University of Cincinnati

Theatre Fires

Political and Legal Foundations of Fire Protection

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Abstract

Back at the turn of the century, going to the theatre for a performance was a risky proposition. These theatres were often made of wood, lit by gas lights; they had very little if any fire code requirements and management in an effort to maximize profits, literally packed people into their theatres. It is no surprise that when fires did occur, the loss of life was great. This paper will explore the history of theatre fires in America and explore the resulting code and technology improvements that resulted. This paper will be broken down into two areas:

- History of theatre fires with two case studies (Brooklyn and Iroquois Theatre Fire)
- Lessons learned and the resulting technology and fire code improvements.

Certification Statement

I hereby certify this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and the appropriate credit is given where I have used the language, ideas, expressions or writings of another.

Signed

Jonathan Flynn
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History of Theatre Fires

Theatre fires at the turn of the century in America were a big problem for the fire service. These theatres like most other buildings in an expanding town were built of wood. Fire codes were weak or non-existent. The theatres were constructed of wood, extremely crowded with poor egress and mostly illuminated with gas lighting. The following paragraphs compare two fires, the Brooklyn and Iroquois theatre fires. These were “typical” fires of the time and occurred fairly often to various degrees around the country.

The Brooklyn Theatre caught fire on December 5, 1876. The building was 5 years old at the time. It held 1,450 people and had three levels. The ground floor, also called parquet, first balcony also called the dress circle and the third balcony also called the family circle. The family circle was served by a separate ticket booth and entrance and had no access to the other areas of the theatre. The theatre was entirely lit with gas lighting. At 11:20pm the stage manager noted a small fire coming from a piece of scenery in the fly loft. Stage hands attempted to control the fire as the play continued. The fire quickly gained headway. The actors broke character and encouraged the audience to remain calm and stay in their seats, even saying this was part of the show. The theatre manager even stopped several occupants who had already made their way to the door, to calm down and return to their seats. Finally, the actors and managements could no longer keep order and a full panic ensued. All exits were overwhelmed; people on the parquet level found locked exits to prevent people from sneaking in. Other exits did not have the now common panic hardware and many had complicated locking mechanisms. On the dress circle level, people had to navigate narrow, confusing stairs. People overcome by smoke quickly blocked these exits. People in the family circle fared the worse. They had one exit to escape and

1 'The Origin and Progress of the Flames' "The Calamity" Brooklyn Eagle 1876-12-06 page 4 column 2
2 'Statement by the Head Usher' "Holocaust" Brooklyn Daily Eagle 1876-12-06 page 2, column 8
due to their proximity to the theatre ceiling, were the first be subjected to heat and smoke. At some point during the evacuation, someone opened additional doors at the front of the theatre as well as large scene doors back stage\(^4\). The rush of air created a large fireball that shot into the theatre. Many people in the family circle were incinerated in their seats. The fire destroyed the entire building and when the flames died down, an estimated 278 people lost their lives. Many were not identified because when the building collapsed into the basement, what was thought to be normal fire debris was a mass of human parts and pieces.

The Iroquois Theatre fire followed a similar set of circumstances. The Theatre was built in 1903 and seated 2,000 people. It had three levels like the Brooklyn Theatre, parquet, dress circle and family gallery. The family circle also had a separate ticket booth and entrance. It was two months old when it burned. Owners promoted the theatre as "Absolutely Fireproof." During the construction, the theatre was plagued with delays and labor unrest\(^5\). A Chicago Fire Department captain who made an unofficial tour of the theatre days before the official opening noted that there were no extinguishers, sprinklers, alarms, telephones, or water connections; the only firefighting equipment available were six canisters of a dry chemical called "Kilfyre", which was normally used to douse residential chimney fires\(^6\). An editor of Fireproof Magazine had toured the building during construction and had noted "the absence of an intake, or stage draft shaft; the exposed reinforcement of the (proscenium) arch; the presence of wood trim on everything and the inadequate provision of exits."\(^7\)

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\(^4\) 'Saved a Great Many Lives' 'What Official Investigation Shows' "Calamity" Brooklyn Daily Eagle 1876-12-06 page 4, column 1
\(^6\) Hatch, pp.13-14.
\(^7\) Quoted in Hatch, p. 12.
The fire started around 3:15pm when an arc lamp shorted out and caught a muslin curtain on fire. Attempts were made to extinguish the fire with extinguishers to no avail. The stage manager attempted to lower the asbestos fire curtain, but it got stuck half way down on a projecting light reflector. Attempts were made by actor Eddie Foy to calm the audience, to no avail. Full panic was on as flames and smoke began licking out from under the half lowered fire curtain. That curtain was later discovered to be made of wood pulp and asbestos and determined to be of no help had it lowered properly. The patron’s escape was hampered by exits hidden behind curtains, iron gates blocked stairs to prevent people from sneaking to better seats. Many exit doors had no panic hardware and locking hardware was unfamiliar and complicated. At some point, the large scenery doors on stage were opened, introducing a rush of air that sent a fire ball into the audience, incinerating some in their seats. When the flames died down, 605 people were estimated to be dead, most people were found stacked five high in the exits. Some of the bodies had been removed by family before the fire was over and others died later of their injuries. Later, investigators discovered stage smoke vents were nailed shut, the fire escape was unfinished and there was no training for theatre staff on what to do in a fire.

Listed below are some common denominators and design deficiencies for both fires.

- Both fires involved scenery or curtains that caught fire on stage. Evacuation was delayed while stagehands attempted to extinguish the fire.

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8 Hatch, p.88.
9 Quoted in Hatch, p. 150.
• With both fires, the fire curtain either failed or was never lowered to protect the audience.

• Both fires had blocked, locked or otherwise inaccessible exits.

• Nonexistent or inoperable fire safety systems (sprinklers, standpipes, smoke vents)

• In both fires, actors and management encouraged patrons to stay calm and remain in their seats during extinguishment efforts.

• Both theatres were relatively new and promoted as being “absolutely fireproof.”

• Both fires had a large introduction of air that intensified the fire, sending a fire ball towards the escaping audience.

• Exits and exit routes were designed for orderly, non-emergent evacuation, not panicking patrons.

When analyzing the human behavior of both fires, a small group of people (management and actors) were able to convince the entire audience that they were in no danger even when the visible evidence was to the contrary. In the case of the Brooklyn theatre fire, management was able to convince many patrons who were almost out of the theatre to return to their seats.¹⁰ Interestingly enough, there were no reports of calm, orderly evacuation as is commonly reported in today’s fires. There was full out panic when the threat was realized.

¹⁰ ‘Statement by the Head Usher’ "Holocaust" Brooklyn Daily Eagle 1876-12-06 page 2, column 8
Lessons Learned

In the course of doing research for this paper, I was surprised to find that most of the common fire protection systems (stand pipes, sprinklers and smoke venting) were present as required in most theatres. Smoke detectors and heat detectors were invented at the turn of the century but were very expensive and only installed in theatres that could afford them.\textsuperscript{11} It wasn’t until they were mass produced did they become more affordable. Hallon and other chemical agents were also developed and perfected and used in hidden electrical vaults below stage. New advances in fire retardant textiles, made curtains and other textiles more safe. The one factor that has not changed was the human factor. Humans in general are creatures of habit. As noted in the above mentioned fires, human actions were a direct result of those fires. The following comments are from a technical theatre blog concerning the various fire safety features of theatres, how they are commonly compromised and further highlights the “human factor causes” often found in fires\textsuperscript{12}

**Fire curtain:** automatic (hopefully) fire-proof barrier that closes off the stage space from the seating area in a proscenium theatre in the event of a fire.

Despite this being one of the biggest reasons for the loss of life at the Iroquois, we continue to block the path of the fire curtain for many shows, and in some cases, lock it off to prevent it from coming in (due to effects triggering the alarms during a show).

**Fire doors:** fireproof doors that either automatically close when fire alarm is triggered, or remain closed except when a person is entering or exiting.

We block these open without a second thought, because everyone else always blocks them open. What are the realistic chances of anyone remembering (or being able) to unblock all the doors in the event of a fire? Simply letting these doors shut (even when there is no audience) could prevent a small fire from becoming a large fire.


Fire exits: (usually with fire doors) an exit from the space clearly marked to be an unobstructed path out of the theatre/building.

Where do I begin? We cover the EXIT signs, remove the lamps from the signs, block views of the signs, and remove the signs themselves. If that was not enough, we block the exits with chairs, costume racks, props, even heavy or permanent set elements. We use the hallways of the exits for storage of all sorts of things, which an audience member isn't going to know about until they hit this stuff in the dark. Do your exit doors have crash bars (as opposed to handles)? Crash bars are meant to unlatch a door with no more than the weight of a body falling against the crash bar. If your emergency exit doors do not have crash bars, INSTALL THEM! If your emergency exit doors do have crash bars, do they work? I have seen doors that did not unlatch when the crash bar was pushed, which could result in a crushing situation in an emergency. **MOST IMPORTANTLY: DO THEY OPEN OUT?**

What about the path from the outside door away from the theatre? Is it clear, or is it blocked by dumpsters, trash cans, cars, semi-trailers, or bushes? It is not enough to simply have the door: people have to be able to get away from the building.

Fire extinguishers: portable tanks (usually pressurized) containing a substance capable of extinguishing a small fire. Rated by type of fire they are capable of extinguishing.

Do you know where yours are? Are you using one to prop a door open? Do you have the right kind of extinguisher? You should have all ABC rated extinguishers, to ensure that you can put out any type of small fire. Do you know how to use them? Do you know when a fire is too big for you to extinguish? (if it is bigger than a wastepaper basket) Do you have enough of them, in all locations where they might be needed, and in places that are always accessible?

Fire hoses: Full size fire hoses permanently installed in key locations and fed by city water supply or standpipe.

These are for the use of the fire department only. They should not be blocked, covered, or otherwise made inaccessible to anyone. They are designed to be easily found by fire fighters and easily accessed. Why then to we block these incredibly important pieces of equipment with sets and curtains? Why do make it harder to put a fire out as quickly as possible?

**Automatic sprinklers:** Devices that automatically open during a fire to spray water on the affected part of the building.

These are constantly being painted over, which effectively seals them, and prevents them from releasing water.

Fire escapes: Structure added to the outside of a building to allow persons to exit in the event of a fire.

Have you had yours inspected lately? Is it still capable of holding the weight of the largest number of persons that could be on it at any time? Are the access points to it (doors, windows) blocked or locked in any way? For ladders or stairs that store above the ground and descend when someone is on them: do they operate with the weight of a person? Are they rusted in place? Do they have a clear landing point, or is it blocked with cars, dumpsters, or "temporary" storage of material?

Emergency Stairs: Stairways inside the building intended for use in the event of an evacuation.

Are doors to or from these stairs locked? They shouldn't be. Are all the lights within the stairwell working? Are all the EXIT signs for the stairs working? Is there a clear, visually and physically unobstructed path to the stairs on every level? Is there anything stored in the stairwell? If so, GET IT OUT OF THERE!

Fire lanes: Areas set aside to always be clear for emergency vehicles and equipment. Does your theatre use this space for parking? As a staging area during a load-in? Why do we complicate the work of fire fighters who would be coming to help us?

Flame treatment (for scenery or costumes): means of rendering material fire-proof or flame resistant. Mandatory for all material used in a theatre. How many sets have you seen that you simply knew
there was no possible way that it could have been treated? Fabric is the usual culprit, but some sets have even been made with newsprint. It’s not hard to use, but it needs to be done, and done correctly. Would you trust every material used on your stage to a match test?

**UL rated electrical equipment:** Rated by Underwriters Laboratories to be safe under X conditions, when using Y accessories as recommended by the manufacturer. 1000 watt FEL lamps in Altman 360Q ellipsiodals is the #1 violation of this that I see in nearly every theatre. 360Q's are rated for 750 watts, not 1000. They are not designed for the heat or the power consumption of a 1000 watt lamp. This is a fire hazard! This is just one example. How many times do we push our electrical equipment, cables, and connectors beyond their rated capacity? How many times has someone simply replaced a 15 amp breaker with a 20 or 30 amp breaker, without also ensuring that the wiring was capable of handling such loads? Are they trying to start an electrical fire, possibly in the walls? Nearly all of us have seen a standard 15 amp Edison connector being used to power 2000 watts (or more) of lighting.

**Fire plan:** Plan of action and evacuation in the event of a fire. Does your theatre have one? Do you know if your theatre has one? Is it common knowledge? There is little chance that you will have time to pull it out and read it during a fire, so why not learn it now? Where should the audience gather after evacuating the building? Where do employees gather? What is the procedure for reporting a fire? Do you contact your security department (theatre, museum, school, building), or do you just call 911? Does the fire curtain need to be activated, or is it triggered automatically with the alarm? Are you sure that everyone you work with has read and understands the fire plan?

**Grandfathered Theatres**

In general, most existing/historic theatres are grandfathered under the current building code so long as the building or occupancy is not deemed to endanger public safety and welfare. When existing theatres are generally required to become compliant is when renovations and remodeling take place. This typically is the case for most existing and historic theatres. They are often in some state of neglect and are in need of renovation. This is typically where the fire professional can make their case for current code compliance. While there are code requirements for scenery and drapery in theatres, seats are not specifically addressed. However, one could make the case that since the seats are permanently fixed to the floor; they fall under chapter 8, interior finishes, floor coverings.

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Check List for Crews with Historical Theatres in Their District

- Have a good working relationship with the owner.
- Know the current safety features of the theatre and their state of repair.
- Know what is required of new theatres and how your theatre differs.
- Work with the current owner about voluntary upgrades to their existing systems. Explain that there might be an insurance incentive to do so.
- By far, the most important thing is to know the building intimately, from the basement to the rafters.

Case Study

The Sorg Opera House located in Middletown Ohio was built in 1891. It is typical in design for a theatre of that age. It is ordinary construction and features massive wood roof trusses. At the time of inspection, it had no fire alarm detection system and only featured pull stations. A partial sprinkler system in the stage loft area was out of service due to a broken riser. The building featured numerous and conveniently located exits with correct signage. Other than the broken sprinkler riser, the existing fire safety features appear to be intact and functioning as designed.

In general, existing buildings are not required to conform to new fire code requirements so long as the existing fire safety systems are in good repair. Only when “significant” alterations are made, is a building required to comply with the updated code. Often with theaters, businesses are located at street levels and the theatre is located in back or on the second floor of
the building. After years of being shuttered, the theatre portion is often forgotten and is later “discovered” by the new owners or tenants.

A fire professional would be wise to understand the political and economic implications of these buildings. Theatres are often the anchor in redevelopment plans for downtown revitalizations. Fire officials must come to the table not with an iron fist, but rather a spirit of partnership with owners, developers and city officials to develop these community assets in a manner that addresses fire safety issues as well as economic realities, without destroying the historic fabric of the building.
Conclusion

This paper explored the history of theatre fires in America, the code changes and advances in fire protection that made theatres safer. As was discovered, human behavior played a major role in these fires. Some owners blatantly ignored fire codes, others disabled fire protection systems. Sometimes theatre goers did not recognize critical cues found in fire situations until it was too late. To prevent these tragedies, fire officials must partner with theatre owners to ensure fire codes are met and followed. Unannounced inspections should be made to ensure the code is being followed. This truly is a partnership between the fire official, owners and the public to make theatres safe and enjoyable for everyone.