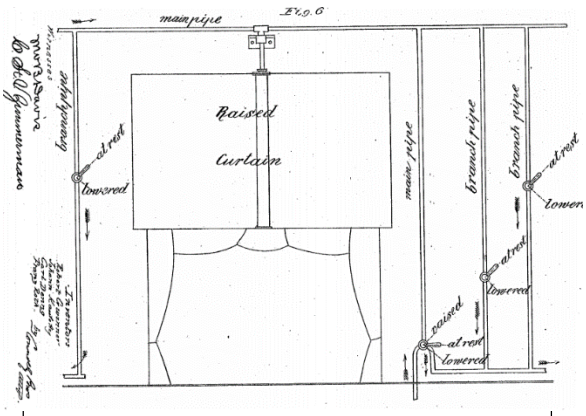
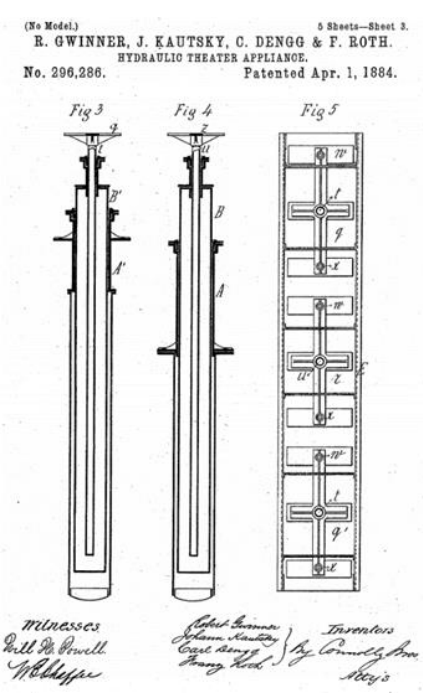


Fig 7 the ropes made of steel and used in movement instead of combustible ropes.


(No Model.) 5 Sheets—Sheet 3.

R. GWINNER, J. KAUTSKY, C. DENGG & F. ROTH.

HYDRAULIC THEATER APPLIANCE.

No. 296,286. Patented Apr. 1, 1884.

Fig 3 Fig 4 Fig 5

Witnesses

Inventors

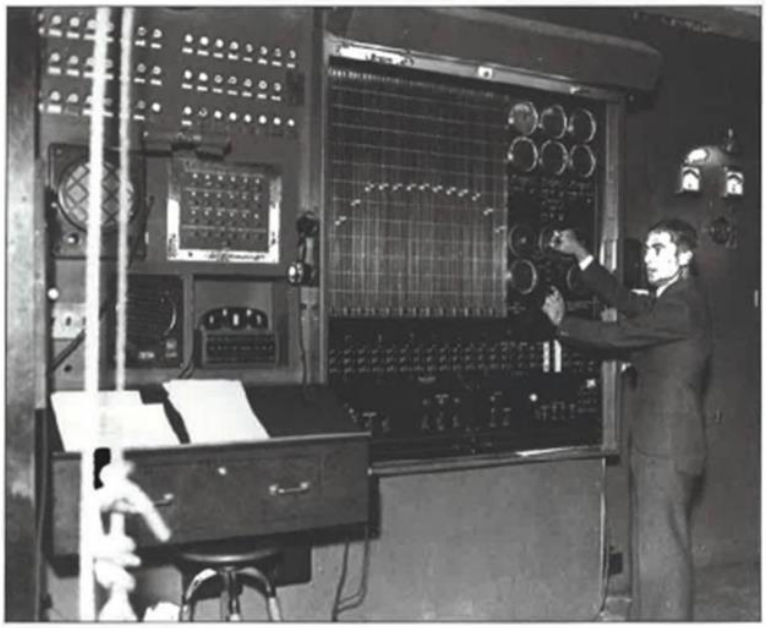

The control station for the thirteen-line coutour curtain. **Terry Helgesen Collection, THS.**

Fig 8, the controlling system for cyclorama lighting which is consisting of one hundred and forty-four lamps,

And to visualize the size of the theater, it is clear from the picture that the rows of cyclorama lighting, consisting of one hundred and forty-four lamps, which accommodate two thousand watts of lamps behind colored glass screens, as for the orchestra car, it was dedicated to seventy-five musicians and was the size of a horizontal locomotive.

Fig 9, the controlling system for stage lifts

The platform lifts move at a speed of sixty feet per minute, in addition to the presence of a rotating tray weighing 11 tons that can rotate in all directions. Its height is fifty feet, and it is set in special tracks for each part of the elevators. Thus, those elevators in the Music Hall are the first hydraulic elevators that are electrically controlled with a system of balance and synchronization during their movement. A control panel may be placed for each elevator in the hydraulic equipment room.

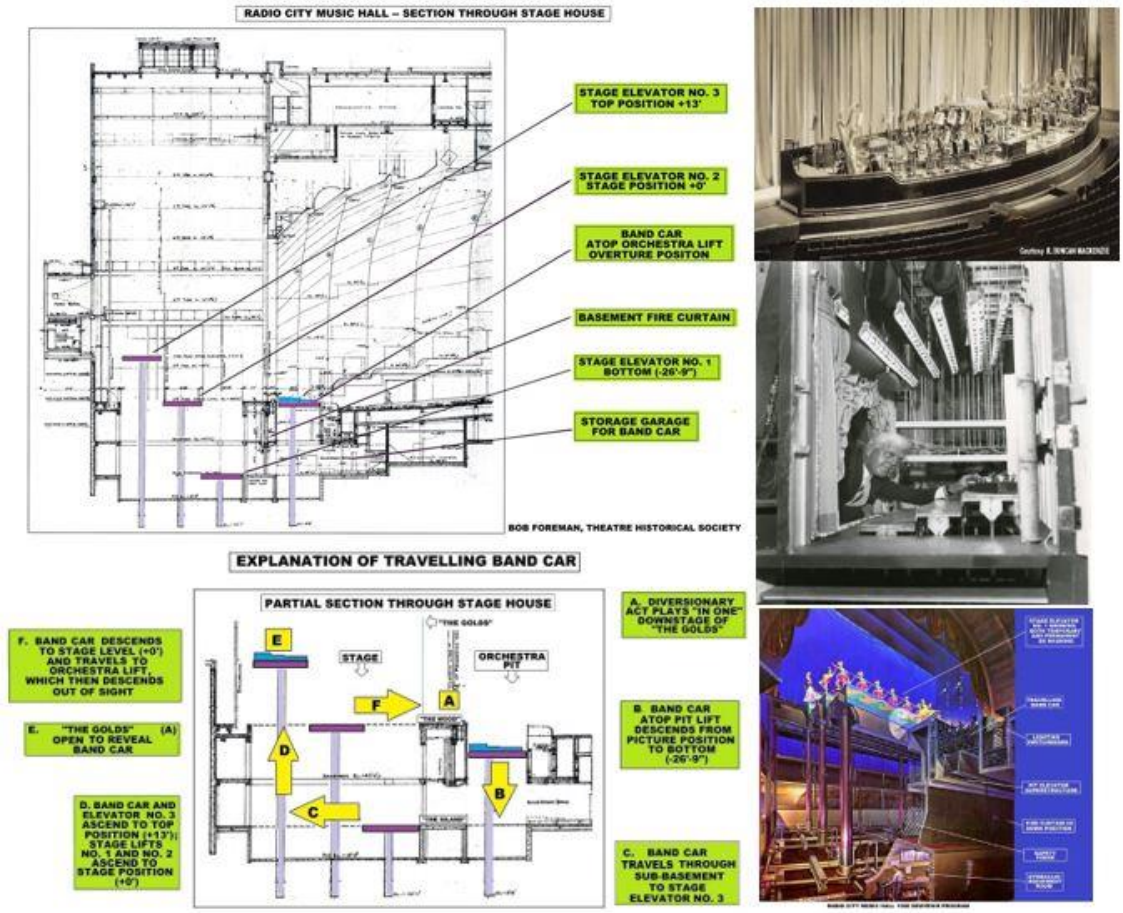


Fig 10, the Radio City Music Hall sections through the stage

The Bolshoi Theater:

The historical Bolshoi Theater in Moscow, Russia, uses a modern system to control the theater by exploiting electromechanical, hydraulic, or hybrid drives, which was implemented by Bosch Rexroth company to ensure speed and ability to withstand heavy weights and quieter operation in addition to this system ability of Reducing heat, this company has a team of specialists in multi-story platforms and rapidly changing backs, as well as moving floors, stage elevators, lighting hoists, and portable sensor-operated bridges.

Fig 11 The Bolshoi Theater is more than 240 years old and dates back to 1776 when Empress Catherine II granted Prince (Pyotr Urusov) a license to stage theater performances in Russia.

The Bolshoi began life as a private theater, whose first name was Petrovsky. Its grand opening was on December 30, 1780, at that time, fires were frequent, the building burned several times, and the last time a massive fire broke out that destroyed the entire building was in 1812 when Napoleon's army approached Moscow. As for the Bolshoi that we see today, it is the fourth and it was opened on August 20, 1856, during the coronation of Tsar Alexander II, and between 2005-2011 the Bolshoi Theater underwent a major renovation, during which they restored the unique acoustics system that existed before the revolution (when the Bolshoi was on the verge of collapse as the Soviet government was ready to get rid of all symbols of decadent bourgeois culture but fortunately the theater survived) and the original Imperial decor was remodeled.

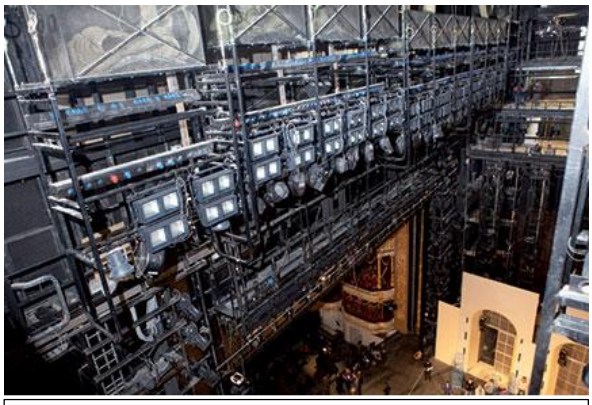


Fig 12 the light bridges in the main stage

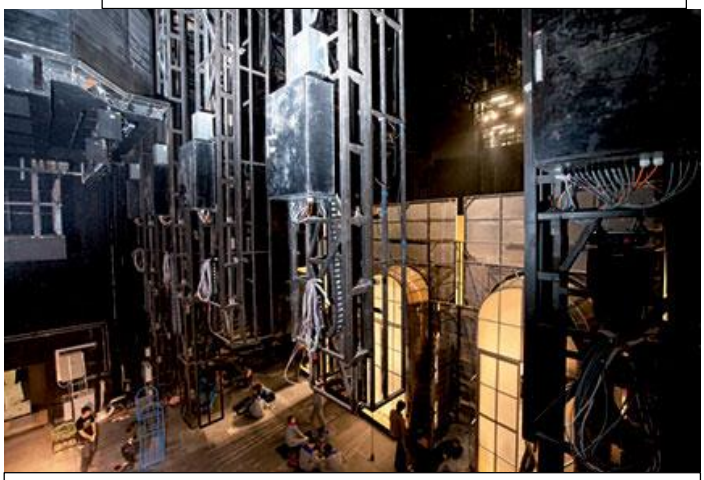


Fig 13 the light bridges in the main stage which moves vertically and horizontally

Before the reopening of the Bolshoi Theater in Moscow (which has been declared a World Heritage Site), the complex renovation work took six years,
and Bosch Rexroth AG designed, installed, and operated more than 600 electric and hydraulic motors, as well as controlled equipment above and below the stage, and innovated theatrical technology. Sophisticated and modern located behind the fully preserved historic facade of 1825. The external dimensions of the building had to remain unchanged during the renovation, thus the theater area was completely reconstructed and a new theater technology room was built which contains platforms now deeper than 20 meters.

The hydraulic unit is so quiet that none of the equipment sounds can be heard in the auditorium, plus Rexroth has also placed it as far from the audience as possible in the lower part of the basement. Two decks with tillable covers, each 22 m long, 3 m wide, and 10 m high.

TRANSFORMABLE STAGE AND LOWER SYSTEM OF MECHANICS

Each platform weighing about 70 tons with a depth of 20 meters to install the stage platform, the two-story stage contains a separation between the upper area and the lower area, in addition to the divided parts within one platform, and the lower platform contains five elevators, one tilting platform, two-height elevators, and a cart representing an area Dancing, the platforms in the lower area can also be raised to a height of 16 meters at a speed of up to 0.7 meters per second without any jolts or shocks. Lifting operations (vibration-free) provide safety and comfort for the performers,

Fig 14 All platforms and mechanisms move silently, smoothly, their speed can reach 0.5 meters per second

and the upper area of the stage also includes cranes (lifting rod, lift point, portable light bridge, portable towers, motor cable reels, etc.) which help the motors in the upper area to raising or lowering a load of up to one ton at a speed of 1.8 meters per second. An added challenge is ensuring the absolute safety of both artists and theater staff on stage while heavy loads are carried over them through advanced sensors and software in the control system provided by Rexroth to ensure that dangerous situations do not occur.

The stage area is 698 square meters. The theater structure consists of 21 lift platforms, each of them can rise 4.6 meters above the stage of the podium and go down to a depth of 3.3 meters, in addition to tilting relative to each other The 21 platforms can use a special lift, they allow the actors to appear or disappear during the scene (there are special lifts under the stage for this).

As for the orchestra pit, it includes the so-called "minimal system of mechanics", which enables the orchestra to play at different levels of the stage. The orchestra pit can also be moved and placed in a special pocket at the bottom of the hall with or without musical instruments. It can also be raised to the stage level and thus increase the stage by an amount of 108 square meters, the opera stage floor has a turntable and a ring that can move in one direction or the opposite direction as well as a sliding ballet floor that has a special vinyl surface. The third floor, a special treadmill-like running track, can be installed in 5 places on the stage and stored in the wings.

Performers can pretend they are walking somewhere without actually disappearing from the stage.

The stage has a tilt of 4 degrees allowing the audience to see the entire stage from any seat as well as the possibility of converting the stage to the horizontal position.

All platforms and mechanisms move silently and smoothly, and their speed can reach 0.5 meters per second. To drive all these machines, modern hydraulic, mechanical and electronic equipment is used - 1.5 thousand tons of metal is concentrated under the platform at a depth of 14 meters.

As for the upper grill system, it is a complex system of different devices that helps to implement an instant change of scene, makes solving various technical tasks easier, and also provides appropriate lighting using lighting bridges, which consists of hundreds of lighting devices located on metal bridges high above the stage which consists of 10 rows that can move in any direction and any angle at the same time, in addition, each lighting device can move independently of the other devices and allow lighting any spot on the stage, helping to create a lighting scenario that is operated by the computer and can be synchronized with the heavy machines, and

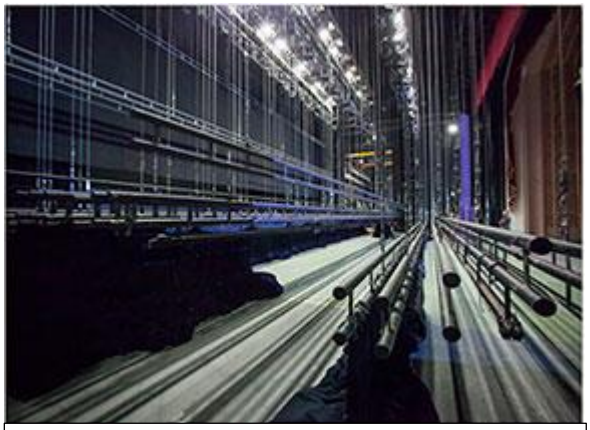


Fig 15 the upper grill system

there are also 4 lightning towers on each side of the wings that can move in any direction and at any angle in addition to the light cannons that transform the light area into a flexible area that can be converted and combined with the projections of the slides.

Fig 16, the upper grill system

As for the beam in the background, it allows changing up to 50 backgrounds during one show, in addition to the large main curtain, which can be opened horizontally and vertically, as it gathers and moves sideways, unlike the other, which is the fireproof curtain in case of emergency, which prevents the stage from the hall in less than 30 seconds.

Fig 17, the stage elevator systems

Tobin Center for The Performing Arts:

This center is located in the state of Texas, the floor of the stage in this building is characterized by its ability to be adjusted using the hydraulic system below, which allows the transformation of the area located as an extension of the stage (the orchestra pit) into rows of individual seats and various configurations with graded levels to make it compatible with events where the levels are changed between 10 to 30 minutes, depending on the hydraulic lifts, and this system allows each row to be moved vertically independently with a specific height.

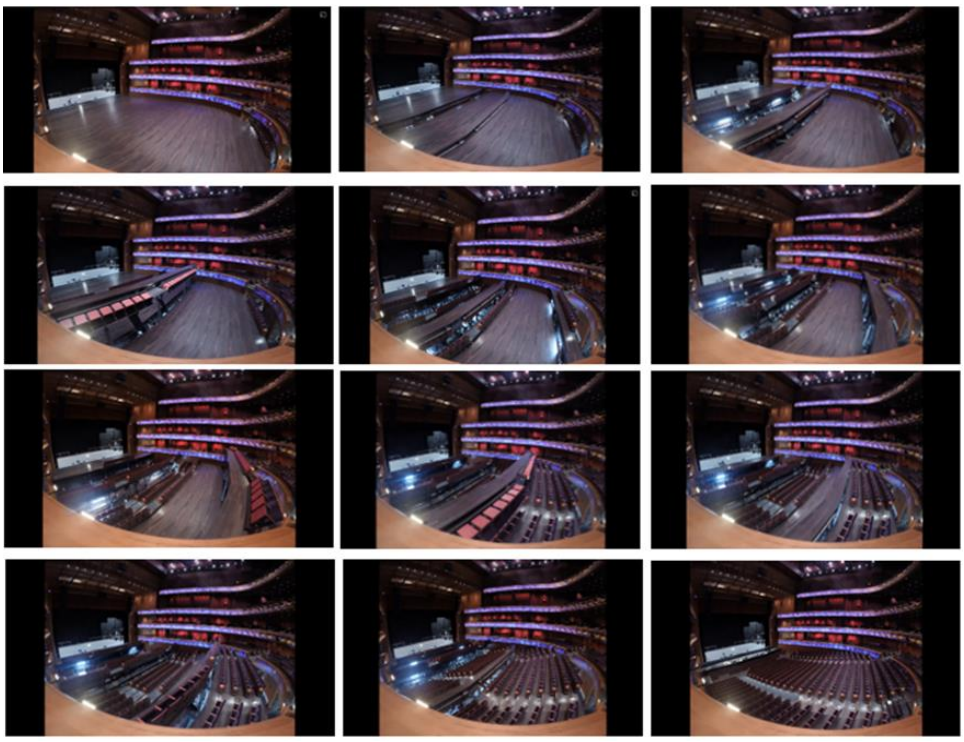


Fig 18 the steps for the transformation of the orchestra pit to theatrical seats

The designer's vision:

The purpose of this research was not to analyze the theatrical performances presented in specific theaters, but the aim was to talk about the beginning of the establishment of many theaters in the modern era, as it presented new beginnings, visions, and ideas, to build hydraulic platforms on stage in a form that enables us to create Complex sequences and scenes change in front of the audience's eyes and control this change in a completely electronic way in a repeatable and flexible way.

The hydraulic platforms were the influencing factor in the design of theatrical performances in the modern theatre, and therefore the goal was to discuss, analyze the freedom of design and movement by the theatrical performance based on the idea of these platforms, which gave the director and designer the ability to feel free movement in the design. This Technology became harnessed to serve the ideas and visions of the director and designer in all directions of the design so that it does not depend on the traditional horizontal or vertical movements, but it changed to movement in all directions until it reached the control of the shape and manner of the audience's sitting and its movement during the theatrical performance.

Therefore, the methods of building theaters arose and diversified according to this thinking until the emergence of aqua theaters and thinking about how to exploit and employ theatrical lifts, which affected the development of theatrical scenography and transformed them into interactive , which in turn introduced a development in theater engineering techniques to create imaginary worlds through the interaction of technological magic with human magic by presenting paintings that are moving on the stage to take us to new dimensions that defy gravity in design, many companies became specialized in manufacturing stage lifts in particular and included many professional experts in building and designing lifts and creating equipped theaters, these companies were not only professional in building and designing lifts, but in designing and manufacturing the construction of complete theaters that include special equipment and scenography, whether in the theater elevators or the seating for spectators, and even concerts, institutions and cultural centers around the world.

The design and construction of elevators and architectural theater equipment on the present time relied on the requirements of the performances presented in these theaters by trying to find the best ideas, and not only that but moved to companies specialized in the construction and development of these theaters.

When the designer creates the configuration for this type of performance, he designs the kinetic plan and its relationship to effects, lighting, number of scenes, and transition from one scene to another by analyzing the information about the theatrical show and integrating it with the director's vision for the show and the technical possibilities available to implement these designs in some kind like a chessboard.

The lines of the theatrical show move in front of the audience in a completely deceptive environment that covers the entire idea of the show, but the problem lies in changing the requirements of each show separately. While maintaining the consistency of the scenes and the movement of elevators from one scene to another, according to the requirements of the gradual use of effects, lighting, and the movement of the performers.

Fig 19 Example from the (Las Vegas, "Le Rêve") show.

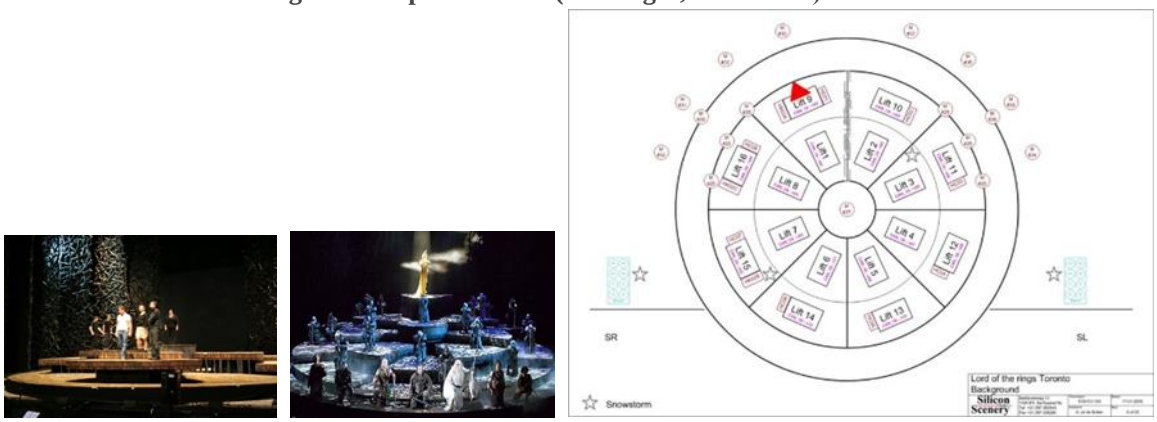


Fig 20 Toronto (Canada) hosted the world premiere of The Lord of the Rings.

We conclude from the above that the design of elevators or moving areas of the stage must comply with all the scenographic data and equipment, not for a single theatrical show, but rather suitable for many shows that are compatible in their type, as the designer has different sets of tools and aesthetic elements used to create various theatrical environments. Below we will discuss examples of some theaters that relied in their architectural construction on the presence of elevators and moving platforms as part of theatrical architecture requirements.

Le Rêve in Las Vegas:

An artistic show with immersive visuals and technology, the show's thrilling performance makes the audience feel immersed among the artists as the 270-degree seating provides a different perspective of the unfolding movement in the specially designed aqua theatre.

Watch the stage flooded and drained in a matter of seconds as artists perform amazing water and aerial feats, such as diving from 25 meters.

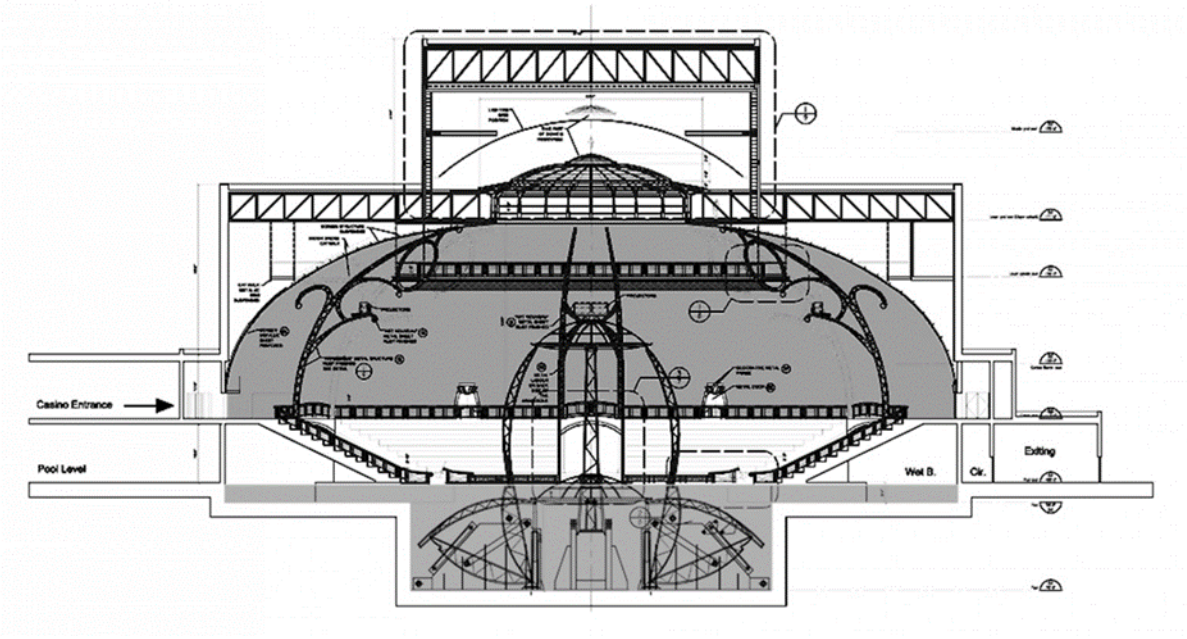


Fig 20 Le Rêve in Las Vegas

Fig 21 Le Rêve in Las Vegas

The first-of-its-kind aqua theatrical show contains 2.7 million liters of water, magically transforms from dry phase to wet phase in an instant showing waterfall tumbling down walls, artists diving from 25 meters in the circular pool on stage in the middle of the stage and real rain inside the theater makes it seems as if the audience is in a natural setting.

This uniquely designed theater creates a one-of-a-kind experience for the audience as every seat ensures a superb view of the show so that they are mesmerized as the show begins. It's a fast-paced neighborhood with performers diving into the pool on stage, flying across the stage at dizzying heights and even challenging Gravity on motorcycles. The 1,300 seat theater has only 14 rows, and as a unique venue, it has continued to capture the audience's attention from the beginning of the first sound of music to the end of the show and cascading scenes that kept the audience immersed as every surface of the theater is transformed into a screen, with 3D performances on the walls and floors and a giant cyclorama, captivating sounds surround the stage through a high-definition pitch, built into the walls behind each seat and in the center of the hall, making everyone feels like being part of the show.

The House of Dancing Water in Macau (China).

City of Dreams Underwater Stage Lifts

Handling Specialty designed, manufactured and installed an underwater platform lift system for The House of Dancing Water of the Franco Dragone Entertainment Group in Macau (China). The 2,000 seater stage is a 270-degree circular amphitheater with the world's largest swimming pool of 160 feet in diameter and 26 feet deep and contains 3.7 million gallons of water.

Fig 22 system for The House of Dancing Water of the Franco Dragone Entertainment Group

The stage has eight lifts that move in a vertical direction 27 feet (26 inches underwater, 1 foot above water to create a solid dry floor). Gross platform area 6,441 sq. ft. Dynamic capacity 322,000 lbs. and static capacity 805,000 lbs.

Fig 23 system for The House of Dancing Water of the Franco Dragone Entertainment Group

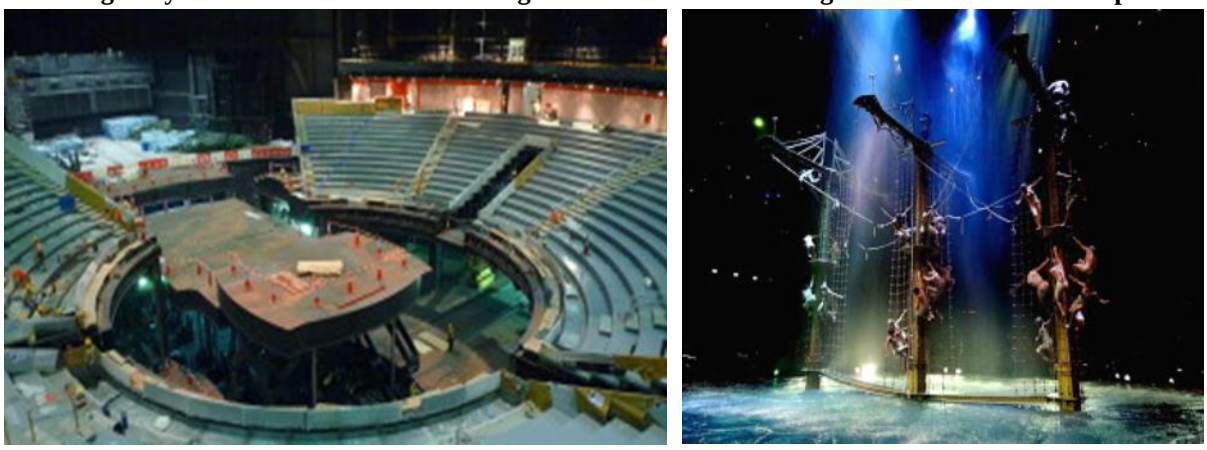


Fig 24, system for The House of Dancing Water of the Franco Dragone Entertainment Group

• Three more lifts move 3.3 inches underwater and rise 3.3 inches above water (to accommodate props and performers). Total area 1,056 square feet, dynamic capacity 52,800 pounds, static capacity 132,000 pounds, plus six hydraulic units to operate the elevators, which move at a maximum speed of 20 feet per minute, an electronic control system that enables the elevators to move independently or synchronously.

Cirque du Soleil's O

Designed, manufactured and installed by Handling Specialty as one of the world's first and largest underwater theater systems for Las Vegas' flagship Cirque du Soleil show, "O". The show is set in a 1.5-million-gallon aquarium, and four hydraulically operated lifts to raise and lower the three-parts, 3,650-square-foot stage platform featuring custom underwater lifts designed using stainless steel columns and four built-in lifts, in underwater lifting system and stage floor.

Fig 25 Cirque du Soleil show, "O".

Fig 26, Cirque du Soleil show, "O". stage platforms featuring custom underwater lifts

Treasure Island Theatre

Treasure Island Hotel & Casino Las Vegas, Nevada, USA, consisting of ١،٥٤١ Seats Costing $26 Million CAD Built 1994.

The theater is 121 feet wide by 70 feet deep and has a grid of 80 feet high Circus ring measures 36 feet in diameter with a revolving stage platform that is 28 feet in diameter allowing up to 10 revolutions per minute. Three computer-controlled theater lifts with a capacity of 300 pounds per square foot, the ceiling is a network of platforms built directly

above the audience and stage, providing tremendous flexibility for lighting, special effects and staging, as well as a variety of original theatrical scenes, and over 731 lighting control units to make optimal use of the country's number of spotlights, 1100 in the showroom. The sound system consists of a complex circuit of 78 speakers that is controlled by software specially designed by Level Control Systems. Using a joystick, the audio technician can plot on a computer screen, the sound path through the speakers.

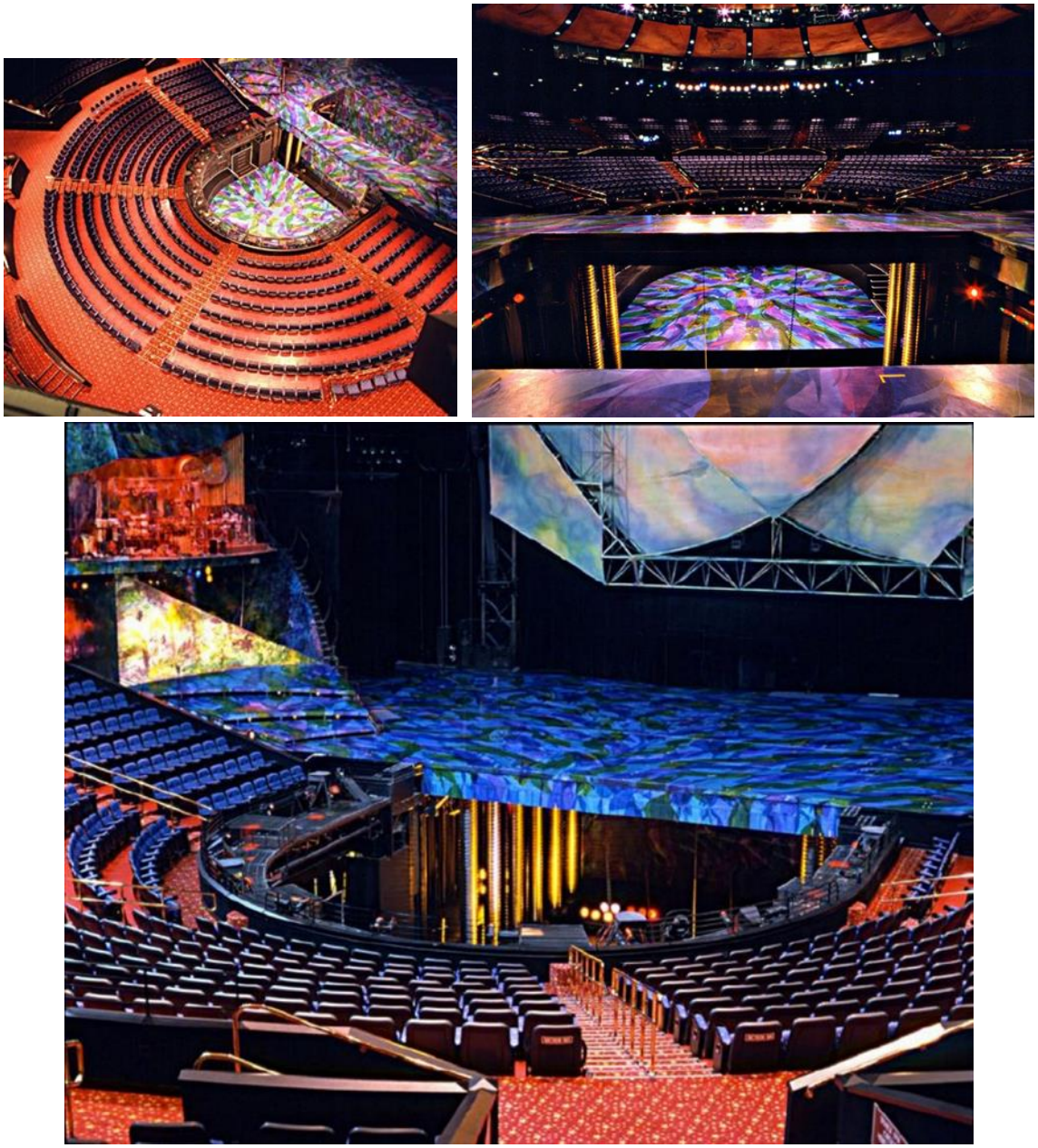


Fig 27, Treasure Island Hotel & Casino Las Vegas, Nevada, USA.

Dubai's La Parle: World Craziest Entertainment Aqua Theatre:

Nov 30, 2018 Dragone's La Perle Show was out of this world, offering a visual experience to its audience that transcends all possible imaginations. This immersive production is centered on water and aerial stunts, as the show uses 2.7 million liters of water to create a visual image. La Parle is a spellbound entertainment masterpiece with impressive architecture, most people refer to as crazy entertainment because of the unbelievable stunt by different performers who are being invited from different parts of the continent to perform at the aqua-theatre ambiance. The show was created by the legendary Artistic Director, Franco Dragone.

It is the first incredible high-tech permanent venue in the Arab region, a 90-minute multi-dimensional and highly serialized entertaining that has been described as an unprecedented immersive production, the magnificent auditorium features 1,288 seats, a state-of-the-art lighting and sound system and an innovative 860sqm stage.

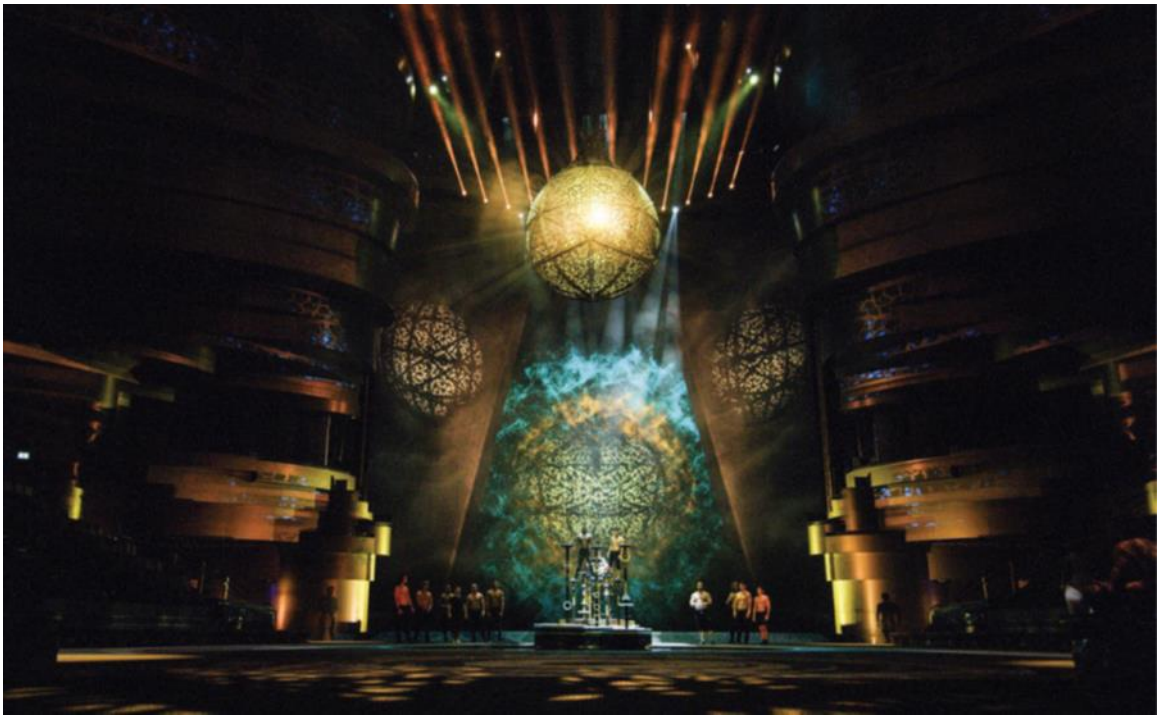


Fig 28, Dubai's La Parle- The show is a partnership between Franco Dragone and Khalaf Ahmad Al Habtoor

Fig 29 Dubai's La Parle - Franco Dragone

Sound system:

Due to the complexity of the stage design, the audio system houses 32 Meyer Sound UP-4XPs along with newly invented Galaxy 816 processors and behind-the-seat is surrounded by speakers made up of 34 Meyer Sound UPM-1XPs. It offers high volume levels and directional control, and these speakers work in a way that allows for an even distribution of sound, the second row include 10 L-Acoustics 12XT speakers, to control effects and echo, and they are water resistant as well as of low voltage.

Fig 30, impressive architecture keeps audience spell bound to what most people refer to as crazy entertainment

Lighting and visual effects:

Lighting fixtures - a combination of smart moving lights and traditional stage tracking points, not symmetrical and not linear, but rather full of curves, which presents many problems, while using little smoke.

As for the pool lighting system, it was made using Anolis LED lights rated IP68.

Fully integrating lighting with video was one of the biggest issues to overcome - there's always a conflict between the two - but having a console like grandMA, which designer Enrico has equipped with the best tools to overcome this challenge, he has been able to map projections in 3D. The displays extend across the walls, benches, floors, and even the dome of the building. With 20 projectors from Barco and content design and creation by Montreal-based VYV, La Perle is a home to fully immersive visual settings.

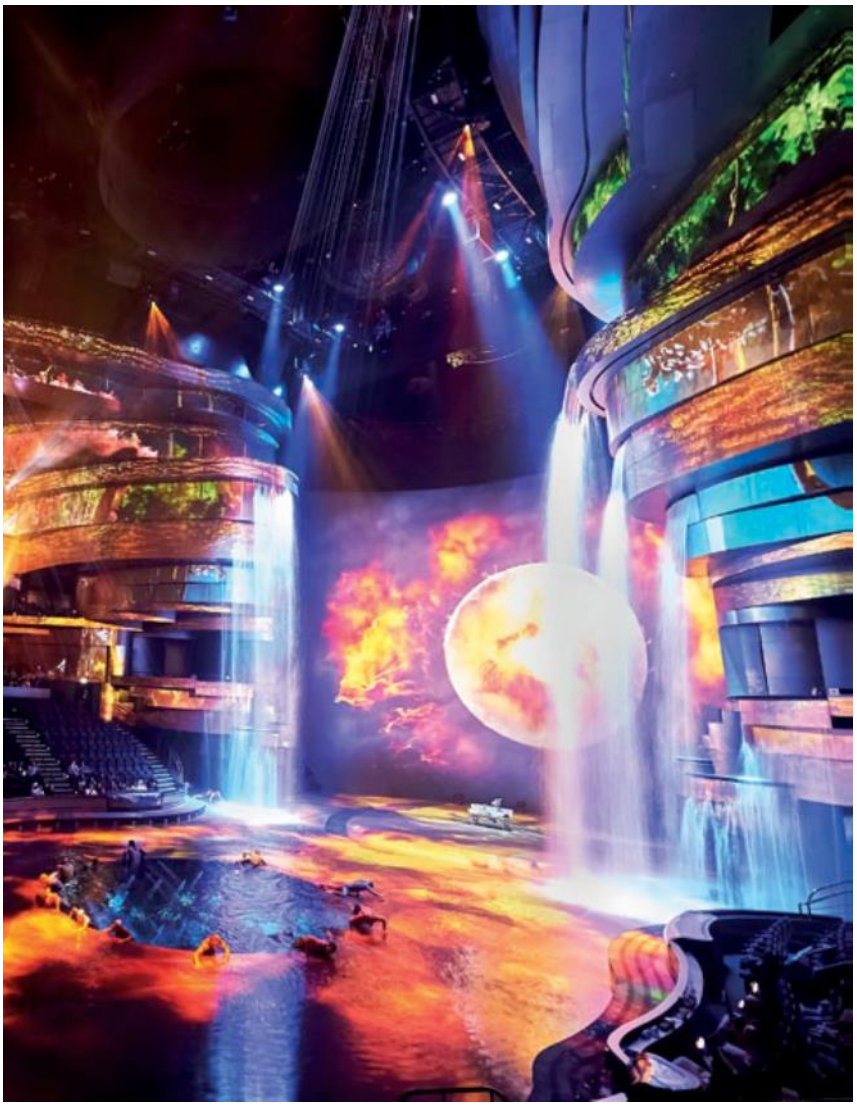


Fig 31 Dubai's La Parle - Franco Dragone

Conclusion:

The idea of designing hydraulic lifts and moving platforms is one of the most important challenges in theater architecture since the beginning thinking about their use and design until now, they became one of the most important scenographic elements that characterize theatrical architecture, as they provide theatrical scenes with the ability to present action and reaction through the relationship between the moving platforms and the rest of the scenographic elements in order to achieve the desired scene.

Results

- The Modern theatrical architecture has provided new ideas and visions to Prove that the design of scenography elements does not necessarily depend on the presence of many elements, but rather may depend on only one element by using hydraulic platforms in a way that enables us to create complex sequences and change scenes before the eyes of the audience and control this change in a completely electronic way in a flexible and repeatable way.
- The hydraulic platforms in the modern theater are the influencing factor in the design of theatrical performances, and thus the freedom of design and movement through the theatrical performance are based on the idea of these platforms, which gave the director and designer the ability to feel the design and stereoscopic elements, creating mechanical movement, preparing the exhibition area, designing elevators and moving platforms, and providing kinetic technology for theatrical elements.
- The main axis in the scenographic design is the integration between three-dimensional projection and the movement of human groups and its relationship to stage modern technology that has provided all possibilities to serve the ideas and visions of the director and designer in all design directions so that it does not depend on traditional horizontal or vertical movements, but rather it changed the movement in all directions until it reached the control of the shape and manner of the audience's seating and movement during the theatrical performance.
- Scenography presented evolution in theater engineering techniques to create imaginary worlds through the interaction of technological magic with human magic to provide artistic paintings that enable us to move to new dimensions that defy gravity in the design, so many companies specialized in the manufacture of theater elevators appeared in particular and included many professionals and experts in the construction and design of elevators and the construction of equipped theaters, and these companies were not only professional in the construction and design of elevators, but also in the design and manufacture of building complete theaters that contain special scenographic equipment, whether in theater elevators or spectator seats, or even concerts, institutions and cultural centers around the world depending on the requirements of the performances presented in these theaters by trying to find the best ideas.

Recommendations:

- The researcher recommends developing our way of thinking about the movement of scenographic elements which should not be limited to the movement of vertical elements (decorations and scenes) only, but the way of thinking should extend to the movement of horizontal elements such as moving platforms to become part of theatrical design, not only in circus performances but also to traditional theatrical performances, to be able to get out of its fixed template.
- The systems of movement of theatrical elements and their ability to adapt and provide innovative solutions to the challenges facing the design process must be the first goal for creating new techniques to achieve the requirements of each show so that the theatrical performance turns into an interconnected series of simultaneous movements.
- We must take advantage of modern electronic and mechanical systems for theatrical platforms in professional theaters and introduce these technological developments in our

theaters so that our designers can formulate their ideas and visions to meet the challenges of design.

References:

1. https://www.shutterstock.com/blog/10-designs-use-nature-inspiration2021
2. https://inhabitat.com/finding-design-inspiration-in-nature-biomimicry-for-a-better-planet/2021
3. https://blog.richardvanhooijdonk.com/en/six-incredible-innovations-inspired-by-nature/2021
4. https://www.dawn.com/news/12971272021
5. https://inhabitat.com/6-groundbreaking-examples-of-tech-innovations-inspired-by-biomimicry/2021
6. https://www.popularmechanics.com/science/animals/g28912650/animal-inspired-technologies/2021
7. https://www.popularmechanics.com/science/animals/a35886739/marine-animals-swimming-circles-mystery/2021
8. https://www.youtube.com/watch?v=iMtXqTmfta02021
9. https://www.cultureunplugged.com/documentary/watch-online/play/7027/Inspired-by-Nature--Episode-1---The-Art-of-Movement2021
10. https://www.wbdg.org/resources/biomimicry-designing-model-nature2021
11. https://www.galasystems.com/en/solutions/understage-systems/2021
12. https://www.figueras.com/philharmonie-de-paris-py-16-en2021
13. http://www.arthurlloyd.co.uk/DruryLane/Substage.htm
14. PETER+CLARK+%26+RADIO+CITY+%26+STAGE+ELEVATOR+G1E+%282%29.jpg (1117×550) (bp.blogspot.com)2021
15. 007.0R+RADIO+CITY+MUSIC+HALL+%26+PETER+CLARK.jpg (879×647) (bp.blogspot.com)2021
16. https://www.behance.net/gallery/3221331/Theatrical-Equipment2021
17. https://michaelcurrydesign.smugmug.com/Wynn/Le-Reve-Wynn-Las-Vegas/2021
18. https://lasvegasnightclubs.com/shows/le-reve/2021
19. https://www.lasvegasconcierge.com/all-shows/australian-bee-gees-show-8.html2021
20. https://www.cirquedusoleilentertainmentgroup.com/2021
21. https://www.stsonstage.com/en/projects/lord-of-the-rings2021
22. https://www.mandatory.com/fun/200849-las-vegas-back-of-house-tour-le-reve-at-the-wynn
23. https://lastheplace.com/2007/05/30/imagination-soars-with-le-reve-at-wynn-las-vegas/
24. https://whyps.com/top-theatre-stages-using-hydraulics2021
25. https://www.tobincenter.org/venues/h-e-b-performance-hall2021
26. https://www.britannica.com/art/stagecraft/Stage-machinery2021
27. https://www.geneseo.edu/~blood/SetDesign1.html2021
28. Bolshoi Theatre and Its Hydraulic Stage (whyps.com)
29. https://www.bolshoi.ru/en/2021
30. https://bridgetomoscow.com/bolshoi-theatre_2_32021

31. https://www.boschrexroth.com/en/xc/industries/machinery-applications-and-engineering/stage-technology/applications/lower-stage-machinery/index2021
32. https://fluidpowerjournal.com/bolshoi/2021
33. https://www.bolshoirussia.com/theatre/bolshoi/bolshoi-main-stage/2021
34. https://www.bolshoi.ru/en/about/hist/history/2021
35. https://bolshoibelarus.by/eng/2015-09-09-14-47-29/vozmozhnosti-stseny-eng.html2021
36. https://www.boschrexroth.com/en/xc/industries/machinery-applications-andengineering/stage-technology/references/theatrebolshoi/implementation/index-2021
37. https://scenoplus.com/en/projects/detail/treasure-island-theatre/ p 26
38. https://www.handling.com/all-solutions/cityofdreams/p22
39. Image-3__ScaleMaxWidthWzE2MDBd.jpg (1600×1200) (handling.com)p24
40. https://scenoplus.com/en/projects/detail/wynn-las-vegas-showroom/ p22
41. https://www.reviewjournal.com/entertainment/shows/fire-spices-up-water-show-le-reve-photos/p21
42. https://tribuneonlineng.com/dubais-la-parle-world-craziest-entertainment-aqua-theatre/p22
43. https://www.musement.com/uk/dubai/la-perle-by-dragone-tickets-in-dubai-27777/p 28
44. https://www.timeoutdubai.com/attractions/attractions-news/386121-al-habtoor-theatre-is-now-open-for-venue-hire p 27
45. https://mondodrawards.com/archive/portfolio/al-habtoor-city/p 27
46. Be Left In Awe With A Show At La Perle By Dragone | Winged Boots p 20
47. https://www.theatrecrafts.com/pages/home/shows/the-lord-of-the-rings-the-musical/ p 19
48. https://beckymann92.wordpress.com/2013/05/13/hydraulics/p 19
49. HANDLING SPECIALTY MANUFACTURING LTD., A WHITING COMPANY - INFO@HANDLING.COM WWW.HANDLING.COM p *41977. P 24-25.*
50. HANDLING SPECIALTY MANUFACTURING LTD., A WHITING COMPANY - INFO@HANDLING.COM WWW.HANDLING.COM p84851p 23
51. la perle an exclusive look inside Franco Dragone's Dubai masterpiece- open skies-magazine - emirates P 30
52. p 42-48 LIGHT & SOUND INTERNATIONAL - DECEMBER 2017 ENTERTAINMENT- PRESENTATION INSTALLATION La Perle Dragone Studio in Dubai p 29-30