

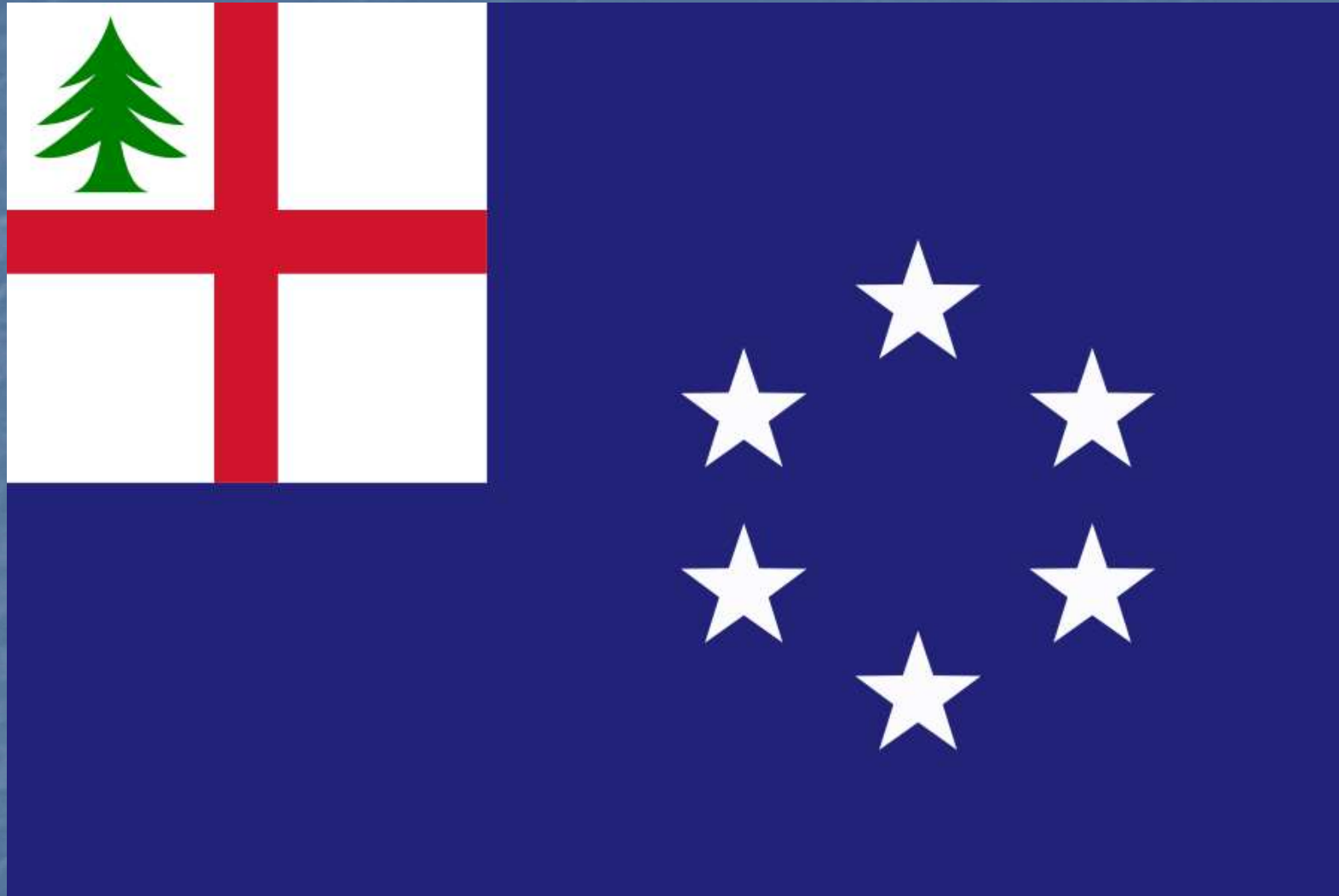
The Fandom of the Opera: Opera & Media Technology Pre- and Post-Pandemic



Mark Schubin, SchubinCafe.com
opera engineer since 1972

pdf of these slides at bit.ly/sne-opera





The Flag of New England

as designed by Albert Ebinger of Ipswich MA, adopted by the New England Governor's Conference 1988 June 8

[Raymond1922A](#)

Program

- Overture: Opera
- Act I: Technologies at the time the 1st ticket was sold
- Act II: Technologies for opera performance
- Act III: Technologies to reach beyond the opera house
- Act IV: The pandemic & what it inspired

Mariinsky Opera House
St. Petersburg, Russia

Overture: Opera

What Is Opera?



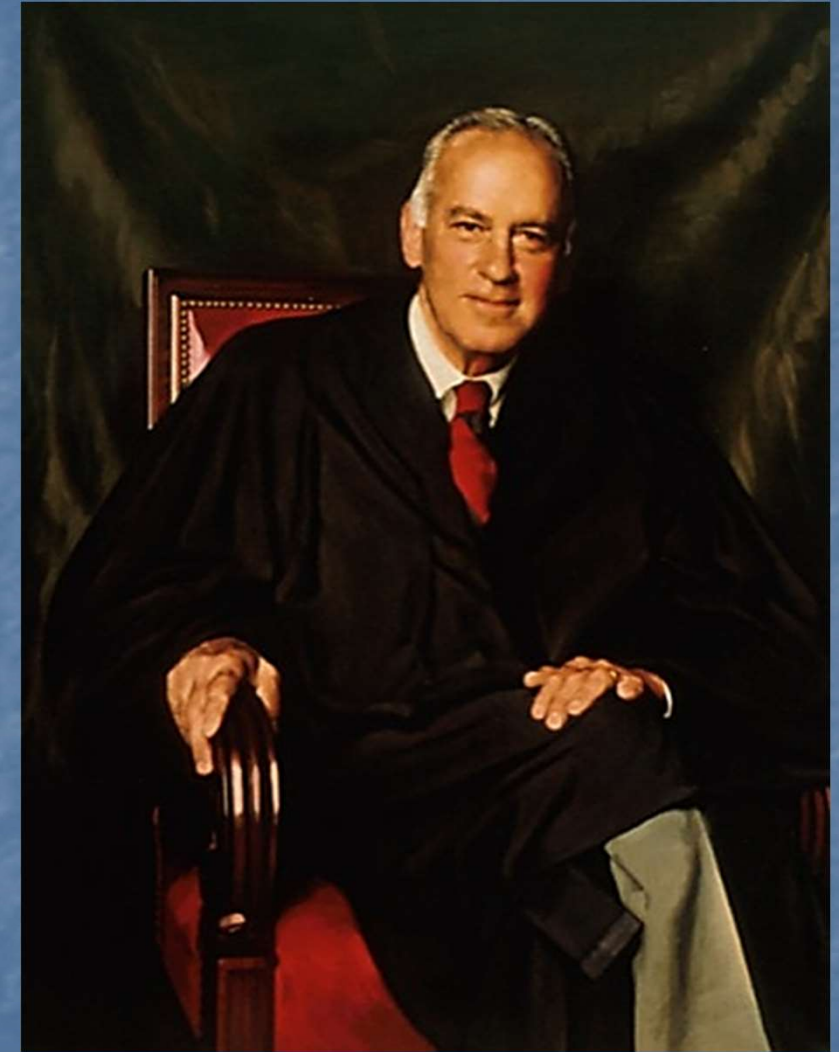
What Is Opera?

- a form of musical theater



What Is Opera?

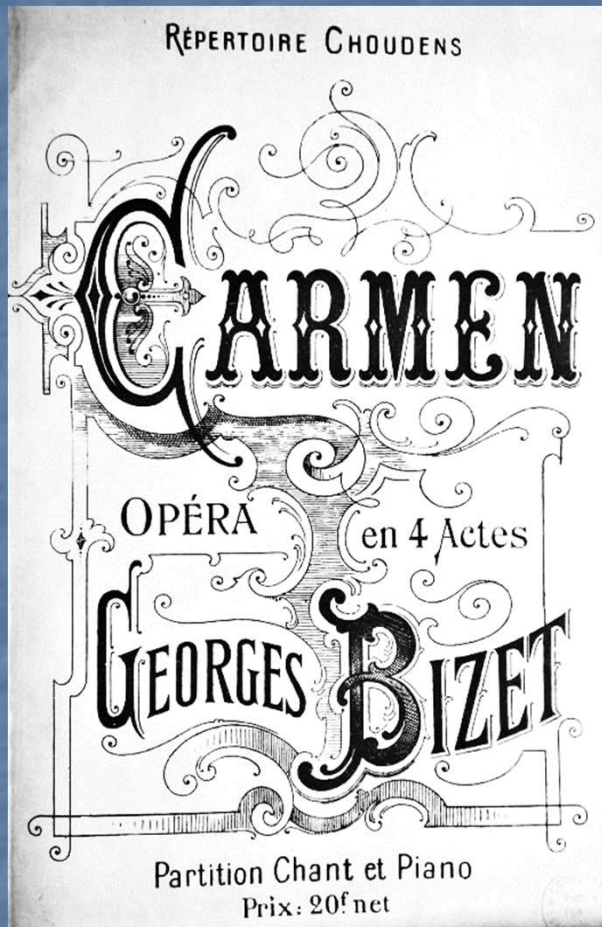
- a form of musical theater
- that I recognize when I hear it?



Justice Potter Stewart

Not Opera?

Carmen



opéra-comique

The Magic Flute



singspiel

Die Fledermaus



operetta

Parsifal



bühnenweihfestspiel

Opera

- Latin: *opus* = work, *opera* = works
 - Singing
 - Instrumental Music
 - Storytelling
 - Acting
 - Visual Arts
 - Stage Craft
 - Dancing
 - Nudity & Erotica
(ok, not always, but sex often)
- “exotick & irrational”
 - Samuel Johnson



Los Angeles Opera web site



Opus
[a
piece
of
work]

©
Berkeley
Breathed
<http://www.berkeleybreathed.com/>

Not Cheap!

“Of all the noises
known to man,
opera is the
most expensive”
- attributed
to Molière



According to *The New York Times Magazine*, March 24, 2013,
the annual budget of the Metropolitan Opera was \$330 million

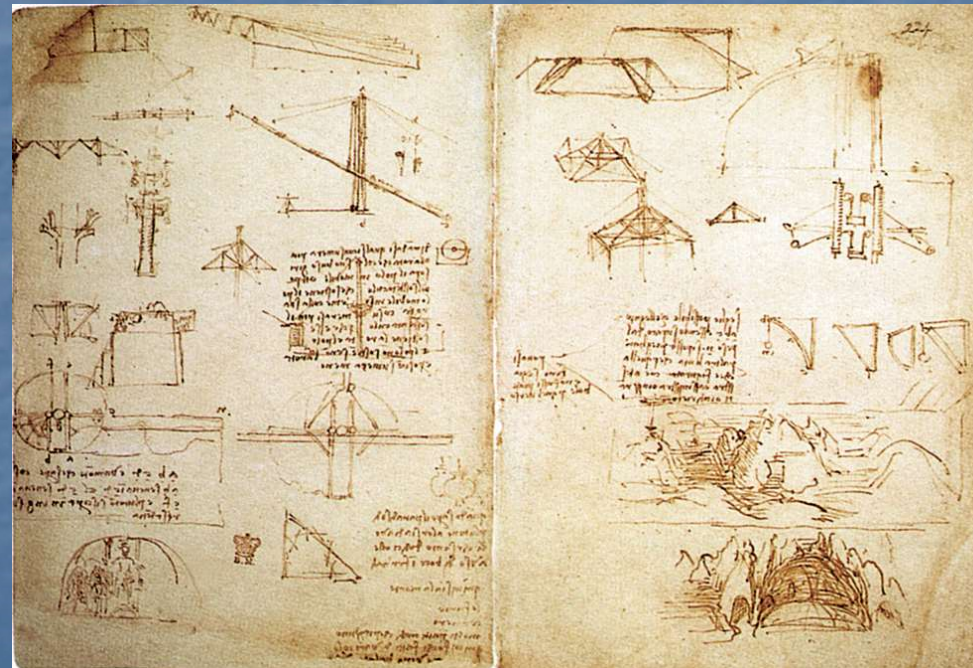
When Was The First Opera?

- Galileo's father: ancient Greece
- *Ludus Danielis* ca.13th century
- Poliziano's *Fabula di Orfeo* c.1480
 - Leonardo da Vinci designed stage machinery
- *Dafne* 1597/8

Vincenzo
Galilei's
opera book
1581

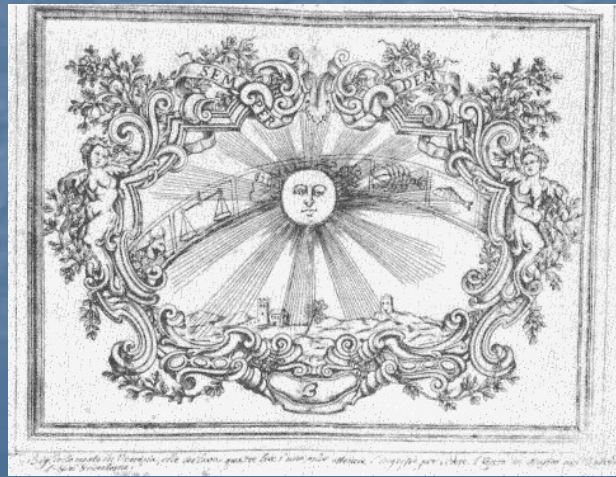


"studies for the
staging of
Poliziano's *Orfeo*"
from the *Codex Atlanticus*
c. 1506



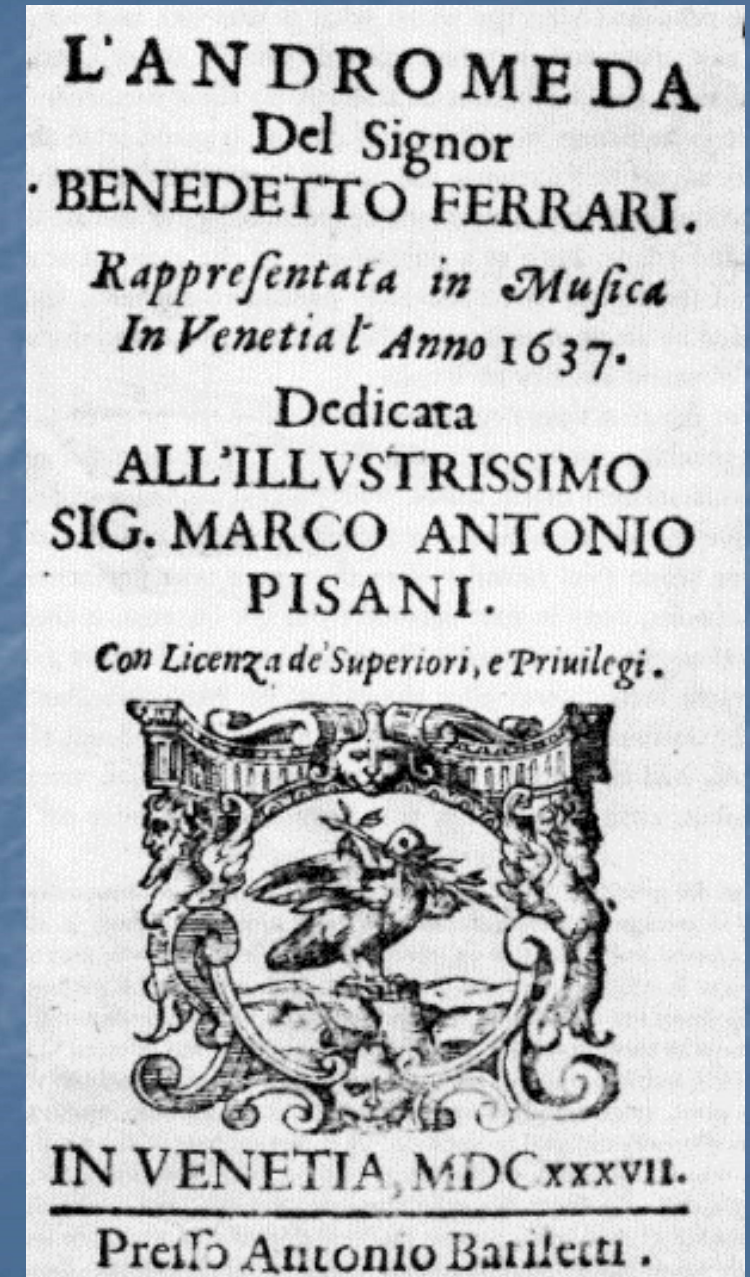
1st Ticket-Selling Opera House: 1637

- boxes to rent & sell to the rich
- large size
 - *melodramma* > *melodrama*
 - sound ducts
- increase revenue, reduce expenses



17th-century opera ticket

libretto for 1st
opera in a
ticket-selling
opera house



Act I: Media Technologies at the Time the 1st Opera Ticket Was Sold

Symbiotic Relationship of Opera & New Media

- New Media Get from Opera
 - prestige, funding
 - stories, characters, & stars
 - existing audiences
- Opera Gets from New Media
 - reduced expenses (in house)
 - new audiences
 - new revenue streams

■ Media Existing in 1637

- books
- motion-picture projection
- automated music playback
- automata

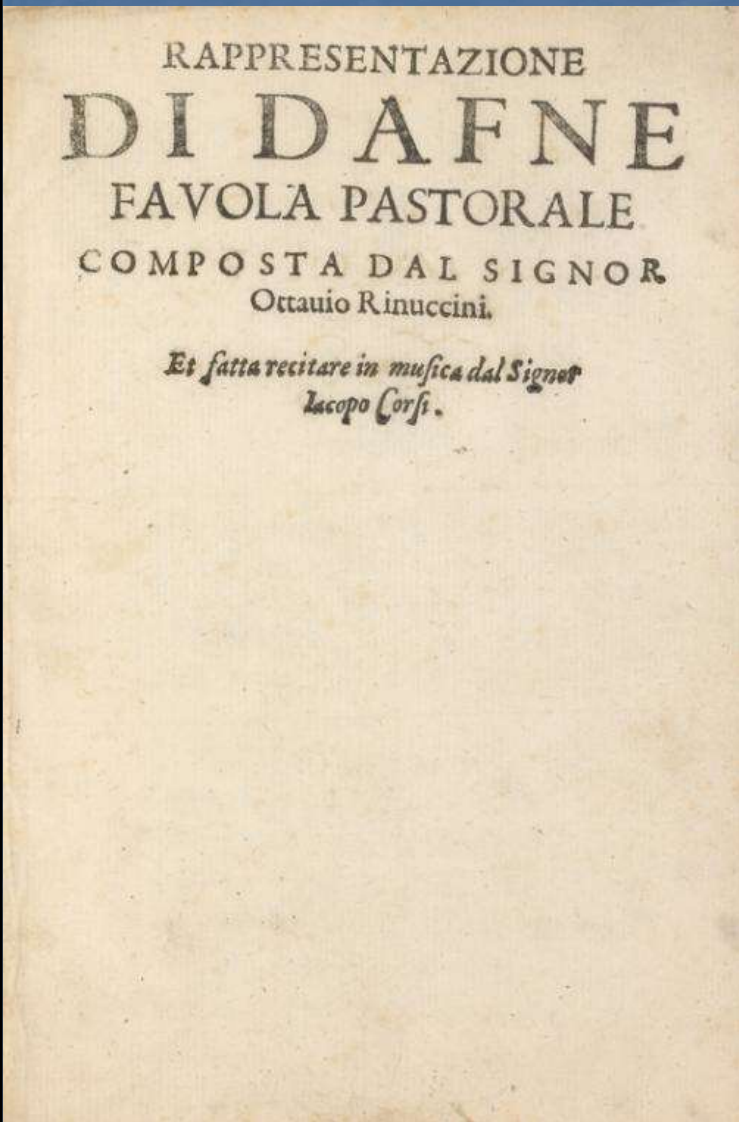


musical clock 1625
Metropolitan Museum of Art



image projection c. 1420
Giovanni da Fontana
Bellicorum instrumentorum liber

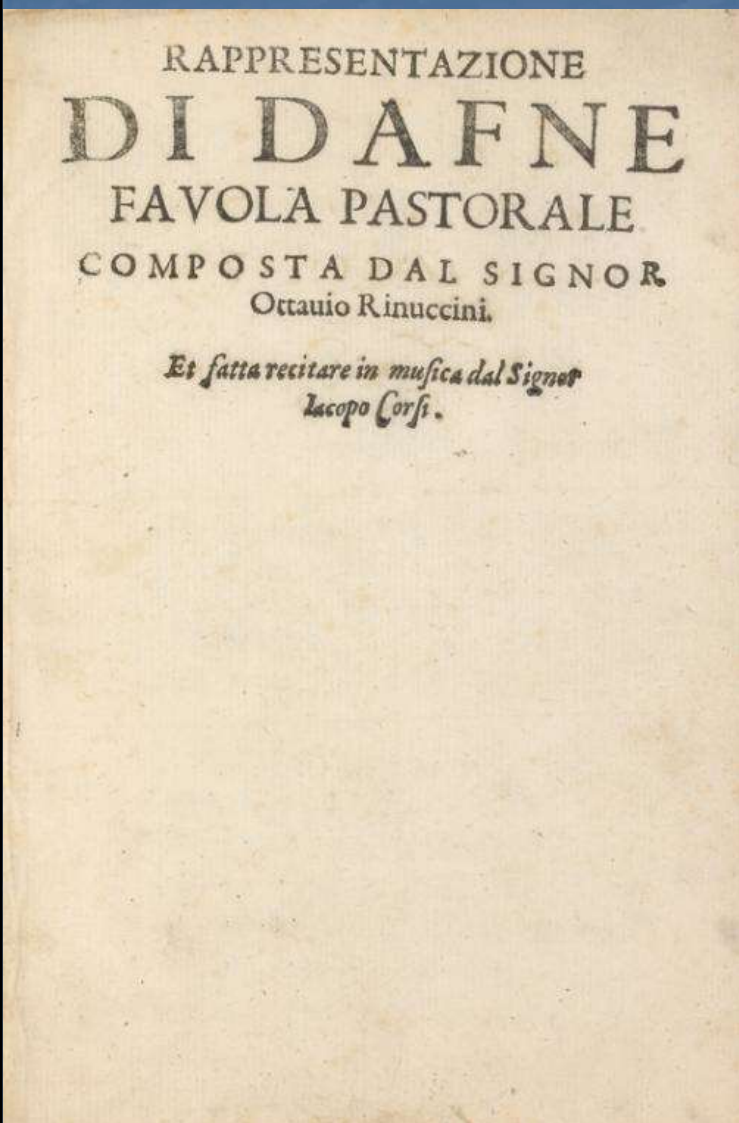
First Out-of-House Opera Medium: Books



libretto = little book

1598 – gift

First Out-of-House Opera Medium: Books



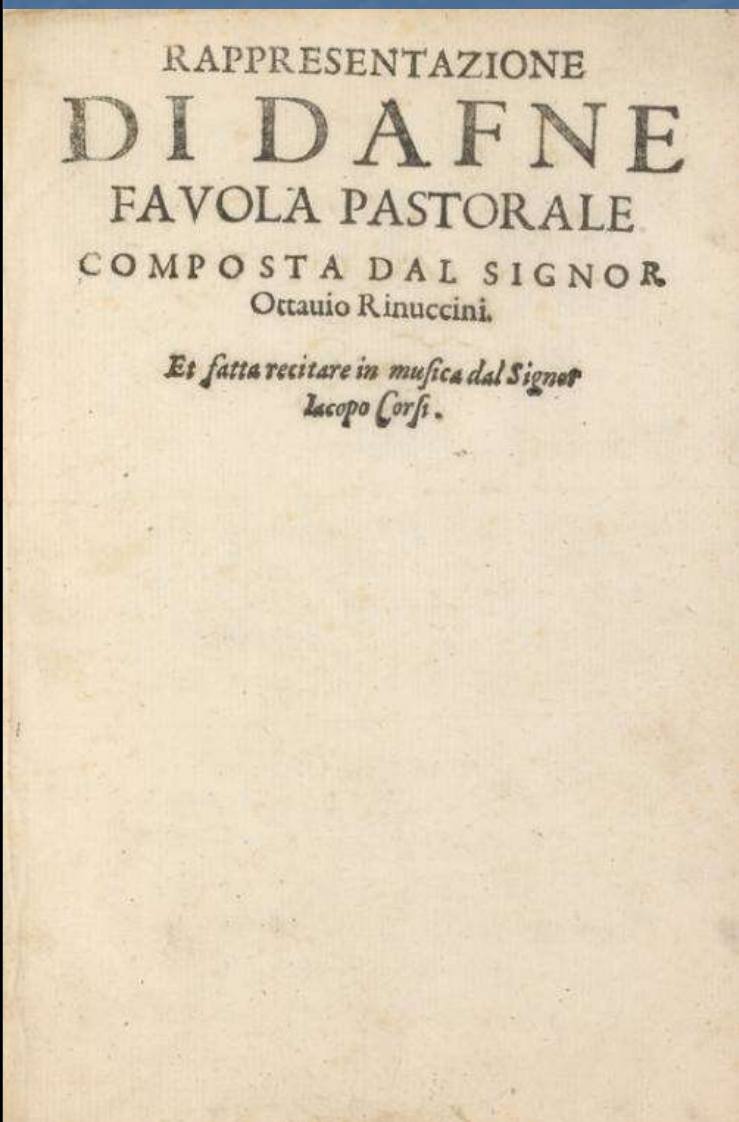
1598 – gift



1600 – for sale

cheaper
paper

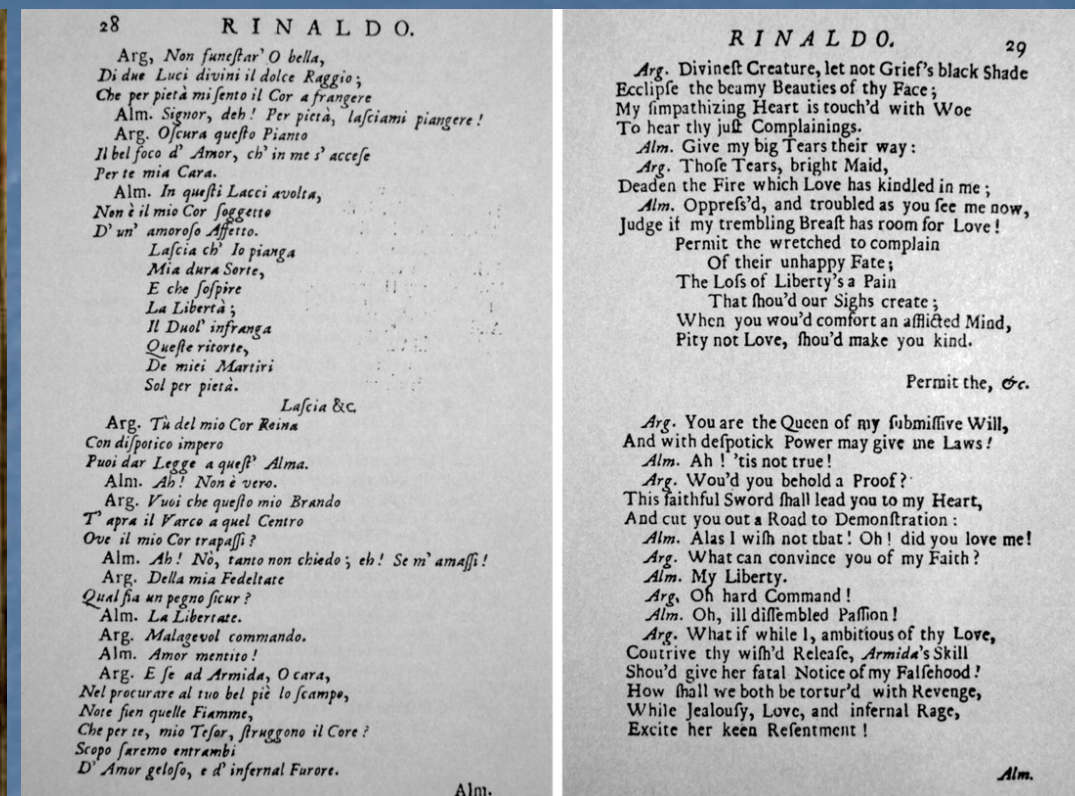
First Out-of-House Opera Medium: Books



1598 – gift



1600 – for sale



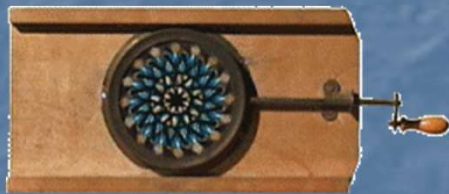
1711 – multi-sales
translation & reading light
(Handel's candles)

Early Moving-Image Projection in Opera

1728
book

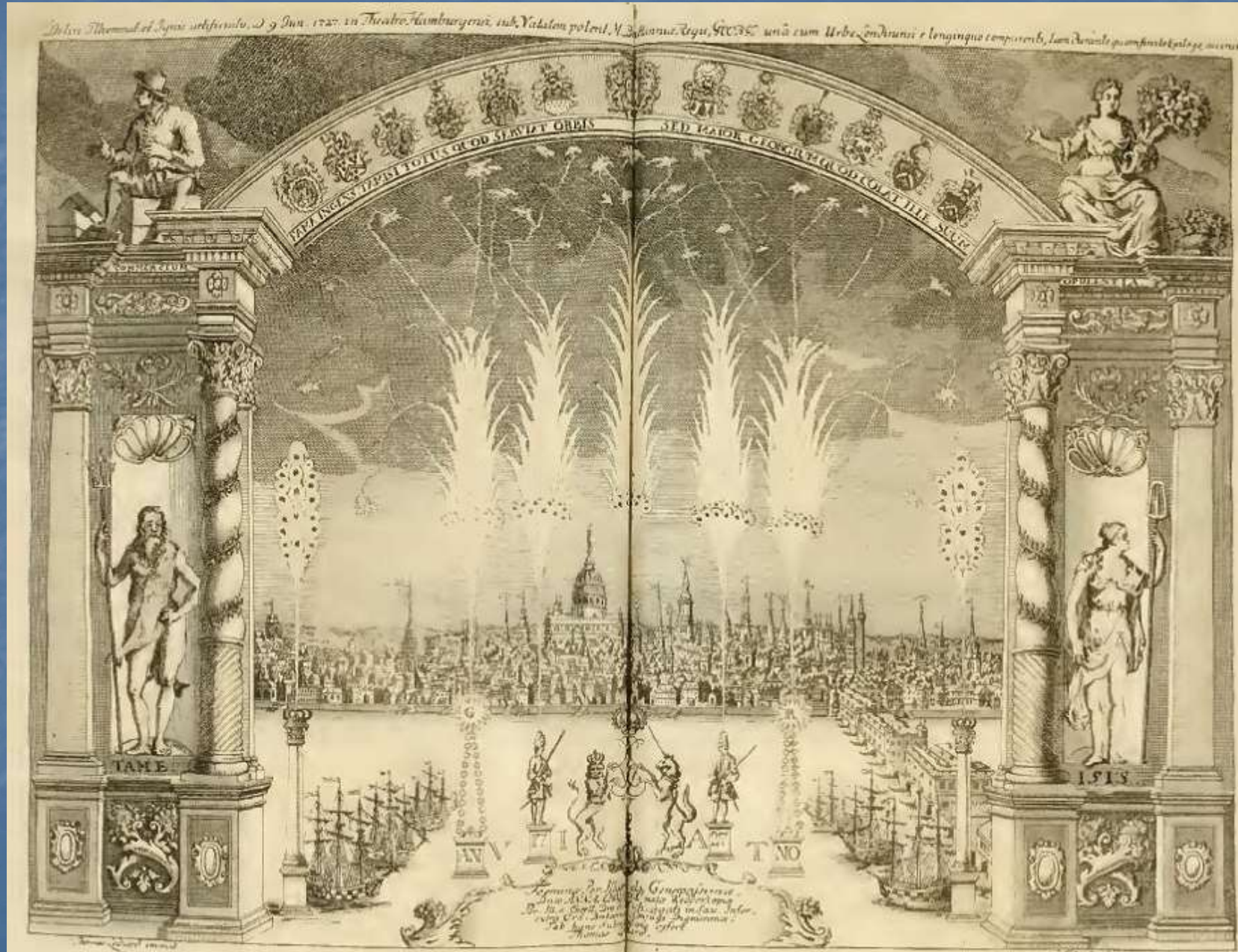
Hamburg Opera

- (no later than 1727)
magic lantern



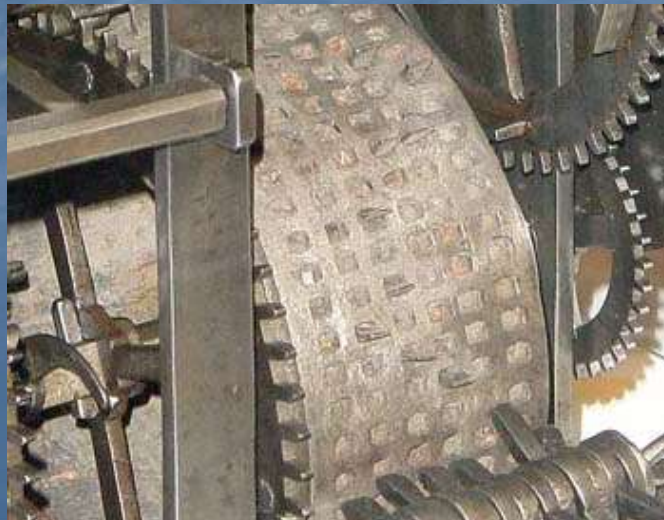
https://www.luikerwaal.com/indexx_uk.htm

Mark Schubin, SMPTE NE, 2021 April 21

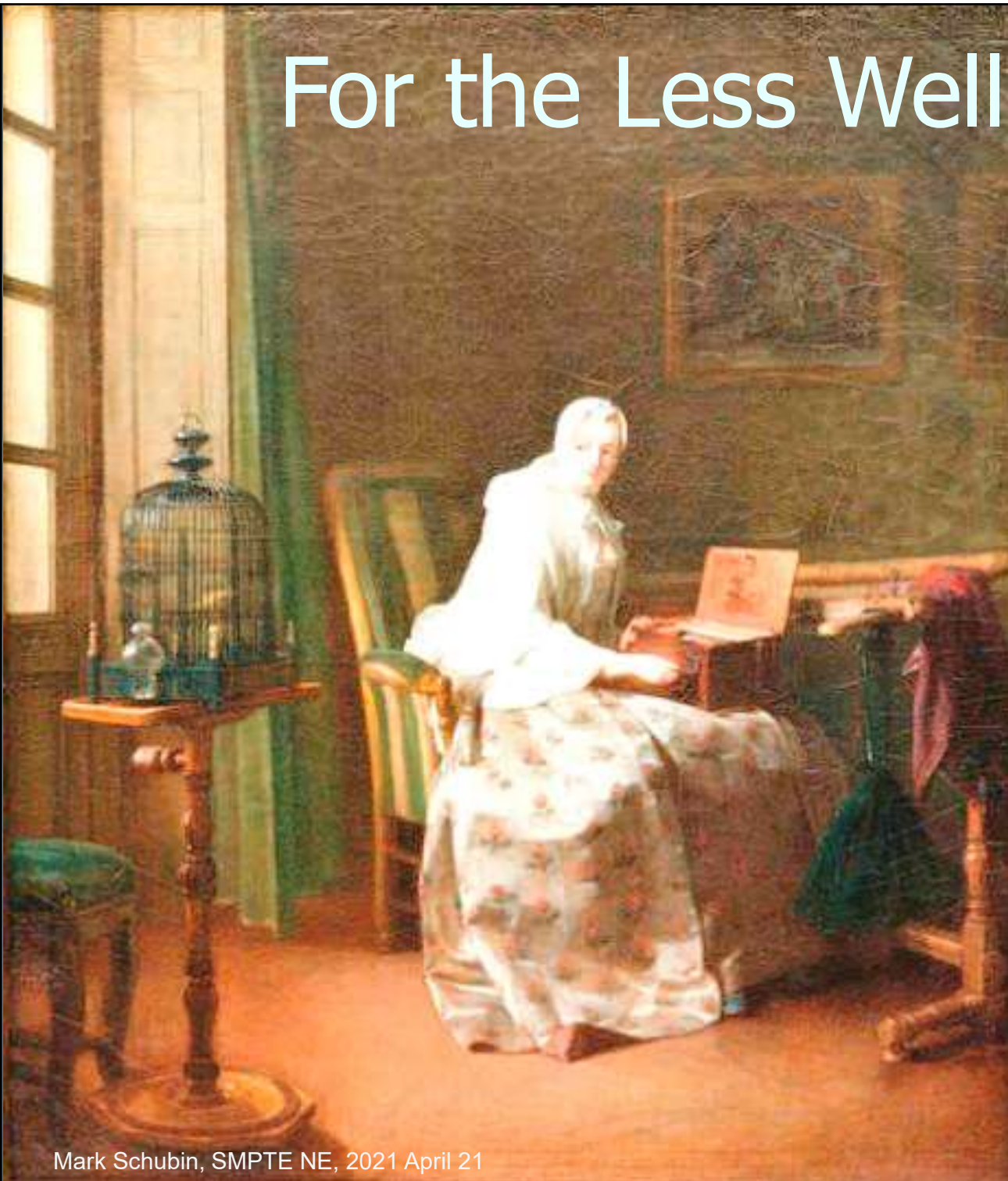


Playback & Automata

- 1784 David Roentgen & Peter Kinzing automaton for Marie-Antoinette plays opera music
- 1738 Charles Clay clock with organ played pieces from operas
- c. 1480 barrel re-pinnable
 - pre-Jacquard loom



For the Less Well-Heeled: Serinettes



Mark Schubin, SMPTE NE, 2021 April 21

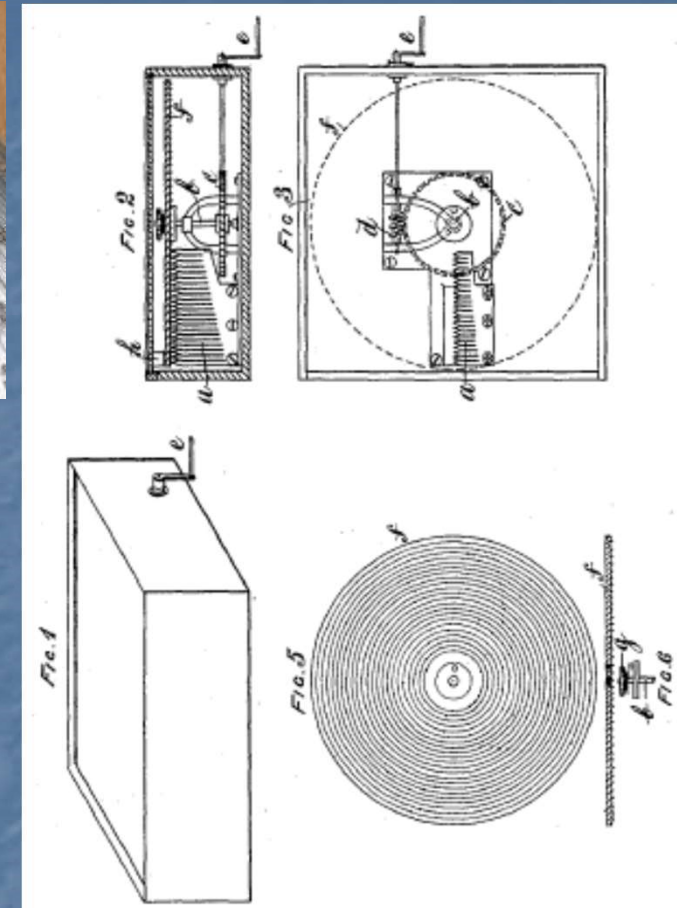
La serinette
enivrante



Die Vogelorgel, 1751
Jean-Baptiste-Siméon Chardin
Frick Museum

Pre-Phono Opera Playback for the Masses

- 1888 gramophone disk
- 1885 musical box disk
 - mass produced
 - “a few pence”
 - disk changers (longer)
 - coin-operated
- 1845 *New-York Mirror*:
tunes from that year’s new opera
The Bohemian Girl were already
“established favorites... ground by
every hand organ”



disk musical box patent
Ellis Parr 1885

1892
organ
grinder

Beyond the Opera House: 1673

Athanasius
Kircher
*Phonurgia
Nova*



1st Subscription Home Entertainment Proposal

Les mêmes conditions d'abonnement subsisteroient à l'avantage de MM. Perrier; ils distribueroient également leurs conduits pour les eaux comme pour les sons. Combien d'amateurs de musique en feroient aboutir à l'orchestre de l'Opéra; & de leur chambre, en soulevant une trappe, s'extasieroient à leur aise sur Gluck & sur Piccini! Combien de personnes pieuses, impotentes, ou malades, seroient trop heureuses de s'unir, de leur fauteuil, au chant de l'église, & expieroient ainsi, par des abonnemens édifiants, l'usage profane auquel on les consacreroit d'ailleurs.

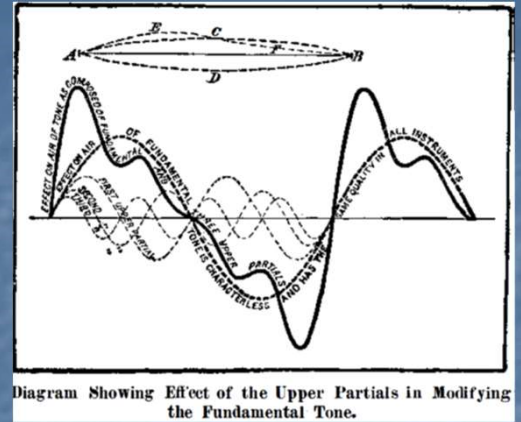
use of pipes to deliver opera music (as in the recently installed waterworks in Paris)

"How many music lovers would turn to the orchestra of the Opera; & from their room, lift a flap, and go into ecstasy at their ease over Gluck and Piccini!"

"Letter on the propagation of sound and of movement," *Variétés littéraires. Littérature légère, ou Recueil des vers, chansons anciennes, contes, tant en prose qu'en vers* 1787 September 6, pp. 185-9

SMPTE Honor Roll of Opera

- Lee de Forest (broadcast synthesized opera music 1907)
- W. K. L. Dickson (opera music in earliest existing sync-sound movie, c. 1894)
- Ray M. Dolby (large-screen opera distribution)
- Thomas Alva Edison (opera for movies, sound movies, proposed color TV)
- Harvey Fletcher (live opera stereo sound mix and distribution)
- C. Francis Jenkins (TV sets for opera)
- Louis A. A. Le Prince (motion-pictures for operatic scenes)



how the synthesizer worked
Scientific American
March 9, 1907, p. 210

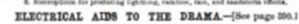


Harvey Fletcher, opera conductor Leopold Stokowski, & W. B. Snow
Bell Labs Archives

Act II: Technologies for Opera Performance

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. LIX.—No. 51. NEW YORK, DECEMBER 22, 1888. [53.00 A YEAR.
ESTABLISHED 1843. WEEKLY.]



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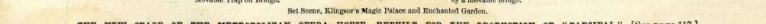
A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.
Vol. XXXII. No. 21. NEW YORK, MAY 25, 1897. [SEVEN A YEAR.
\$3.00 IN ADVANCE.]



Downloaded from <http://ajphaphapublications.sagepub.com/> at 10:05 11 May 2015

[Entered at the Post Office of New York, N. Y., as Second Class Matter, Copyright, 1901, by Mann & Co.]

Vol. XC.—No. 6.] NEW YORK, FEBRUARY 6, 1904. [8 CENTS A COPY
ESTABLISHED 1845.] \$3.00 A YEAR.



The stage is divided into sections, the floor is removable and its place can be taken by "bridges," which can be raised to the level of the stage, carrying set scenery. The wing scenes are operated from the cellar,

1st Opera Engineer?



design
for
*La finta
pazza*
1645



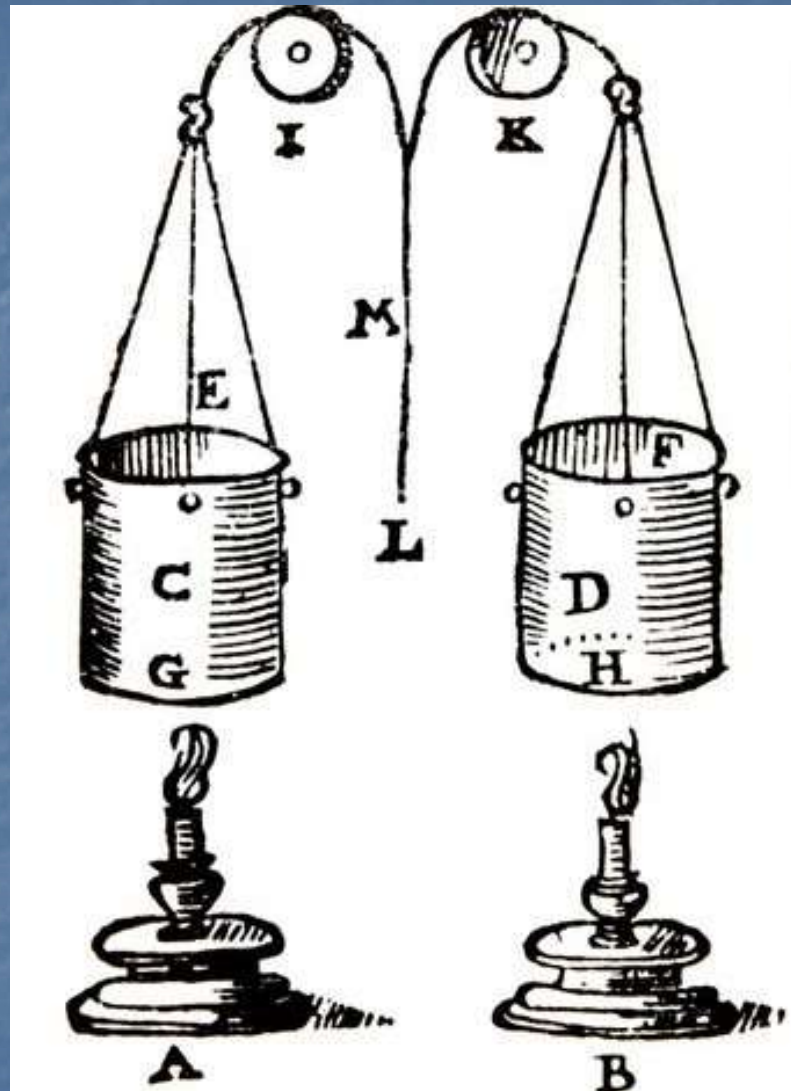
Giacomo Torelli, creator of the counterweighted pole-and-chariot scene-changing system for solo operation in full view of the audience

Drottningholm Court Theater 1766



<https://www.youtube.com/watch?v=EdRUdoKfPvo>

Pre-Electricity Lighting Equipment



1638 remote-controlled lighting dimmer

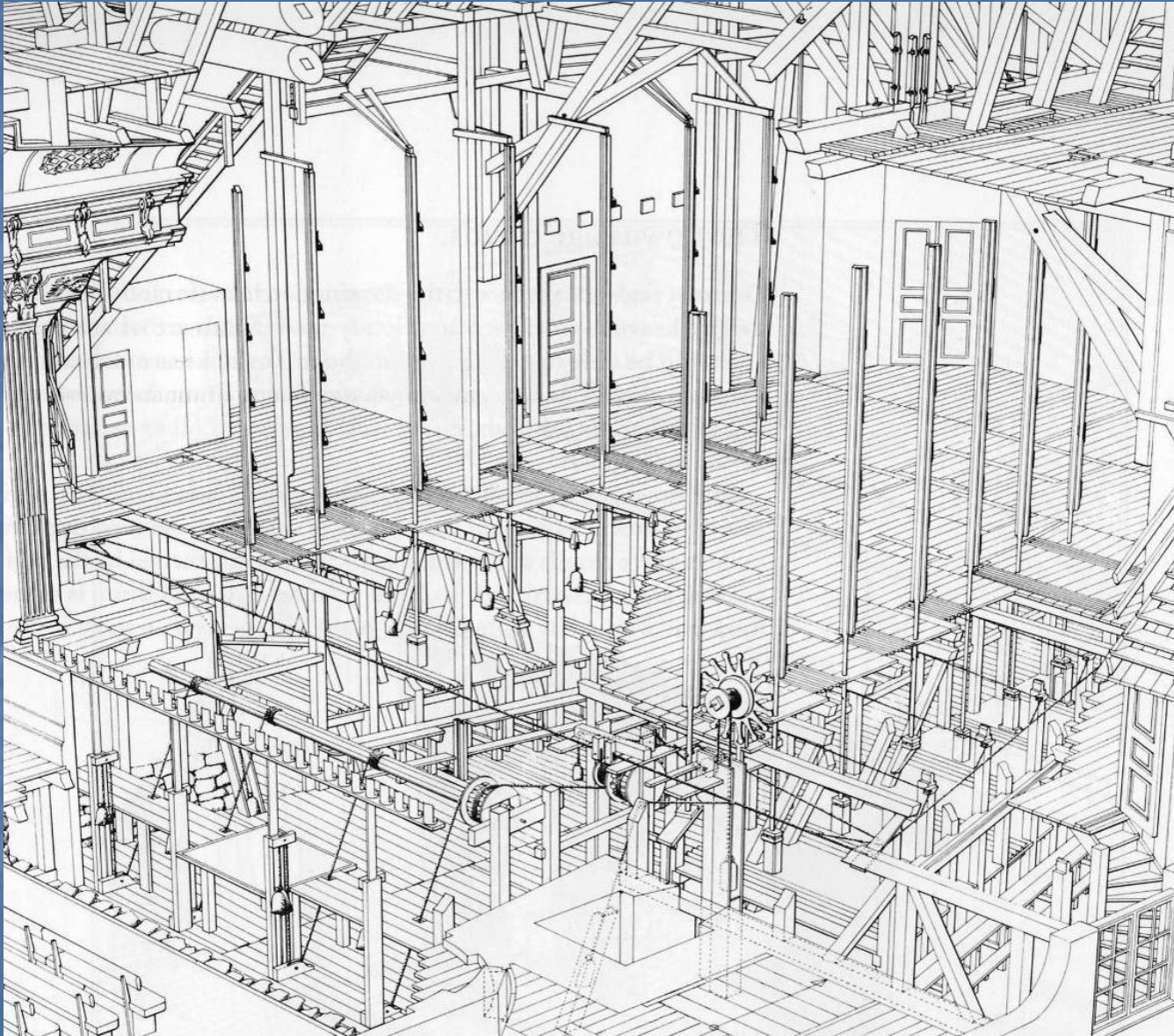
Nicola Sabbattini, *Pratica di fabricar scene e machine ne' teatri*, p. 86



bozza for color changing and focus

<http://en.terbly.com/index.php/About/index/pid/6>

Lighting Control



Drottningholm
Court
Theater
opened 1766

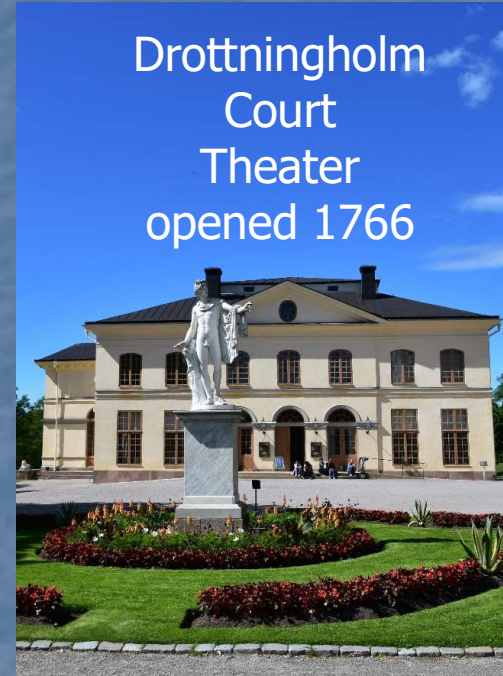
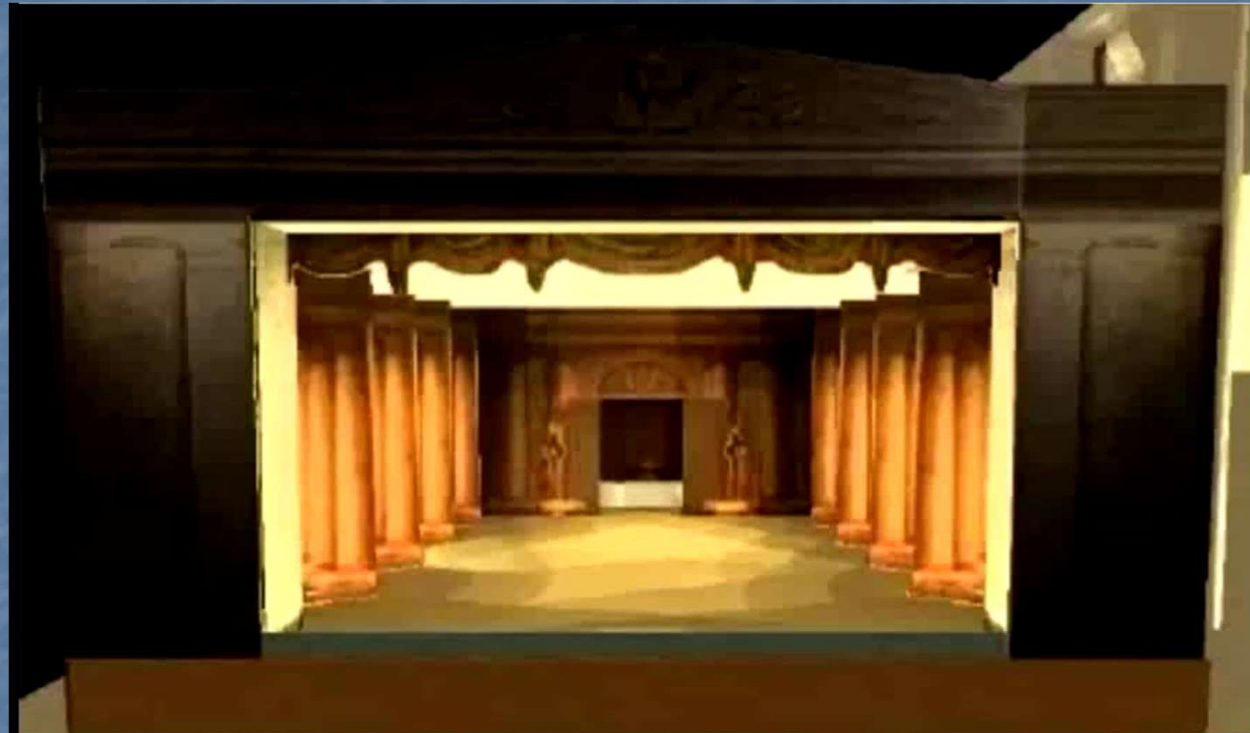


photo: Richard Mortel
theater: <https://dtm.se/home>



Pre-Electricity Lighting Effects



Mnichovo Hradiste Simulated Lighting Change
“The Development of Scenic Spectacle”
Appalachian State University
used with permission of
Frank Mohler, professor emeritus

<http://spectacle.appstate.edu/movies/mnichovo-hradiste-lighting-change>

And Audience Lighting?

pre-mid-19th-century candle
wicks weren't consumed &
had to be trimmed

- backstage: stagehands
- onstage: performers
- sconces: footmen
- chandelier: ?

COURSE OF SIX LECTURES
ON THE
CHEMICAL HISTORY OF A CANDLE;
TO WHICH IS ADDED
A LECTURE ON PLATINUM.
BY
MICHAEL FARADAY, D.C.L., F.R.S.,
FULLERIAN PROFESSOR OF CHEMISTRY, ROYAL INSTITUTION; FOREIGN ASSOCIATE
OF THE ACADEMY OF SCIENCES, ETC.



pair of snuffers made in 1680

© Victoria and Albert Museum, London

1683: Darkened Room & Exit Lighting

232 MERCURE

introduites par l'usage, & qui les voudroit changer ne se feroit pas entendre. Vous vous souviendrez, s'il vous plaist, que quand je me fers du nom de Noble, j'entens toujours un Noble Vénitien.

RELATION DES OPERA,
représentés à Venise pendant le
Carnaval de l'année 1683.

LE Carnaval de Venise, dont on parle tant à Paris, & dans toutes les autres Villes de l'Europe, est proprement un assemblage de plusieurs sortes de Divertissemens, qui ne se permettent

GALANT. 233

publiquement que dans ce temps-là, à moins de quelque Réjouissance extraordinaire. Ces Divertissemens consistent en Comédies, Opéra, Réduits, Bals, Festins, Courses, & Combats de Taureaux, Danceurs de Cordes, Marionnetes, Bateleurs & Farceurs; liberté à tout le monde d'aller masqué en plein jour, & encor dans la Cerémonie qui se fait le Jeudy-gras en présence du Doge.

Autrefois le Carnaval commençoit dès le lendemain de
Mars 1683.

V

254 MERCURE

la Salle, dans l'épaisseur duquel sont encor quatre Pales de chaque costé de la mesme simétrie que les autres, mais beaucoup plus ornez & enrichis; & dans la Voûte ou Arcade, deux Re-nommées avec leurs Trompettes paroissent suspenduës en l'air, & une Vénus au milieu, qu'un petit Amour caresse.

Une heure avant l'ouverture du Théâtre, le Tableau de cette Vénus se retire, & donne jour à une grande ouverture, d'où descend une maniere de Lustre à quatre branches d'étofe d'or & d'argent, de douze à quatorze pieds de hauteur, dont le corps est un grand Cartouche des Armes de Messieurs Grimani, avec une Couronne de Fleur-de-Lys, &

GALANT. 255

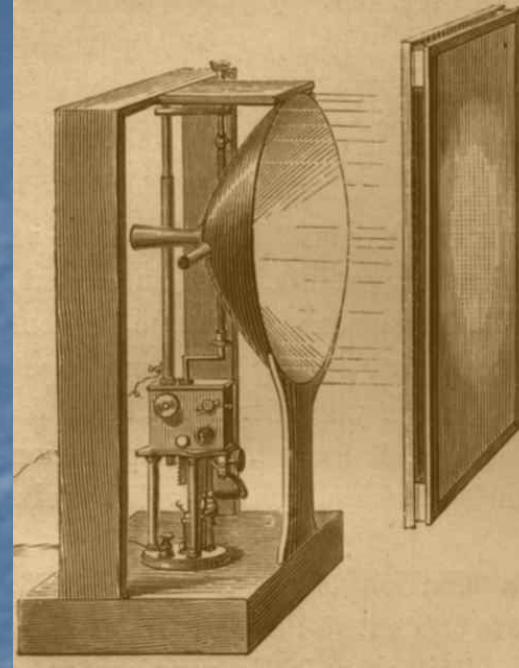
de rayons surmontez de Perles au dessus. Ce Chandelier porte quatre grands Flambeaux de poing de Cire blanche, qui éclairent la Salle, & demeurent allumés jusqu'à ce qu'on leve la Toile, & alors le tout s'évanoût, & revient à son premier état. Dès que la Piece est finie, cette Machine paroist de nouveau pour éclairer les Spectateurs, & leur donner lieu de sortir à leur aise, sans confusion. Les Armes sont pallées d'argent & de gueules de huit pieces, le troisieme Pal chargé en chef d'une Croisette à deux travers de gueules. Cette Croisette distingue une des Branches de la Famille. Elle fut donnée à leurs Ancestres, qui firent paroistre des preuves de leur valeur

Source gallica.bnf.fr / National Library of France

1849: Electric Lighting Effect

Jules Duboscq

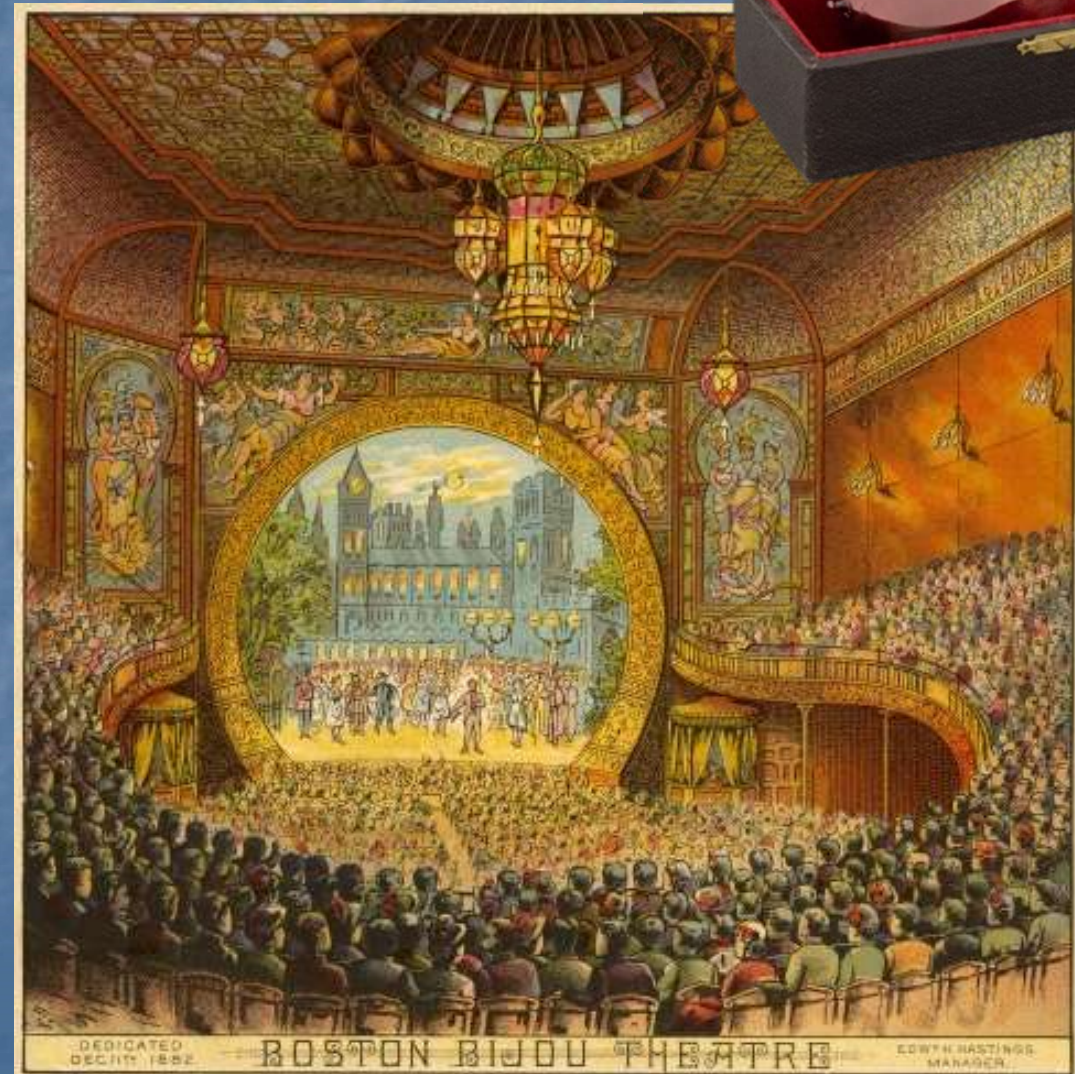
- sunrise via arc
 - remove toxic battery fumes
- also
 - rainbow
 - illuminated fountain using total internal reflection
 - earliest photographic sequential motion picture patent (1852)
 - in stereoscopic 3D



Electric Lighting

- 1881: Paris (test) and Savoy (London)
 - in-house generators
 - Brno to Rio
 - initially saltwater dimmers
- 1882: Bijou Theatre, Boston
 - “parlor opera house” 
 - production from the Savoy
 - 1st in U.S.
 - “No opera, no X-rays!”
 - Children’s Hospital

[images from the
Harvard University
Houghton Library](#)



Remote-Controlled Lighting Grid

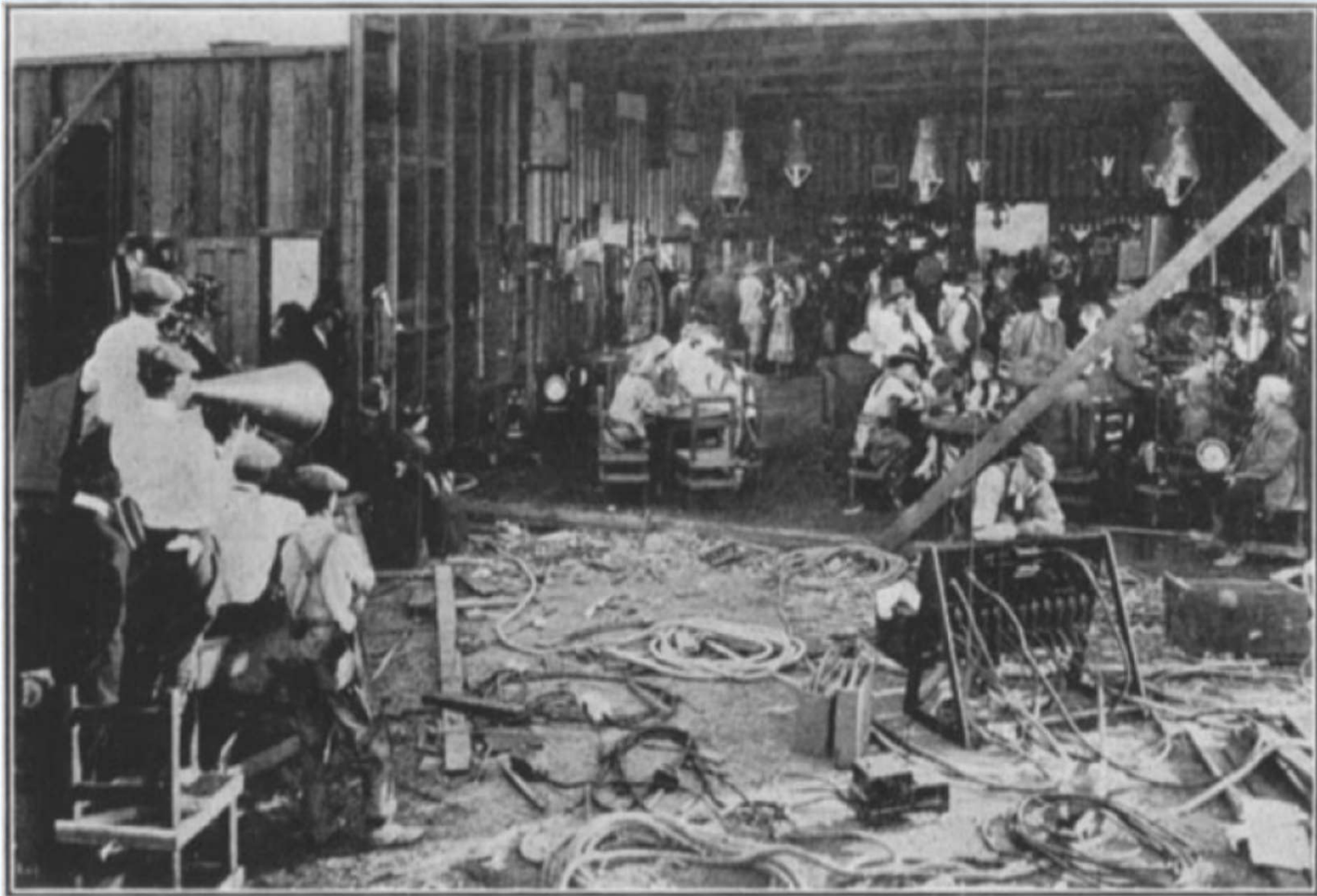
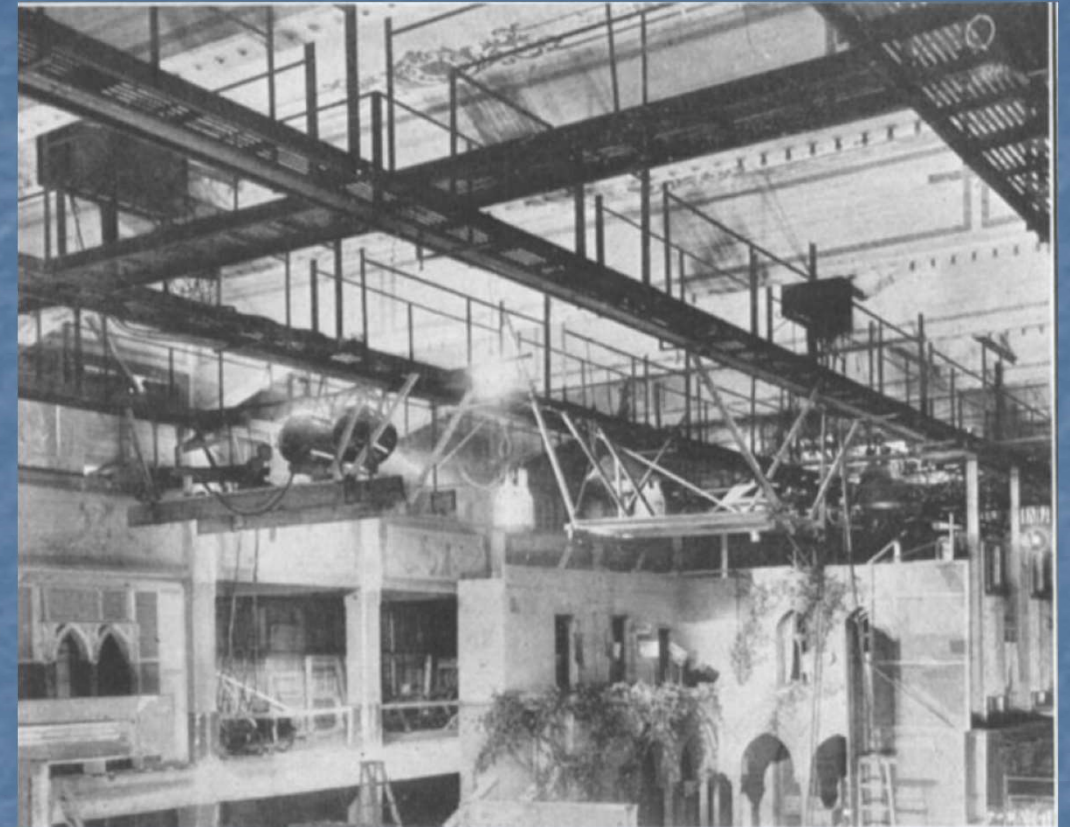


Fig. 1. A Typical Studio Scene When Remote Control is Not Used.



Amsterdam Opera House, NYC, above

both images from "Remote Control
Switchboards for Motion-Picture Studios"
Transactions of the SMPE, January 1920

Movies for Opera Scenery

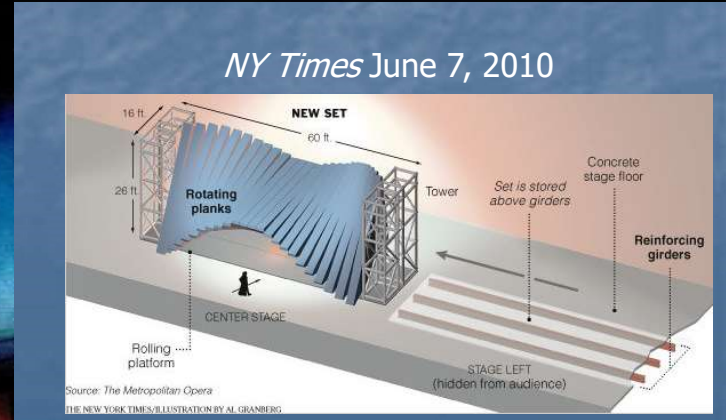
“I, the undersigned, Ferdinand Mobisson, Secretary of the National Opera, Paris, residing at 38 Rue de Mauberge, certify by this present to have been charged with the study (or examination) by means of the apparatus brought before me, of the system of projection of animated pictures, for which Mons. Le Prince, Louis Aimé Augustin, of New York, United States, has taken out in France patent rights dated the 11th of January, 1888, having the number 188,089, for ‘Method and Apparatus for the projection of Animated Pictures, in view of the adaptation to Operatic Scenes,’ and to have made a complete study of this system.

“Career of L. A. A. Le Prince,” *JSMPE*, July 1931



Current Projection: Real-Time Interactive CG

- Sensors:
 - infra-red cameras
 - microphones
 - rotational encoders
- Processing (real-time)
 - interactive images
 - video warping
 - depth-plane selection



Kurt Weill Operas Incorporate Media

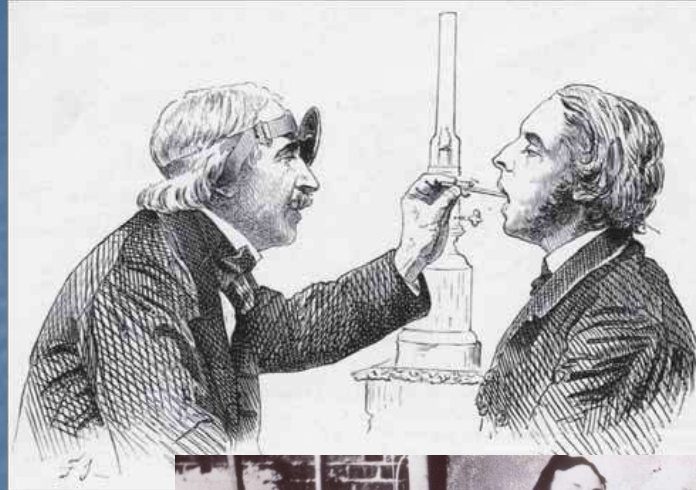
- 1927: *Royal Palace* - movie
 - 1937: Berg's *Lulu*
- 1928: *Der Zar läßt sich photographieren* - phonograph record (distributed with the score)
- 1930: *Aufstieg und Fall der Stadt Mahagonny* - loudspeaker



from the 1937 film scene of Berg's *Lulu*

Earlier Sound

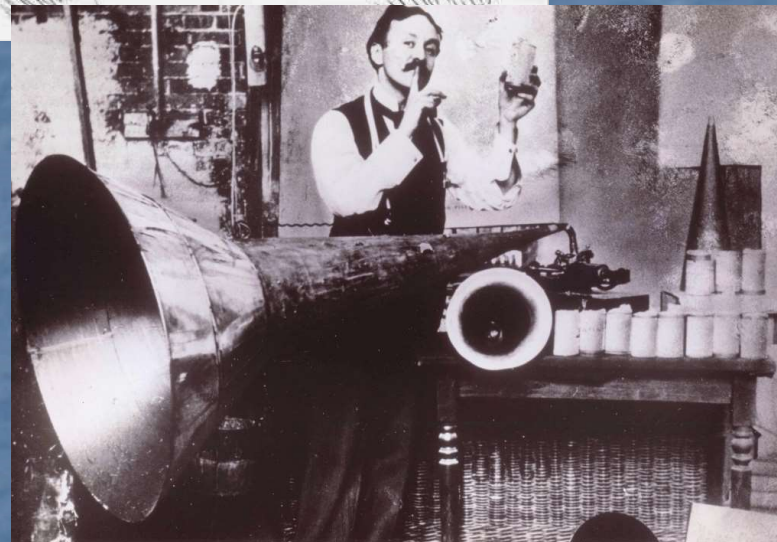
- 1854: laryngoscope
- 1860: aria recording
- 1901: study recordings
- 1903: assisted listening for the hearing-impaired
- 1908: surveillance audio



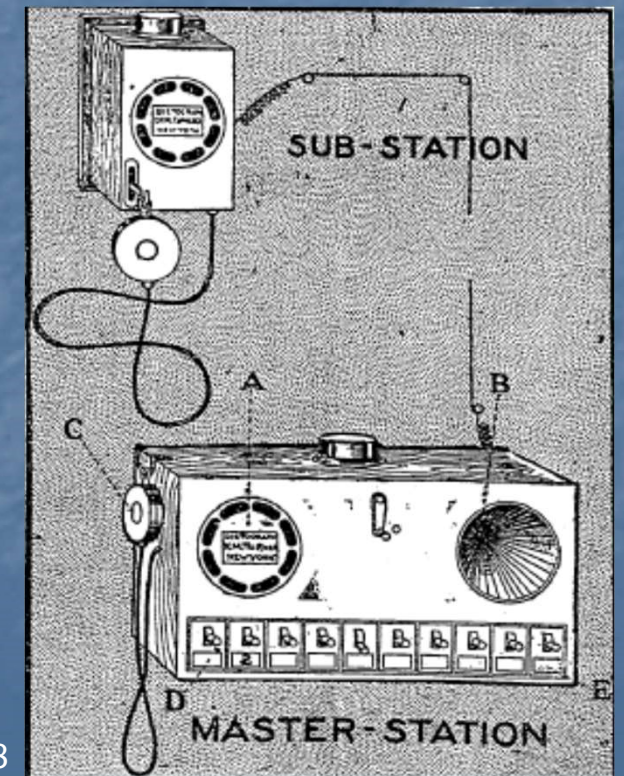
created by
baritone
Manuel
García



phonograph
1860 recording
couldn't be
played until
2009



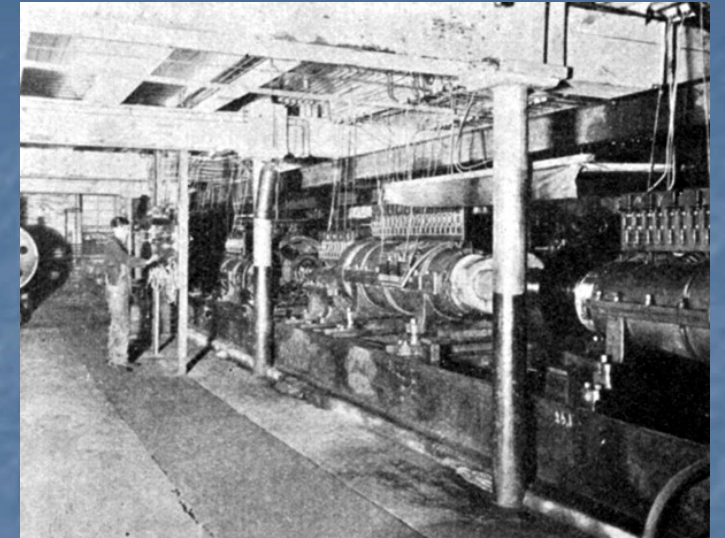
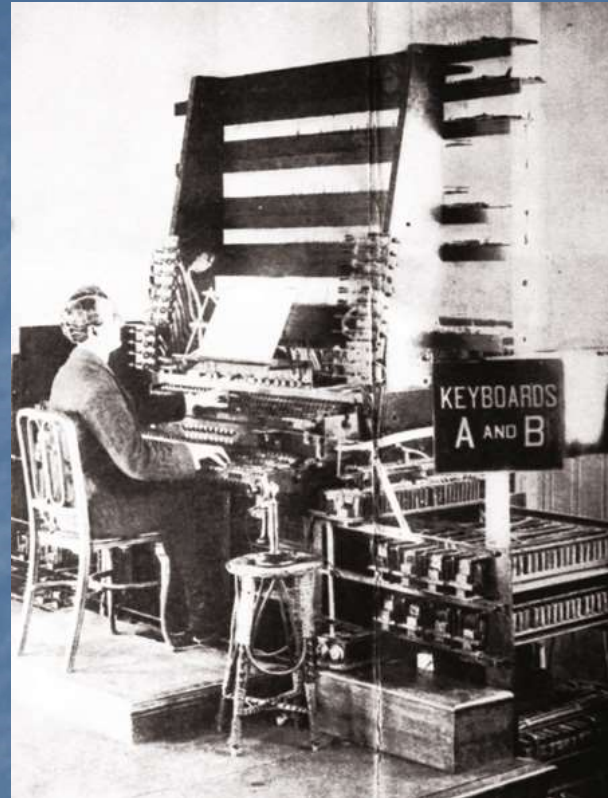
Mapleson cylinders



The New York Times, January 19, 1908

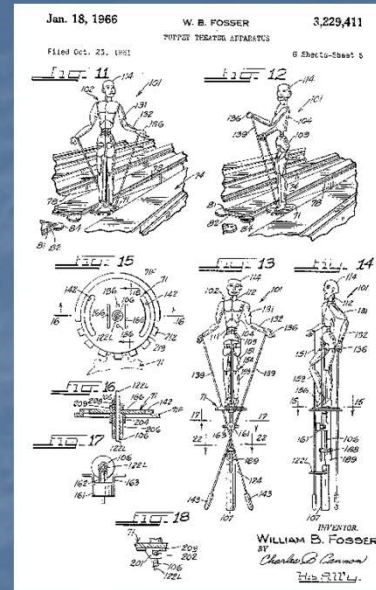
Synthesized Music

- Telharmonium
 - starting 1896
 - built in Holyoke 
 - 200 tons
 - alternator per sine wave
- *Countdown* 1987 
 - Boston Lyric Opera commission
 - 1st live virtual orchestra
 - 1st computer-assisted composition
 - 1st audio streaming



Non-Living Performers

- puppets by 1647
 - two U.S. patents for opera puppets, specifically
- 1975: synthesized singing voice



- 2010: robots



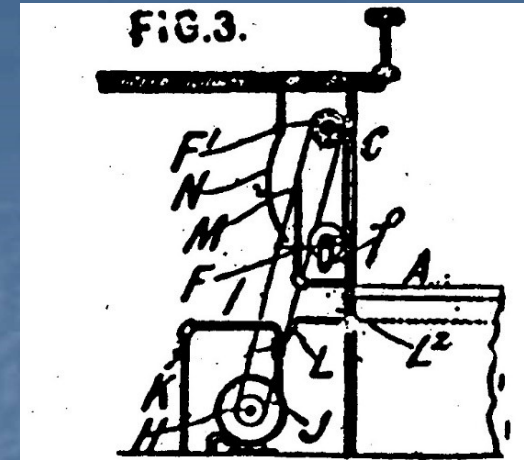
“emotion capture”
Death and the Powers
MIT Media Lab
Opera of the Future



Mar-ri-ia-a composer Joseph Olive
Bell Labs Archive

Live Titles

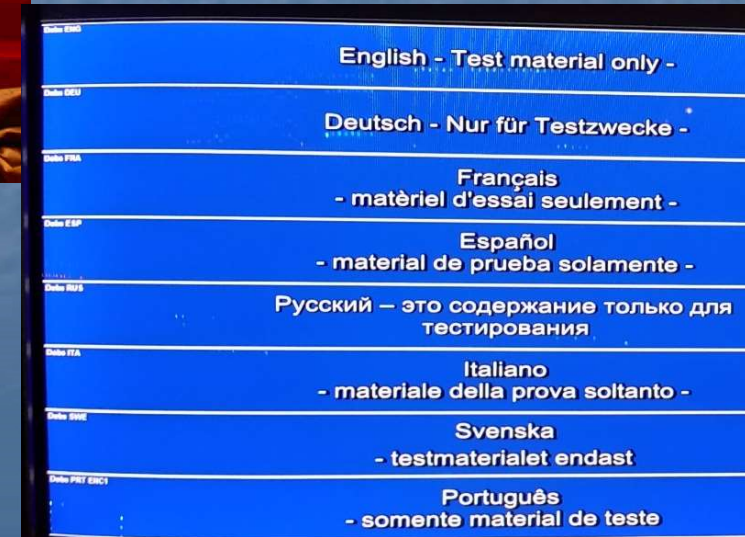
- 1881: UK patent 4267 (gas lit)
- 1976: *Live from Lincoln Center*
- 1983: Surtitles
- 1995: Met Titles
- 2007: multilingual
- 2019: pictorial



anticipates the teleprompter



Santa Fe
Electronic
Libretto
System



2014 On Site Opera's *Pigmalion* (1748)



Google Glass major role
(also smartphone)

Image Magnification

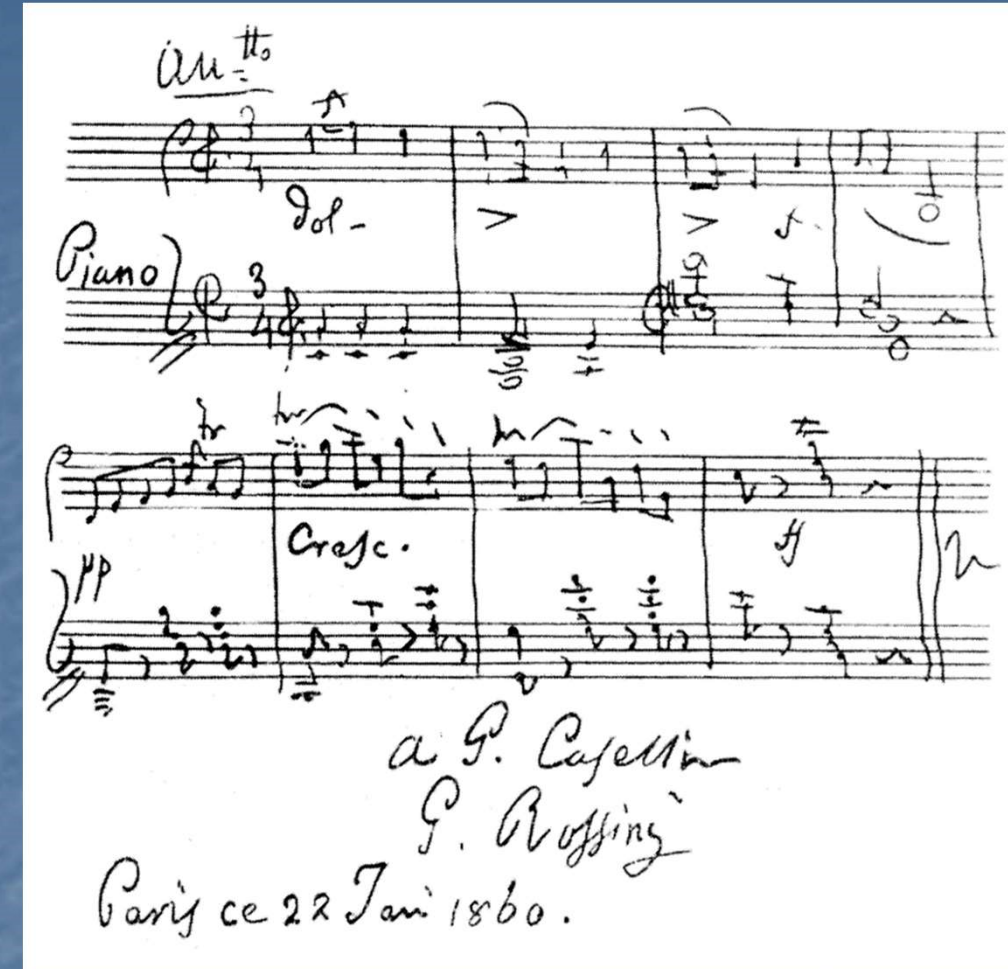


San Francisco Opera
OperaVision

Act III: Technologies to Reach Beyond the Opera House

Telegraph

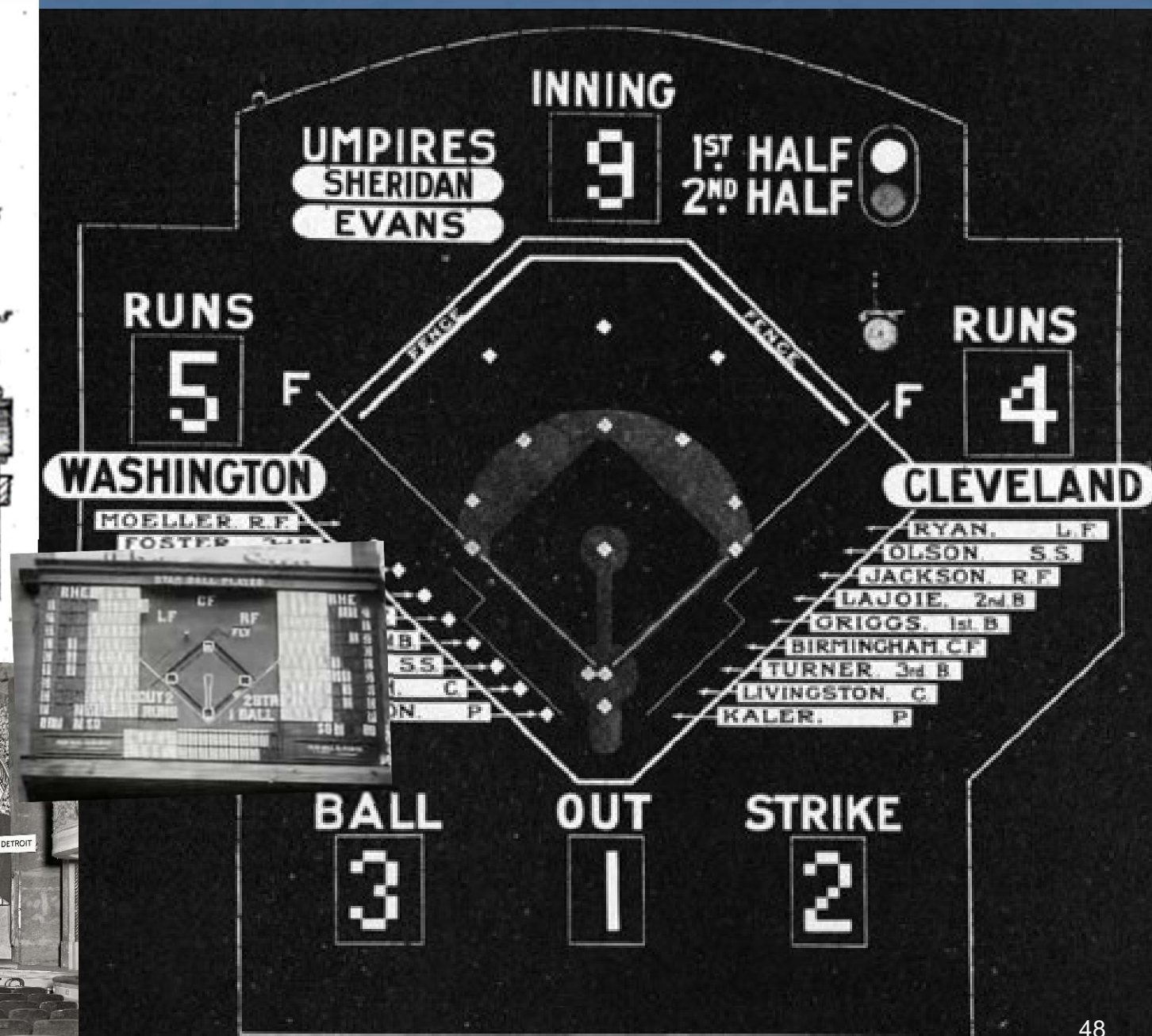
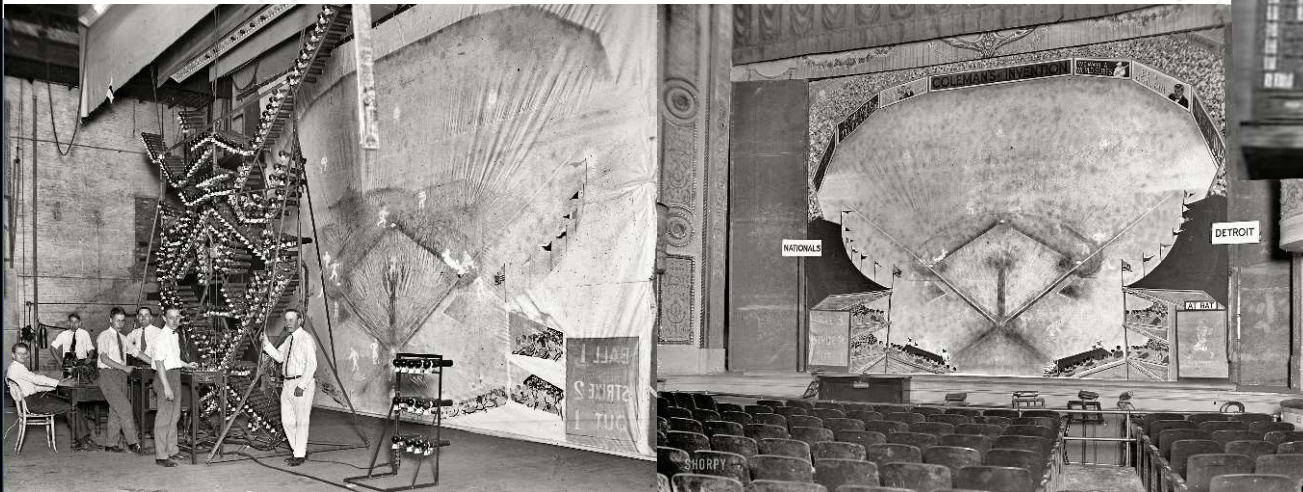
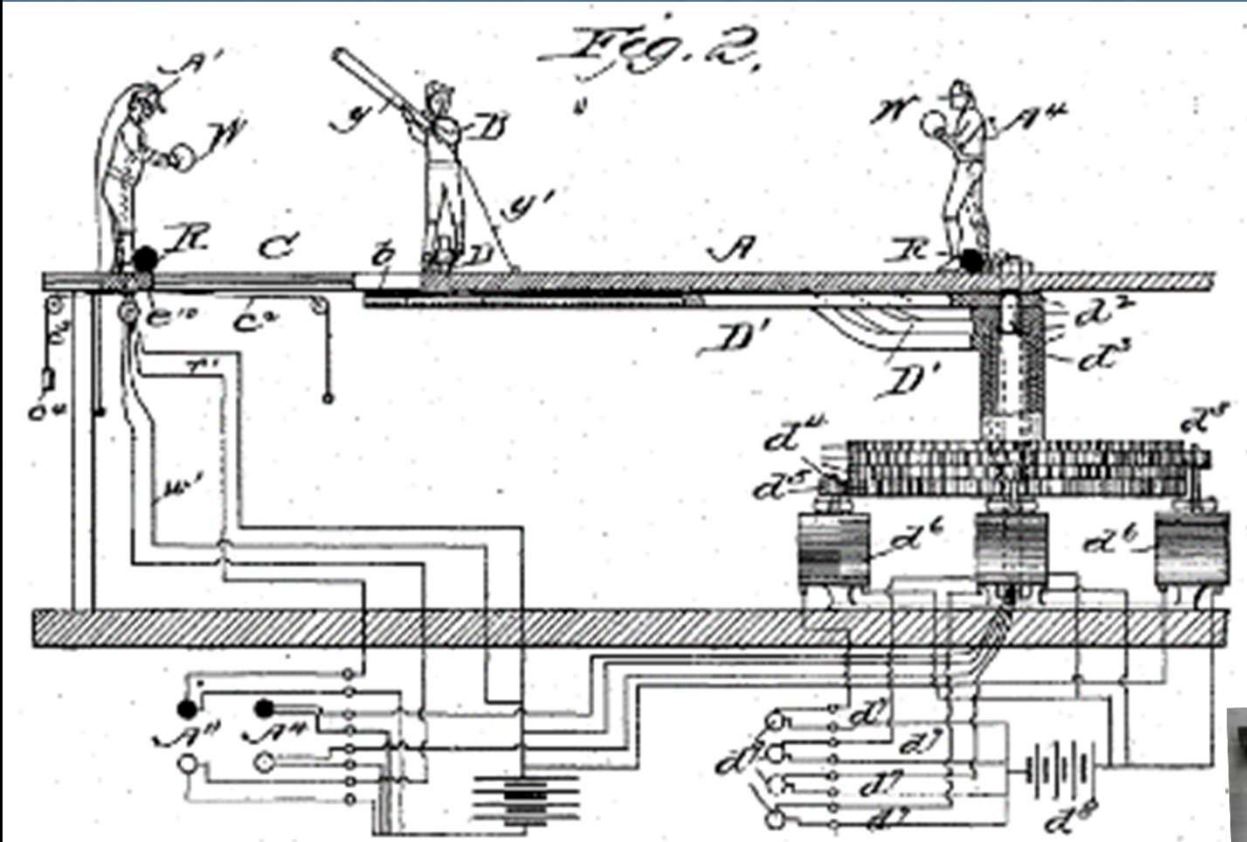
- 1853: Parliamentary news to London's Royal Italian Opera House
- 1860: Rossini transmits sheet music
 - via Caselli's pantélégraphe
- 1885: live remote baseball games




BASEBALL AT THE OPERA HOUSE.
**A Complete and Convenient Arrangement
to Take the Game in Detail.**

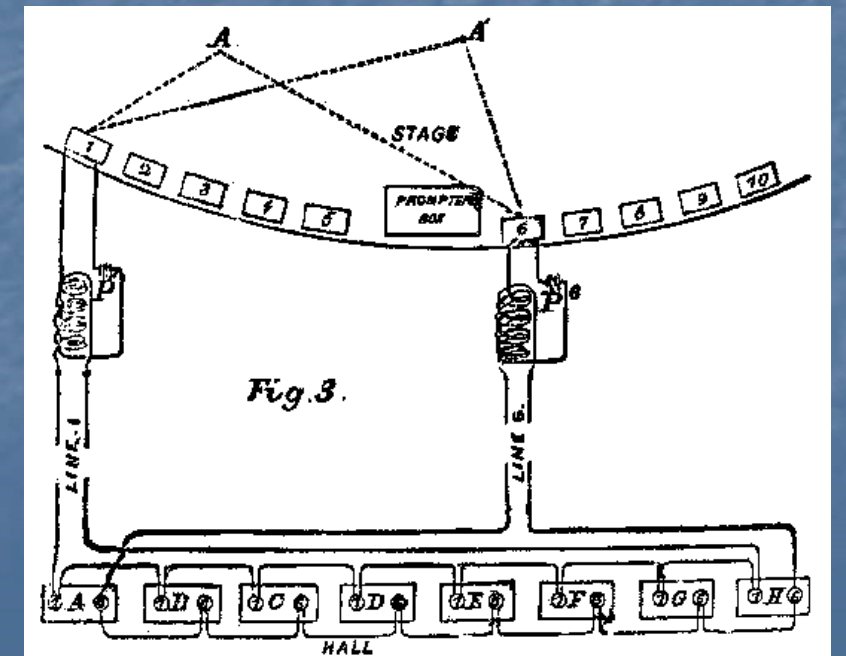
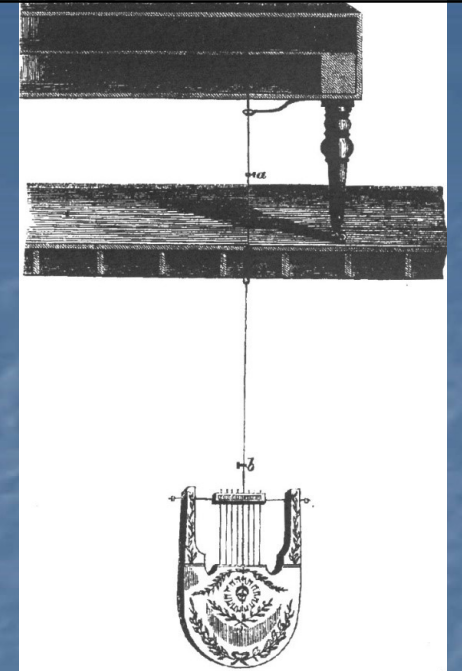
Atlanta Constitution
April 15, 1886

Baseball at the Opera House



Live Sound Distribution

- 1787: 1st proposal
- 1821: Wheatstone acoucryptophone inspires sound-by-wire suggestion
- 1876: pre-Bell, *NY Times* predicts home delivery
- 1877: Bell opera aria Providence-to-Boston 
- 1878: complete opera in Bellinzona
- 1880: opera to homes in UK & U.S.
- 1881: stereo at 1st electricity congress
- 1882: toll charges in Dundee
- 1885: subscription service in Lisbon

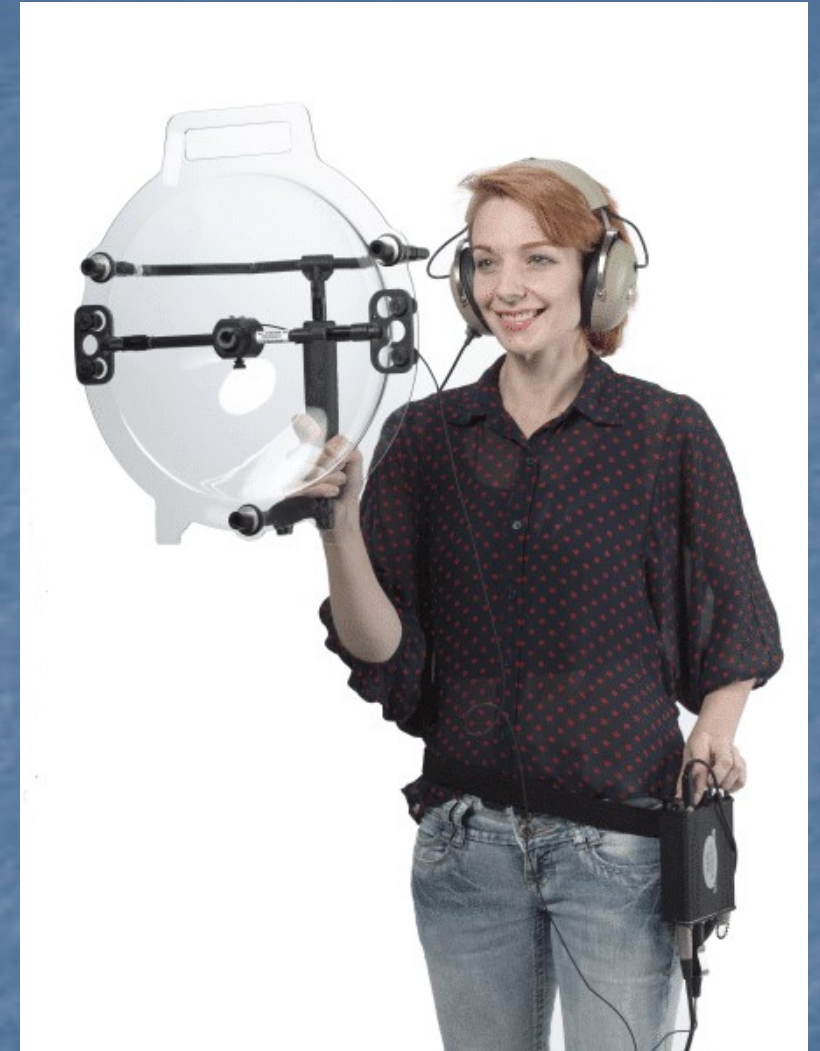


Parabolic Microphone

On a exécuté à Rome des expériences d'auditions téléphoniques avec un nouvel appareil, imaginé par l'ingénieur Giulio Marini, directeur de la Société Romaine des Téléphones. Les essais ont eu lieu au Théâtre National, pendant la représentation de *I Puritani*. Ils ont complètement réussi : la musique et le chant étaient reproduits avec une netteté et une exactitude complètes.

Le perfectionnement présenté par l'appareil, auquel l'inventeur a donné le nom de *télomicrophone parabolique*, consisterait, dit le *Bulletin international d'électricité*, dans l'addition au diaphragme d'une surface parabolique, dont le foyer est au centre du diaphragme. De

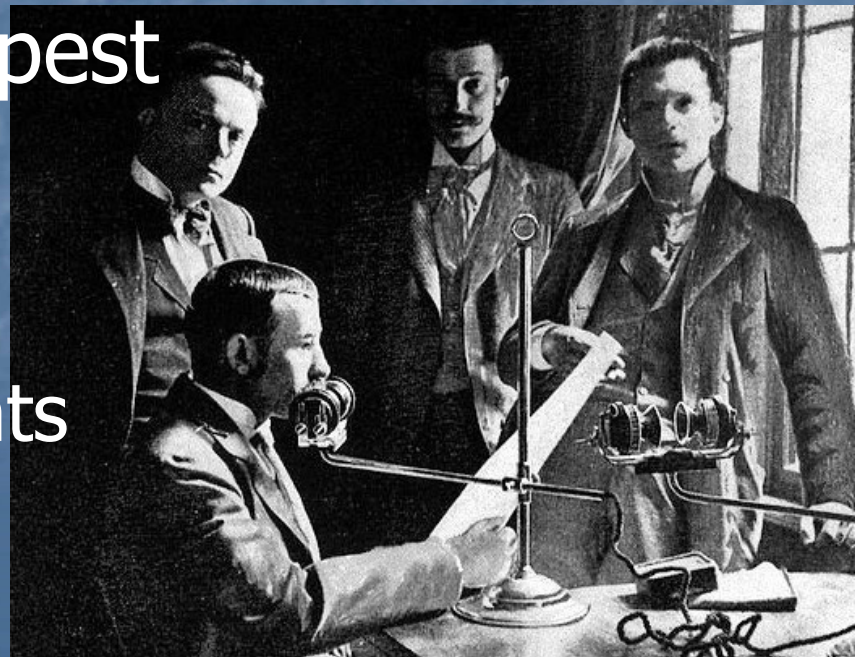
L'Année Scientifique Et Industrielle, 1887



<https://www.klovermik.com/klover-mik-16-parabolic-microphone/>

More Commercial Service

- Madrid 1885
 - listening rooms
- Théâtrophone – Paris
 - coin-op & subscription
 - Marcel Proust subscribed
- Telefon Hírmondó – Budapest
 - first newscasts 1893
- Théâtrophone – Brussels
 - established broadcast rights 1899



Radio

- 1907: live opera singer & music via synthesizer
- 1910: live operas
- 1919: opera >2k miles
 - 1920: transatlantic & beyond
- 1925: stereo broadcast
- 1932: radio opera commissions
 - 1937: “non-visual” (w/sound effects)
- 1938: 1st edited program
- 1973: 1st stereo network
- 2007: **satellite** channel

Hammerstein London Opera 1911
NEW IDEAS IN OPERA HOUSE.

**Wireless Station on Roof—Plan for
Free Admission of Students.**

Special Correspondence **THE NEW YORK TIMES.**



1920 Nellie Melba
global broadcast
(1st off-air recording)



Met Opera
Saturdays

Live Video Proposals

- 1877: earliest publication about television

and motion while in the electroscope. Both telephone and electroscope applied on a large scale would render it possible to represent at one time on a hundred stages in various parts of the world the opera or play sung or acted in any given theatre. The actors and singers will

The Sun
(New York)
March 30, 1877
p. 2

- 1878: publication describing actual technology

nie męczy się i nie choruje. Zakupiwszy „kilka łokci Patti“ w składzie fonogramów, będziemy mogli zasypiać codziennie, kołysani do snu melodyją diwy, zakłętą na wale fonograficznym, który sobie ustawimy przy łóżku. A jakaż to będzie wygoda dla profesorów

Julijan Ochorowicz, "On the possible construction of a device for transmitting optical images at any distance," *Kosmos*, February 10, 1877

- 1891: Edison proposal for home projection color TV

of the singers. When the system is perfected, which I hope will be in time for the fair, the muscles of the singer's face, every glance of the eye, and each expression will be seen. Every colour in the performer's attire, too, will be exactly reproduced. Moreover, the spectator, seated by his own fireside, will see

Evening Post
(Wellington, NZ)
June 27, 1891
p. 1

1881: Dioscope Spoof



THE OPERA AT HOME.

WHY GO TO THE OPERA? THE DE BEAUVILLES SIT IN THEIR DRAWING-ROOM, AND BY MEANS OF THE DIOSCOPE THEY CAN SEE WHAT PASSES ON THE STAGE, WHILE THE TELEPHONE ENABLES THEM TO HEAR THE SINGING. A GIRL WITH "ICES AND BOOKS OF THE WORDS" COMPLETES THE ILLUSION. IT IS FROM MERE FORCE OF HABIT THAT THEY CLAP THEIR HANDS AND CRY "ENCORE!"

Another Prediction of Opera TV, 1882

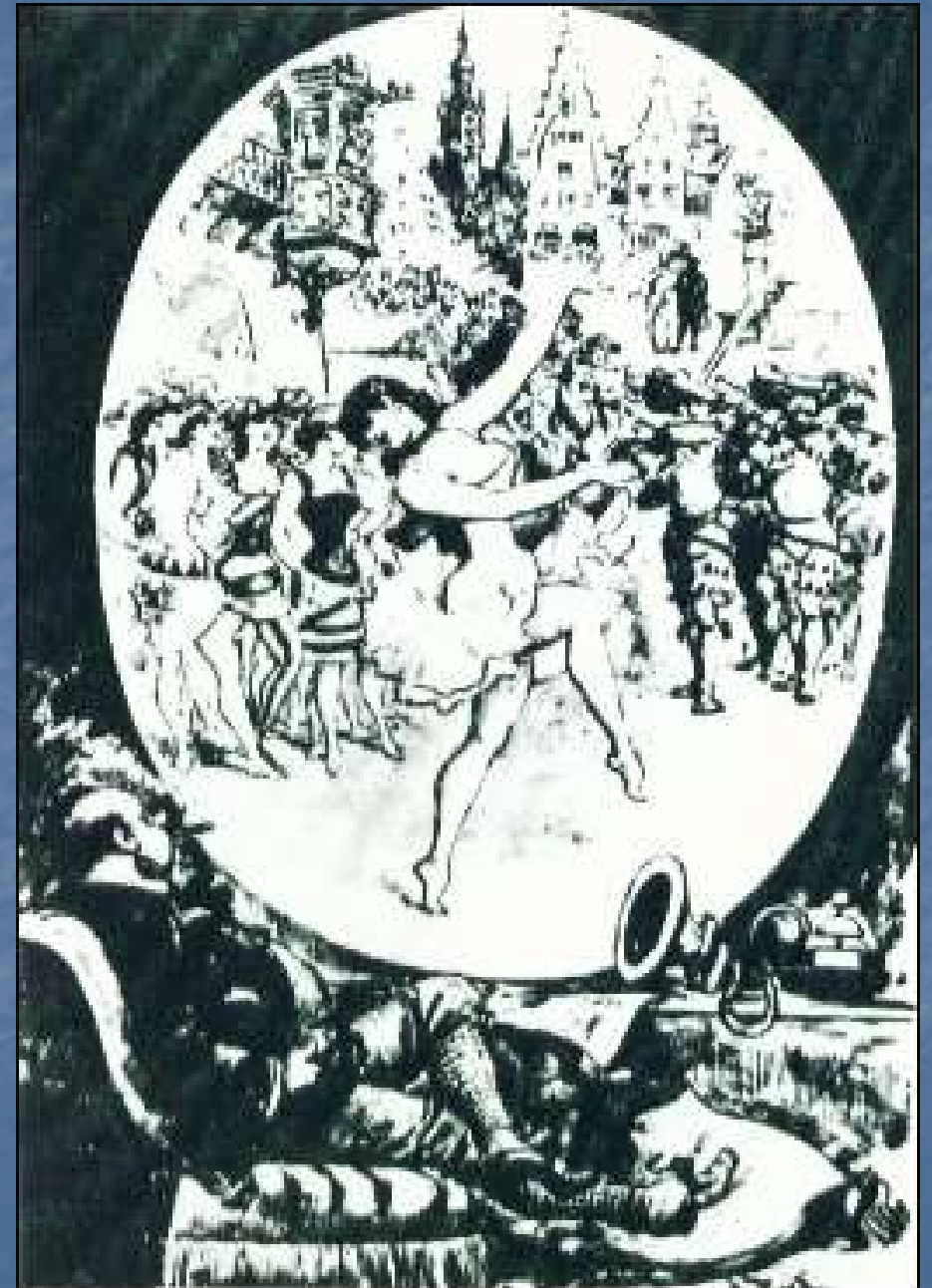
"...opera on the telephonoscope
to which he treated himself
daily after dinner...."

Albert Robida,
Le Vingtième Siècle
(*The Twentieth Century*)



English translation published by Wesleyan University Press 2004

prediction of TV, broadcasting,
newscasts, & product
placement, all based on 1881
Paris opera demonstrations



Sound Recording

■ Telephone

No man who can sit in his own study with his telephone by his side, and thus listen to the performance of an opera at the Academy, will care to go to Fourteenth street and to spend the evening in a hot and crowded building.

NY Times
Mar. 22
1876

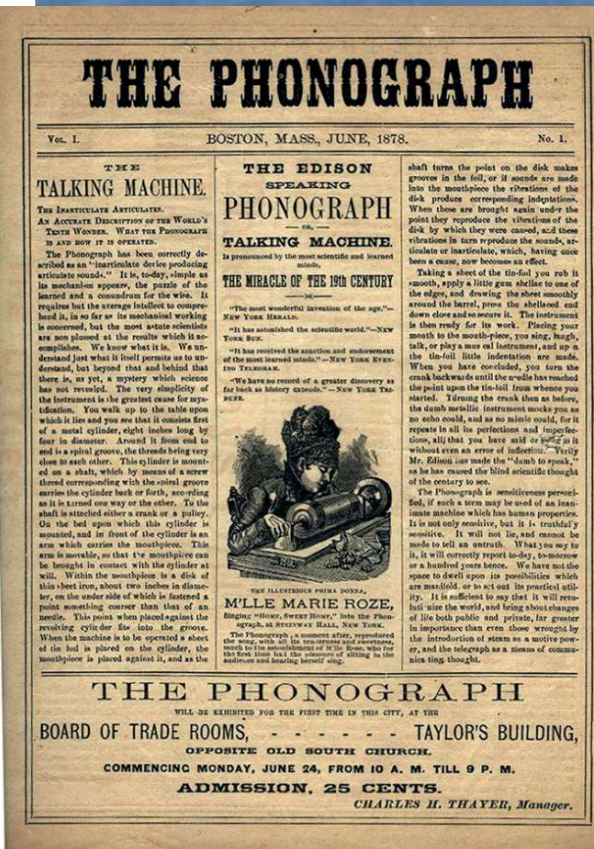
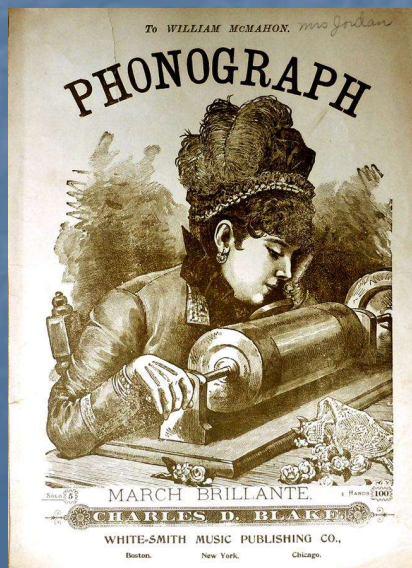
■ Phonograph

sermons can be stored away in the cellar, to be brought out years hence with their tones unimpaired by age, and their loudest yells as piercing and pervasive as ever.

NY Times
Nov. 7
1877

- Edison 1878: “The main utility... being for... letter writing”

Then Opera
soprano Marie Rôze
recording an aria
from the opera
Faust in 1878
becomes the image
of the phonograph



Recording: Not Live & Too Short

- 1860 aria (1st played in 2009)
- 1877 Edison cylinder, “perfected” in 1888
- 1888 Berliner disk gramophone
- Early cylinders & disks 2-minutes
 - later extended to 4-minutes
 - cylinders recorded individually (accidental stereo)
- 1889 surviving opera recordings
 - not commercial

phonograph
strip

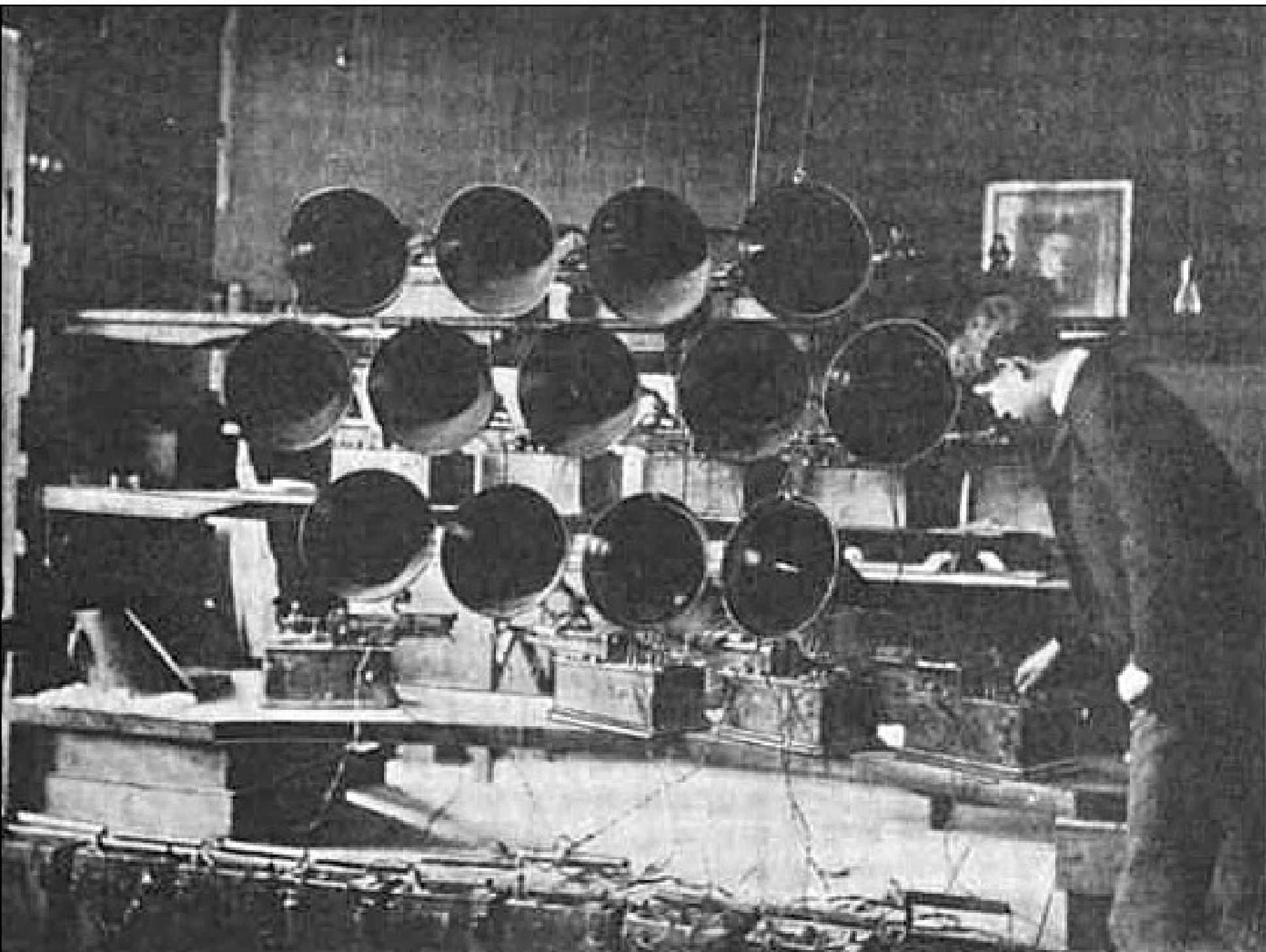


Indspilningen med Peter Schram er på denne valse fra Ruben-samlingen.
© Statsbiblioteket

1888: 1st Bootleg Recording

New-York Tribune
November 2, 1888
p.7 column 2

Interesting and highly colored accounts of queer incidents seem to be “the rage” just now around the theatres which employ special men to do their press work. The latest comes from the Casino. The story is to the effect that on Wednesday evening the manager of a small travelling opera company went to see “The Yeomen of the Guard,” and took with him a phonograph. He had succeeded in recording the entire first act with his machine, when the eagle eye of an usher lighted upon him and he was hustled, phonograph and all, into Mr. Aronson’s office. The manager explained that he wanted to produce the operetta on the road, and had been compelled to steal the score, as he could not get it otherwise. The libretto he had bought for twenty-five cents. Mr. Aronson was generous and forgave the manager, but took the imprinted foil of the phonograph away from him.



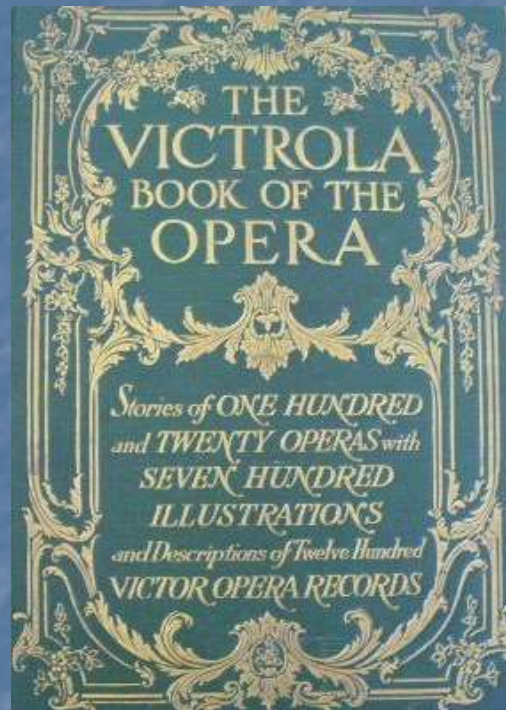
“Thirteen
phonographs
‘set’ to record
full orchestra
of twenty-
six pieces”

The Leisure Hour
April 1903 p. 447

Victor Bets on Opera



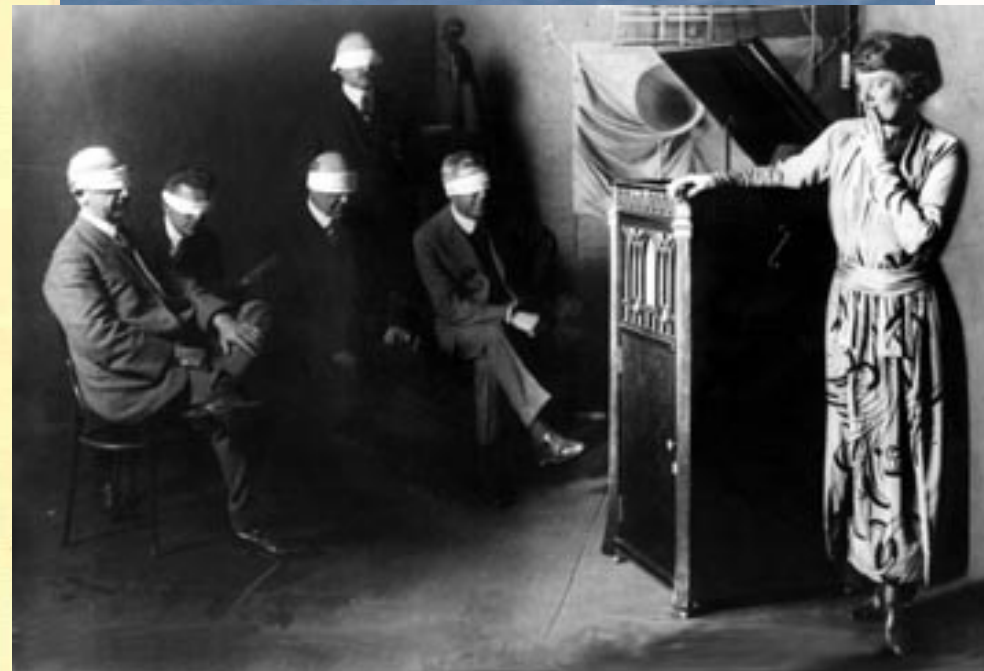
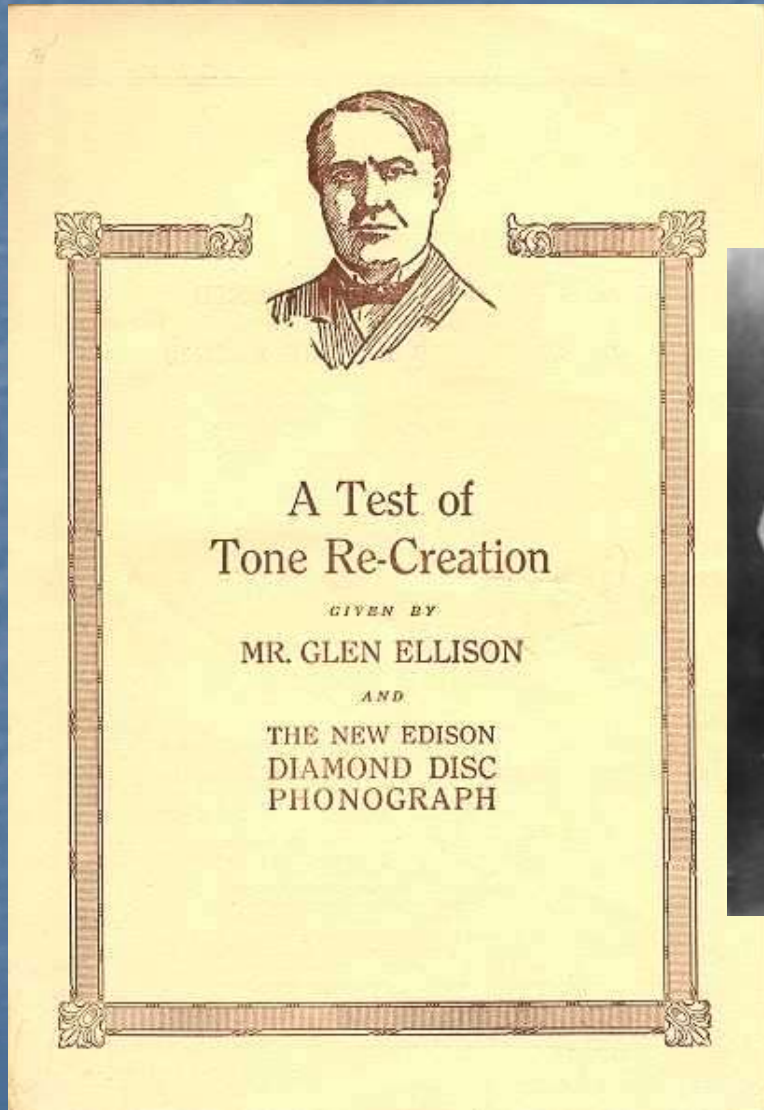
earliest-recorded
million seller



world's largest illuminated sign
courtesy of Artkraft Strauss

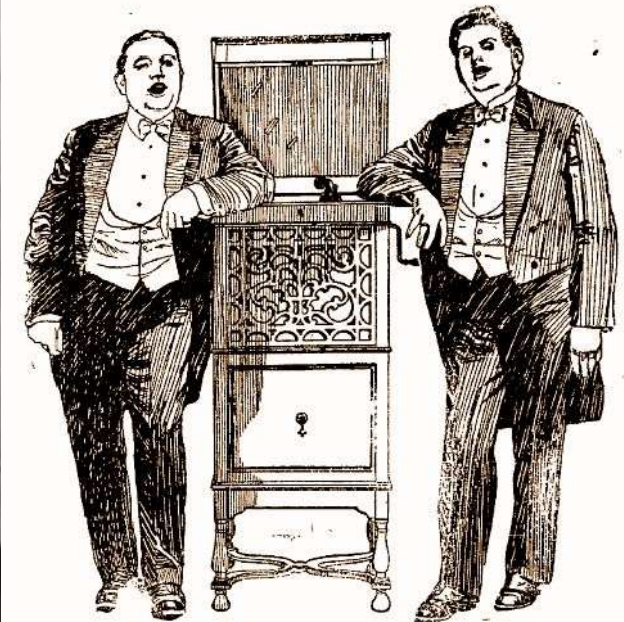


Edison Converts to Disk



Anna Case, Metropolitan Opera soprano, confessed in 1972

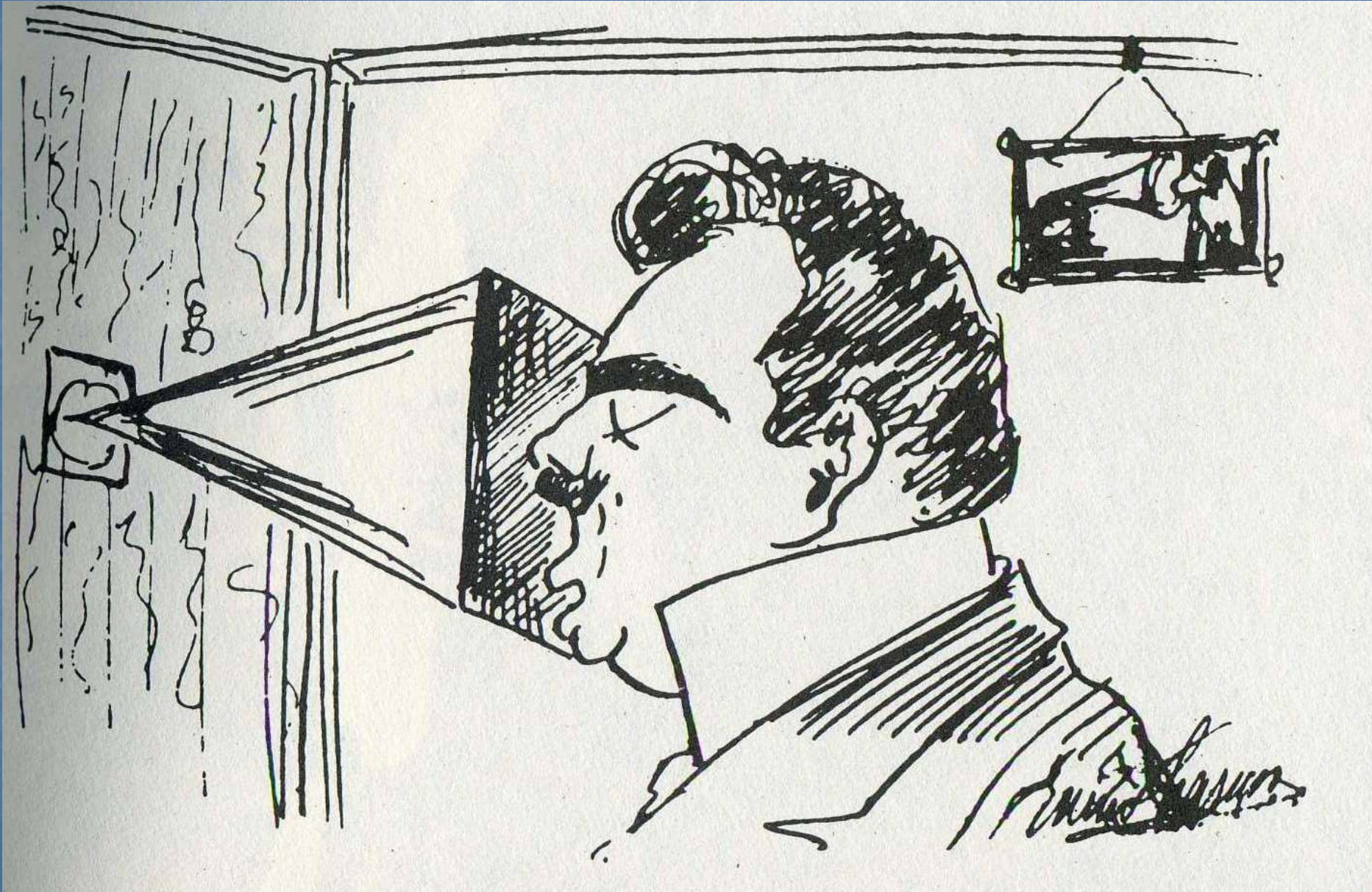
--and no one could tell the difference

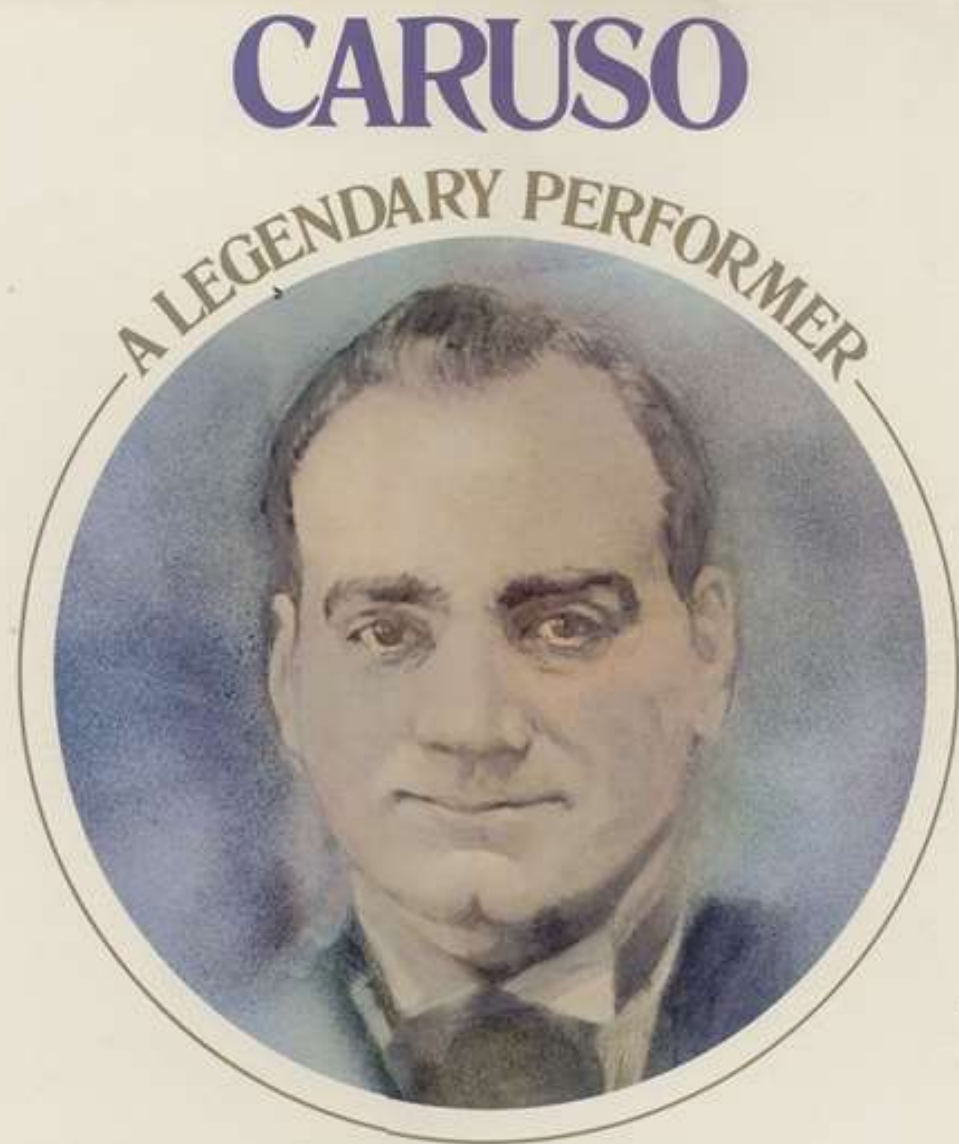


Last night's audience mystified

Tries vainly to detect the difference between art of famous songsters and RE-CREATION
by Edison's new phonograph

Horn Distortion





Illustrated Booklet Enclosed

1
9
7
6

blind deconvolution of horn distortion

Tom Stockham, Soundstream (E.G.O.)



1st commercial digital recording

Movies: Thomas Edison 1888

- “we may see & hear a whole Opera as perfectly as if actually present”
- many more mentions of opera as the impetus for movies

patent
caveat
Oct. 8

a Continuous Opera

110 Filed October 17th 1888
 Orange N.J. Oct 8 1888
 I am experimenting upon an instrument
 which does for the Eye what the phonograph
 does for the Ear. Which is the recording and
 reproduction of things in motion and in such
 a form as to be both cheap practical
 and convenient. This apparatus I call
 a Kinetoscope "Moving View". In the first
 production of the actual motion that is
 to say of a Continuous Opera the
 Instrument may be called a Kinetograph
 but its subsequent reproduction for which
 it will be of most use to the public
 it is properly called a Kinetoscope.
 The invention consists in photographing
 continuously a series of pictures occurring
 at intervals which intervals are greater
 than Eight per second, and photographing
 these series of pictures in a continuous
 spiral on a cylinder or plate in the
 same manner as sound is recorded on
 the phonograph. At the instant the
 chemical action on the cylinder takes
 place the cylinder is at rest and
 is only advanced in rotation a single
 step which motion takes place while
 the light is cut off by a shutter.
 Thus there is a practically continuous
 rotation of the cylinder but it

“Silent” Movies

- Earliest
 - individual, not live, no sound, very brief
- Longer, local sound
 - opera stories (known)
 - opera singers (stars)

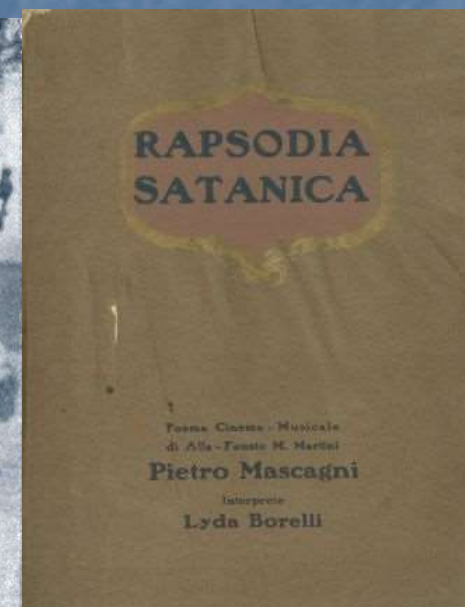


Geraldine Farrar
in C. B. DeMille's
Carmen 1915



"Silent" Sound

- *Martha* 1899
 - singers behind screen
- *L'Assassinat du Duc de Guise* 1908
 - 1st film score (by opera composer Camille Saint-Saëns)
 - 1st two score Academy awards to opera composer Erich Wolfgang Korngold
- *Rapsodia Satanica* 1915
 - 1st "film opera"



Cue Lights in Set

*Das
Caviarmäuschen*
1918



Conductor at Bottom

*Wenn
Männer
streiken
1919*



Score Backwards at Bottom

*La Mujer de
medianoche*
1925



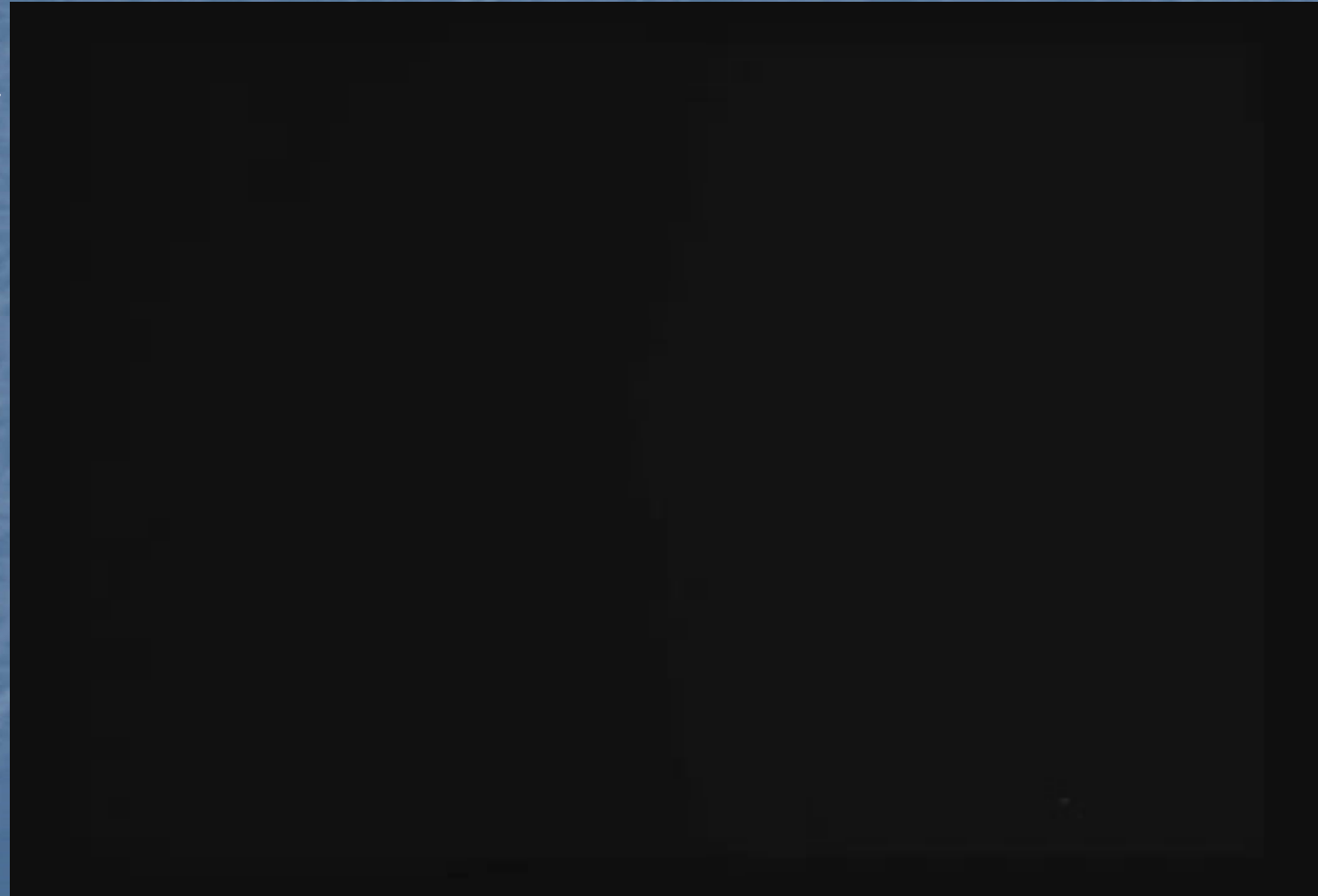
Earliest Extant Sound Movie: 1894-5

“Dickson sound movie”

Why
didn't
sync
sound
continue?

- no amplifier
- live vs. canned
- 1st sync 21st century

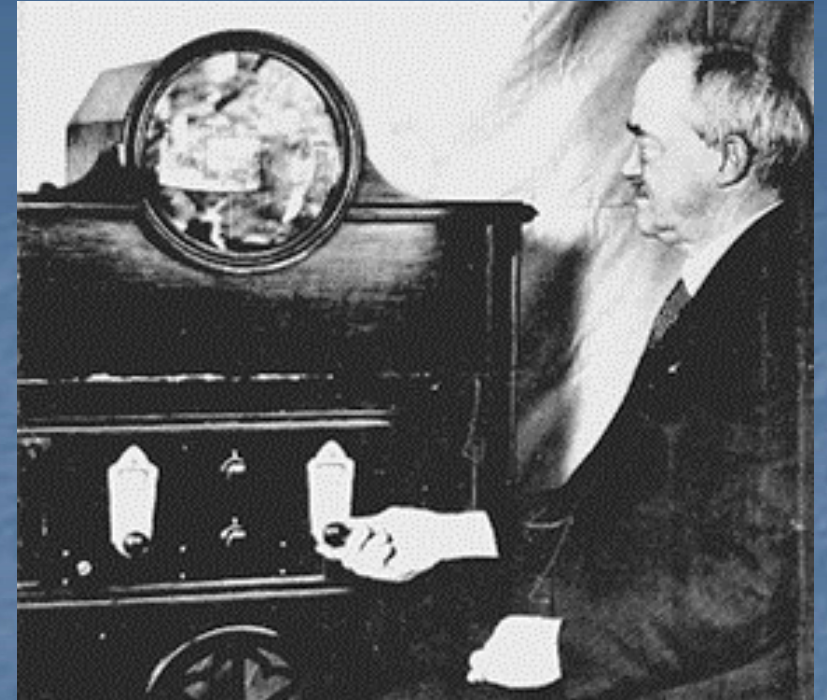
music from
*Les cloches
de Corneville*,
an opera that
opened in Paris
7 years earlier



Vision by Radio

C. FRANCIS JENKINS

COPYRIGHTED, 1925, BY
JENKINS LABORATORIES, INC.
WASHINGTON, D. C.



1930 Jenkins Radiovisor

The casing enclosing the mechanism is not very large, and contains, besides the radio vision mechanism, the radio receiving set, and a loudspeaker, so that an entire opera in both action and music may be received.

STANDARD UNION TUESDAY, JANUARY 13, 1931.

It May Seem Strange But— *It Really Happened!* COMEDY 'SEEN' OVER THE RADIO

CHICAGO, Jan. 13 (U P).—An Eerie glimpse into the future was afforded last night to guests of L. P. Garner, engineer, who watched the first successful attempt to broadcast a musical comedy by television.

The play "Their Television Honeymoon," in which the bride was willing to see her husband only by television until a mouse got into her room, was broadcast from Sta-

tion W9XAO, which is a part of Radio Station WIBO.

In Garner's home, several miles away from the studio, the guests saw the play produced upon a tiny screen, two feet square, saw clearly the images of the actors and heard every sound, even to the final kiss of the "Television Honeymooners."

The receiving apparatus was a glorified radio set, with a tiny hole in the front, through which the pictures were carried to the screen.



from Western Television Corp.
stock certificate

1st TV show with an original script
George Gruskin operetta
Their Television Honeymoon

Video Recordings, Too



off-air recording
(Baird disk)
of Betty Bolton
singing 1932-5

restored by
Donald F. McLean

used with
permission

<http://www.tvdawn.com/earliest-tv/the-marcus-games-discs-1932-35/betty-bolton/>

Television: Live Image & Sound

- 1928: conductor-camera proposal
- 1934: *Carmen* (1½-hour version)
- 1937: full-length, lip-synched
- 1938: dance-sync, film, adaptation
- 1947: from opera-house stage
- 1963: unstageable *Labyrinth*
- 1971: cable-TV, stage conditions
- 1976: 1st live stereo, subtitles
- 1989: HDTV (Bavarian *Ring*)
- 2014: UHD, user view, score

Sara Fischer
BBC's *Carmen*



Music Sheet Has Radium Notes for Television Artists



TELEVISION performers, working in almost complete darkness, except for the flying spot, have found difficulty in reading music when they were broadcasting a program. To remedy this difficulty and enable the performers to see better the music manuscripts from which they are singing, Elliott Jaffee, a New York recording artist, has devised a luminous manuscript on which the characters are painted on black paper with radium paint.

This invention eliminates one of the greatest difficulties the performers have encountered. Now, however, the music is as plain in the darkness as the figures on a radium watch.

Modern Mechanix
April 1932

Luminous manuscript for television artists has the characters written with radium paint on black paper, making the music visible to performers in darkness of studio.

U.S. *Commercial*-TV Opera

■ Programming:

- 1939: NBC puts *Carmen* on TV
- 1948: ABC begins series of Met opening nights
- 1949: *NBC Opera Theater* begins (lasts 16 years)
- 1950: CBS *Opera Television Theater*
- 1953: DuMont *Opera Cameos*

NBC Opera Theater
led directly to
NET Opera Theater

■ Commissions (operas that wouldn't otherwise exist):

4 Laderman & Menotti, 2 Kastle & Martinů, Stravinsky, Foss, Amram, etc.



■ ABC (3):

- *The 13 Clocks* (1953)
- *The Final Ingredient* (1965)



■ CBS (14):

- *A Christmas Carol* (1954)
- *The Flood* (1962)
- *The Trials of Galileo* (1967)
- *Medea in Corinth* (1974)



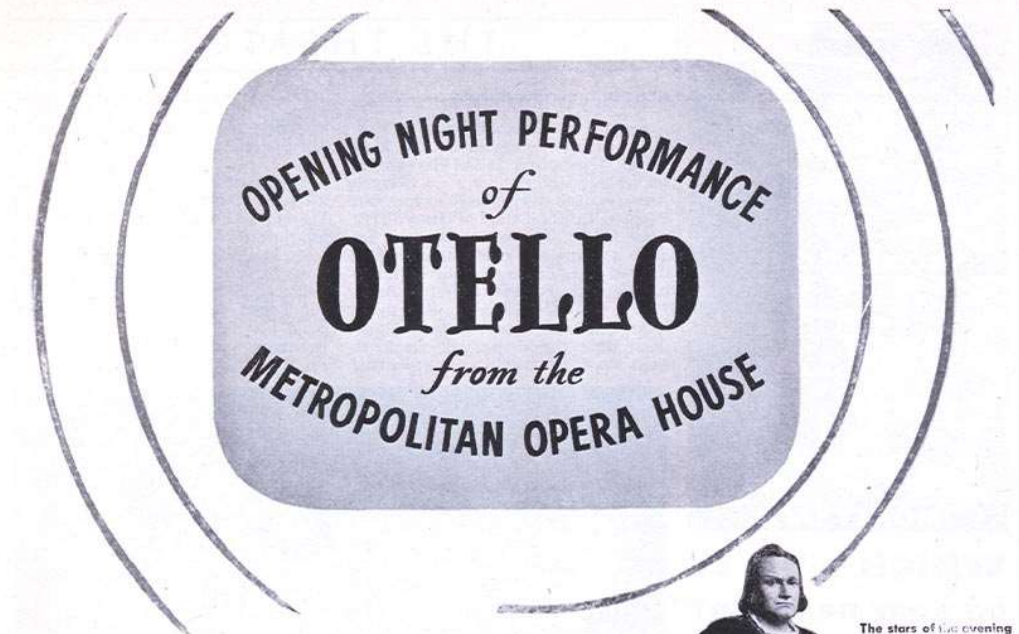
■ NBC (13):

- *Amahl & the Night Visitors* (1951)



broadcast
in Nigeria
& Thailand,
among
other
countries

Dry Ice & IR Lights



Another Great First on ABC TELEVISION!

The magic of television worked a new miracle the other night. To more than a million people in New York, Boston, Philadelphia and Baltimore, ABC's television cameras brought all the glitter, the color, the excitement, the majesty of Opening Night at the "Met." Sponsored by The Texas Company, the historic telecast showed listeners the thrilling premiere from every angle: long-range shots of the stage, spectacular close-ups (closer than a front-row seat!), exciting glimpses backstage.

ABC technicians worked against enormous odds. Not one of the many cameras required could obstruct the view of the audience. To get enough light in the darkened Opera House, special infra-red "black light" (invisible to the audience) had to be installed. "It was an experiment on a grand scale," said critic Harriet Van Horne (N. Y. World Telegram). "And it succeeded beyond all hopes."

ABC TELEVISION
The Living Image of America
American Broadcasting Company

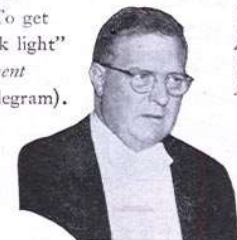
TIME, DECEMBER 20, 1948



The stars of the evening (Leonard Warren, left, and Licia Albanese, below) and many others were interviewed backstage between the acts. Their television audience on ABC was larger than that of all other stations combined!




"The view of 'Otello' that came into one's living room frequently was more detailed and more revealing than that obtained from a seat 'down front'." Jack Gould, N. Y. Times.



For years, opera fans have heard Milton Cross on ABC's Saturday afternoon radio broadcasts of the opera. Now they were able to see "Mr. Opera" as he described the progress of the performance!

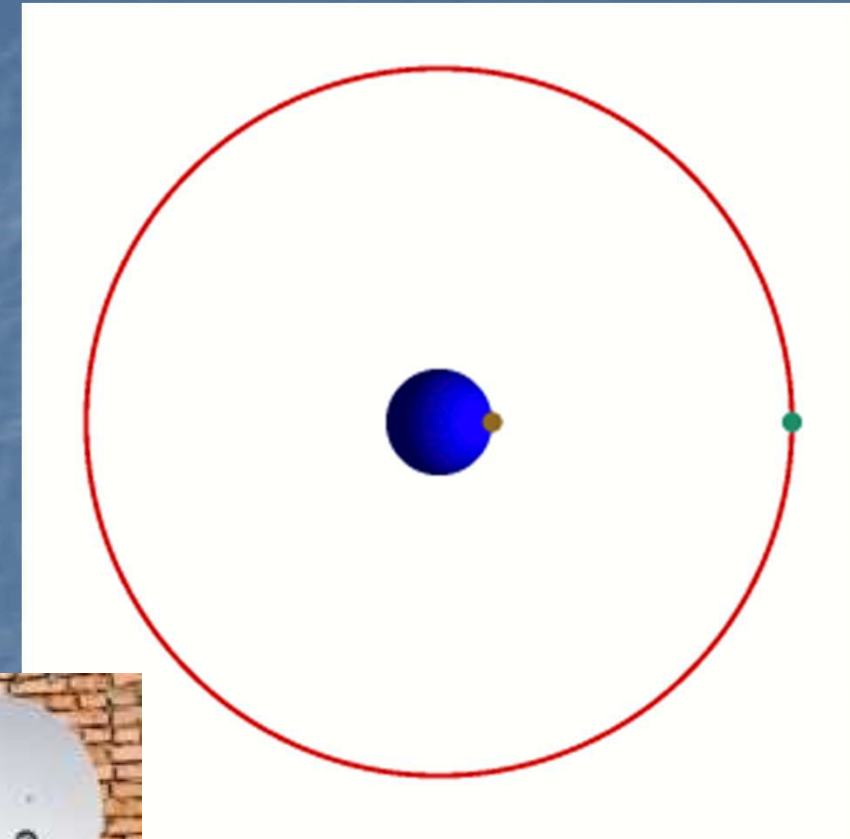
Color TV

- Edison 1891 prediction that he would show opera on it in 1893
- First NTSC-color broadcast viewed at home: *Carmen*, October 31, 1953
- Before that, “first publicly announced experimental broadcast in compatible color TV of a network program”:
St. George and the Dragon 
operetta, August 30



Geosynchronous Satellites

- TV opera delivery since 1976
 - non-GEO since 1967
- proposed by sci-fi author Arthur C. Clarke, 1945
- basis: **Kepler's 3rd law of planetary motion, 1619**



Son of a Witch

- Published 1st two laws of planetary motion by 1609
- Journeyed in 1617 to save his mother, accused (and later convicted) of witchcraft, and read a book along the way
- Published 3rd law in 1619



Johannes Kepler
1571-1630

Ioannis Keppleri
**HARMONICES
MUNDI**

LIBRI V. QVORVM

Primus GEOMETRICVS, De Figurarum Regularium, quæ Proportion-
es Harmonicas constituunt, ortu & demonstrationibus.
Secundus ARCHITECTONICVS, seu ex GEOMETRIA FIGVRATA, De Fi-
gurarum Regularium Congruentia in plano vel solido:
Tertius propriè HARMONICVS, De Proportionum Harmonicarum or-
tu ex Figuris; deque Naturâ & Differentiis rerum ad cantum per-
tinentium, contra Veteres:
Quartus METAPHYSICVS, PSYCHOLOGICVS & ASTROLOGICVS, De Har-
moniarum mentali Essentiâ earumque generibus in Mundo; præfer-
tim de Harmonia radiorum, ex corporibus cœlestibus in Terram de-
scendentibus, eiusque effectû in Natura seu Anima sublunari &
Humana:
Quintus ASTRONOMICVS & METAPHYSICVS, De Harmoniis absolutissi-
mis motuum cœlestium, ortuque Eccentricitatum ex proportioni-
bus Harmonicis.
Appendix habet comparationem huius Operis cum Harmonices Cl.
Ptolemæi libro II I. cumque Roberti de Fluctibus, dicti Flud. Medici
Oxonienfis speculationibus Harmonicis, operi de Macrocosmo &
Microcosmo insertis.



Cum S. C. M^{ti}. Priuilegio ad annos XV.

Lincii Austriæ,

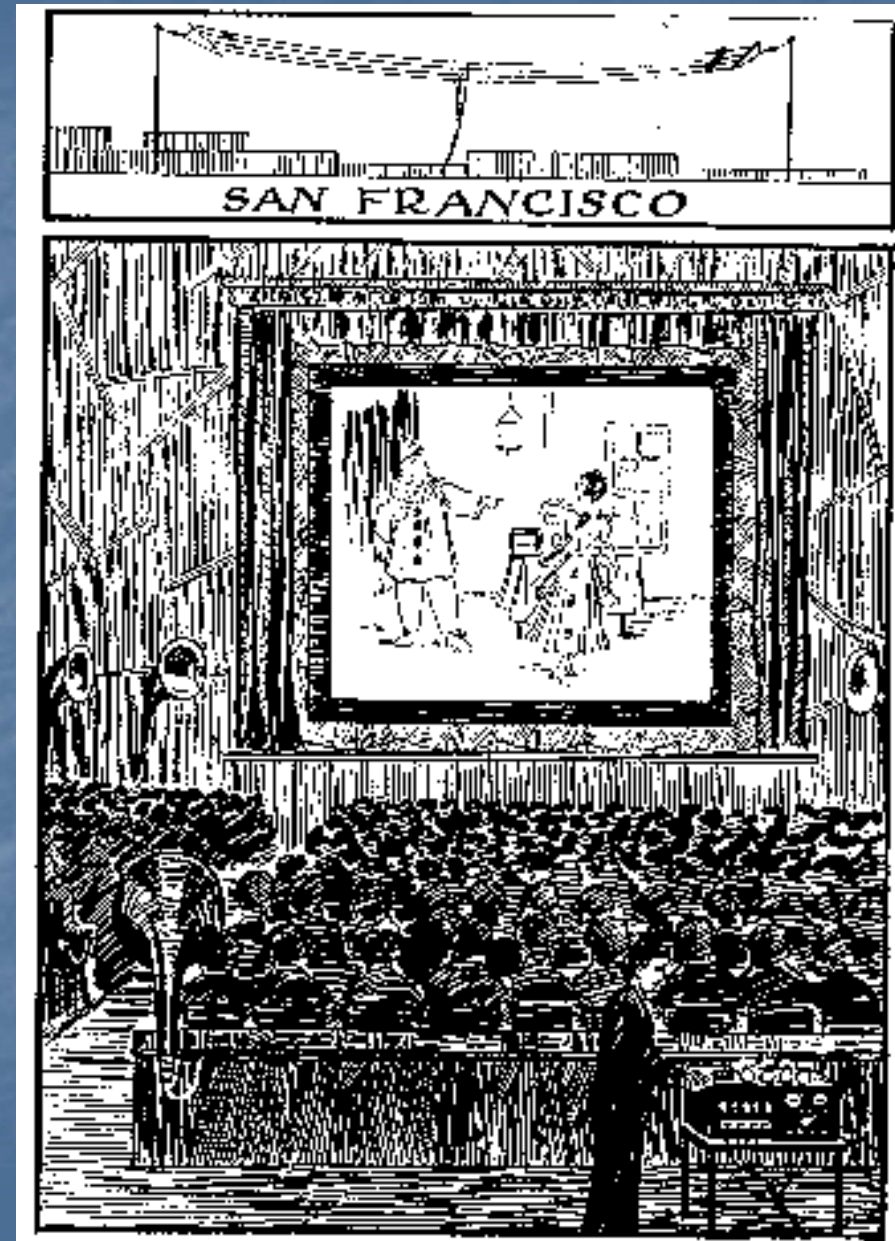
Sumptibus GODOFREDI TAMPACHII Bibl. Francof.
Excudebat IOANNES PLANCVS.

ANNO M. DC. XIX.

Kepler
wrote
(left)
that he
owed
his
ideas
to this
music-
theory
book
(right)



Semi-Live Cinema Proposal 1919



restores
community
aspect

Live Cinema

- 1952 start
- 31 cinemas, 27 cities
- low def, B&W, <AM-radio-quality sound
- >60,000 seats, \$60 top
- rated highly



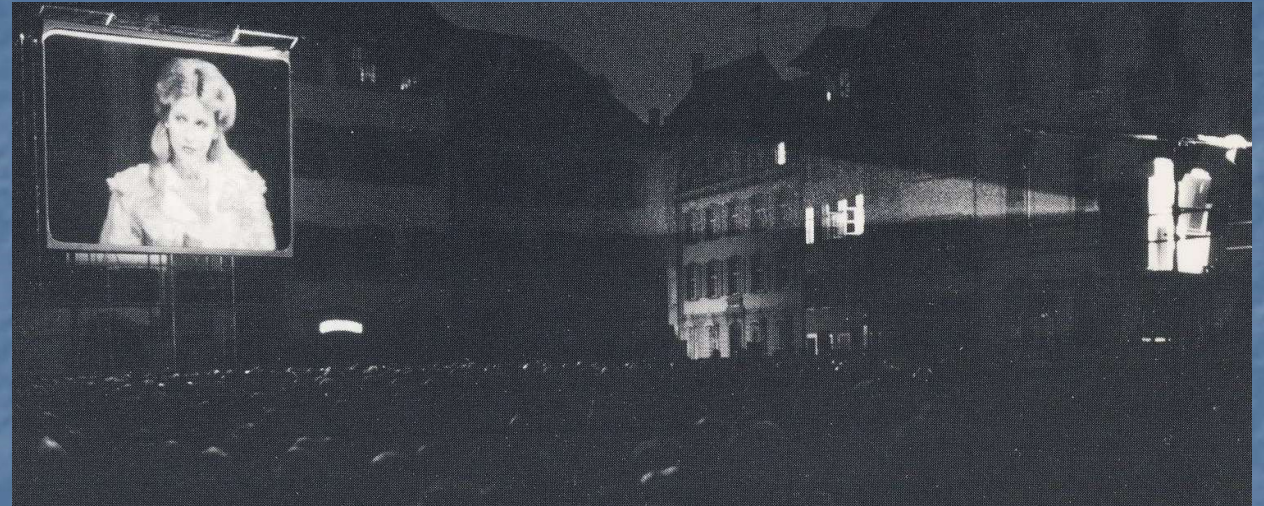
Cinema Opera Perception

- Group Mentality
 - if they don't complain, why should I?
 - applause
- Cognitive Dissonance
 - **money**, time, effort
 - if bad, then stupid
 - therefore good

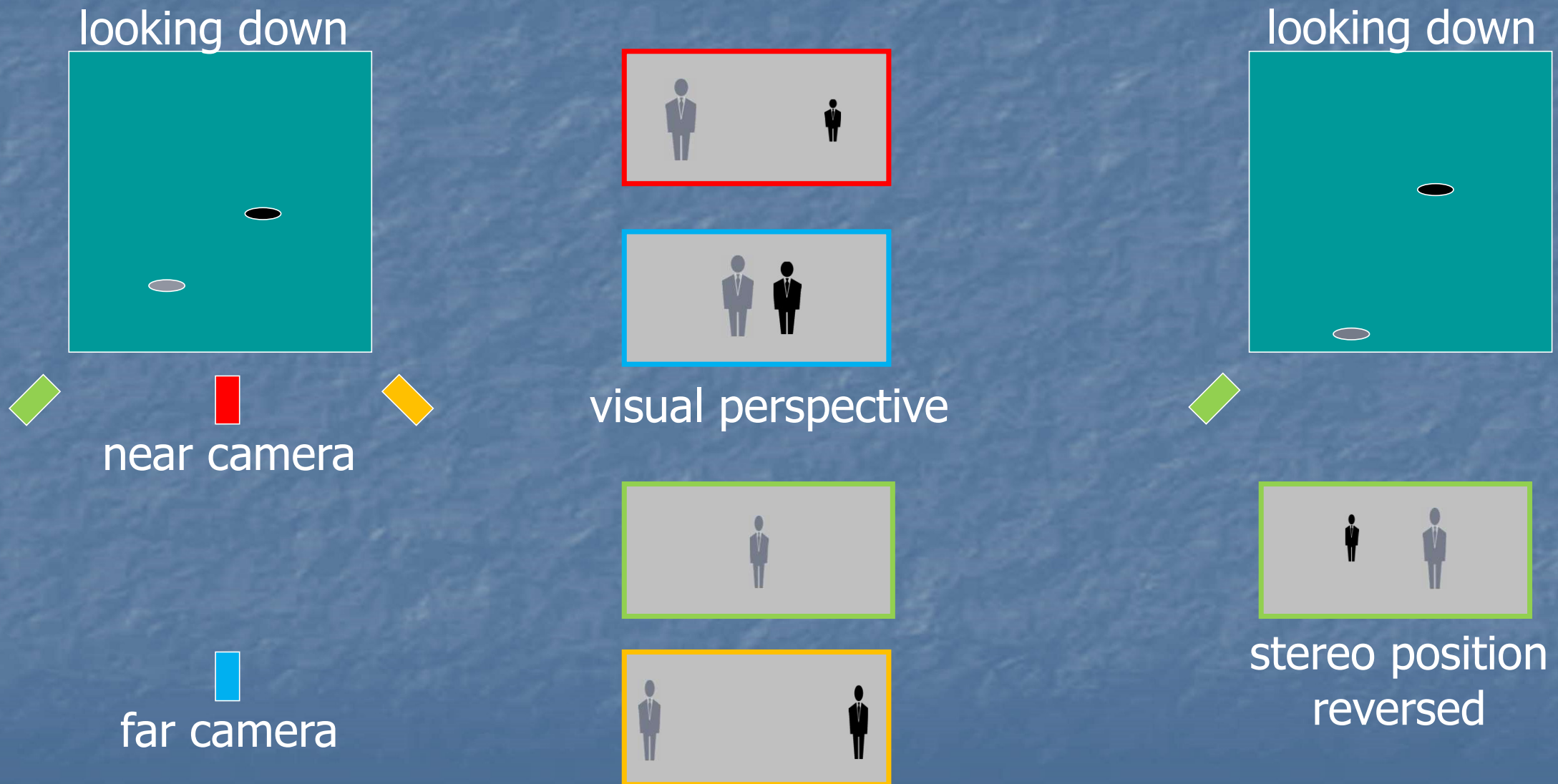


Free Community TV

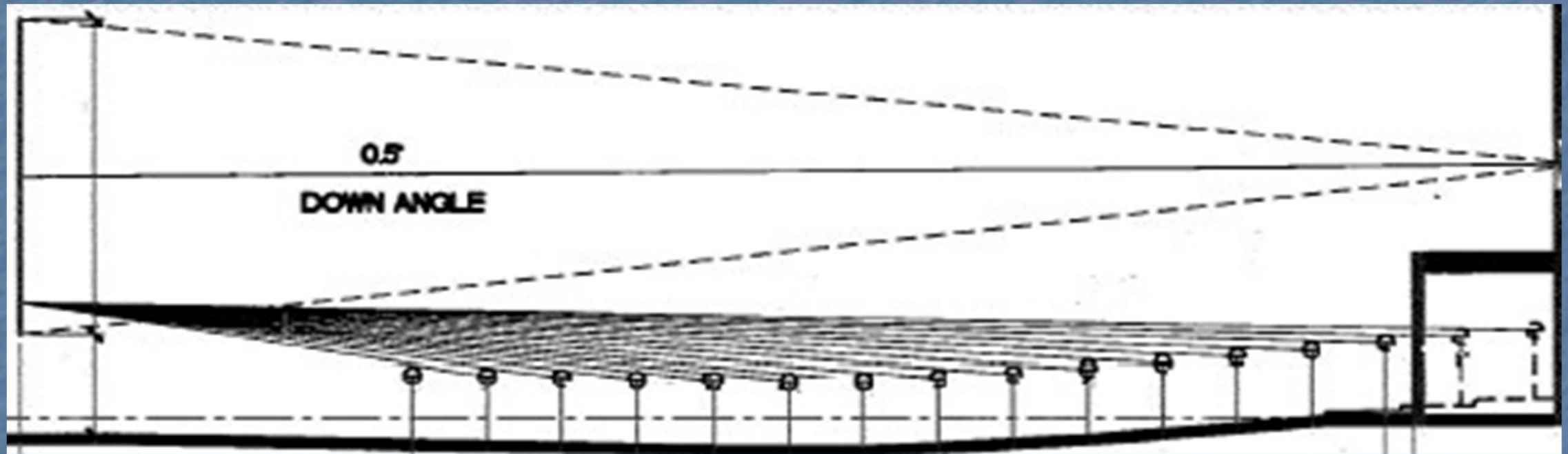
- 1986 Basel plaza
- 2006 Met HD plaza & Times Square
- 2007 SFO at AT&T Park



Visual & Aural Positions



Cinema Sizes



courtesy of Warner Bros. Technical Operations

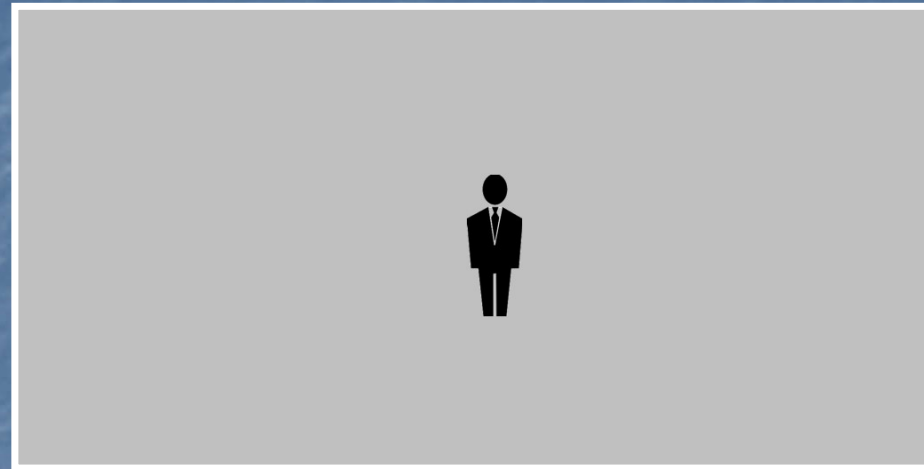
Auditorio Nacional (Mexico City)



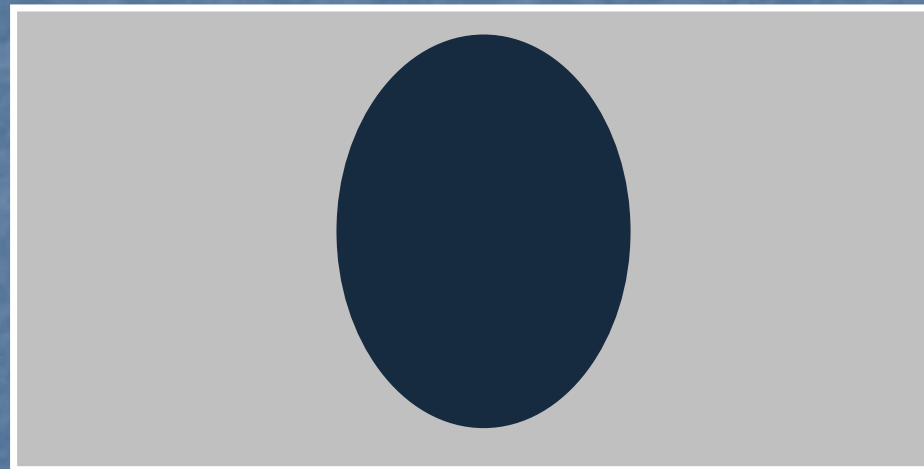
<http://www.auditorio.com.mx/sala/>

capacity 10,000
(Met capacity ~4,000)

Visual-Aural Perspective



delayed
sound
ok

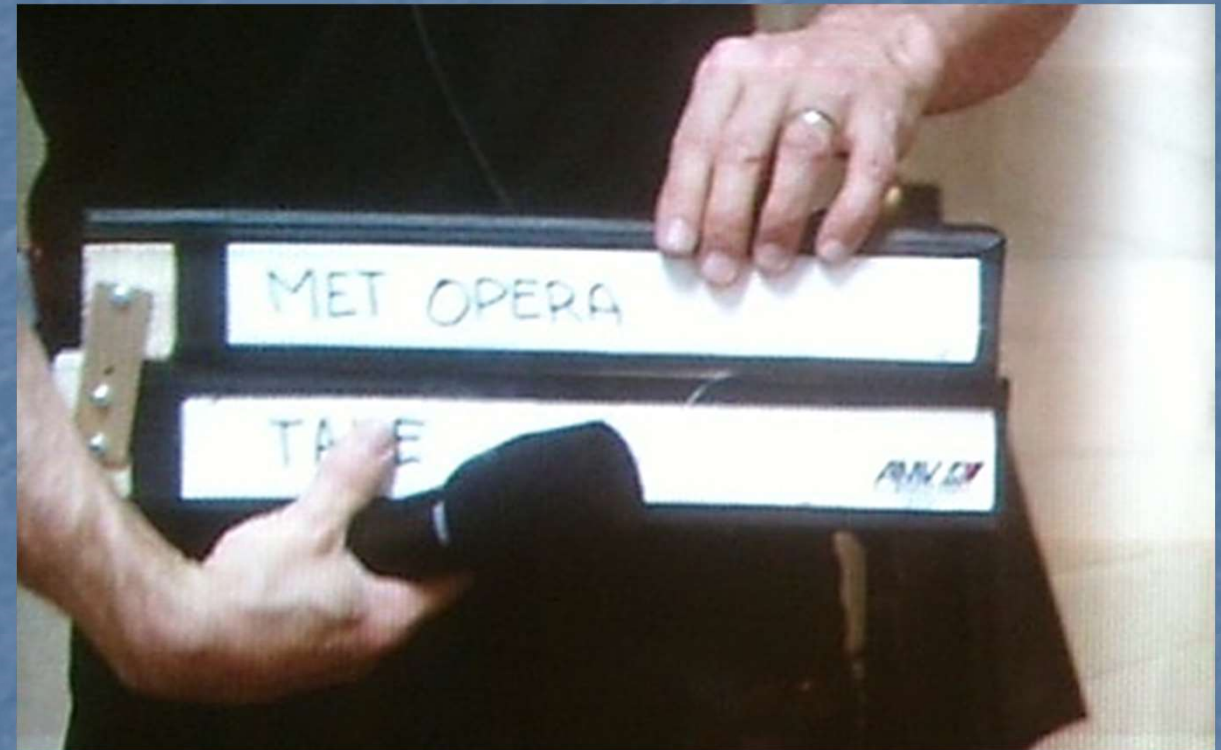


the
killer
close
-up

delayed
sound
not ok

speed of sound $\approx 1100'$ /sec
37 feet ≈ 1 30-fps TV frame

Projectionists Are Not Television Engineers



last 10 minutes

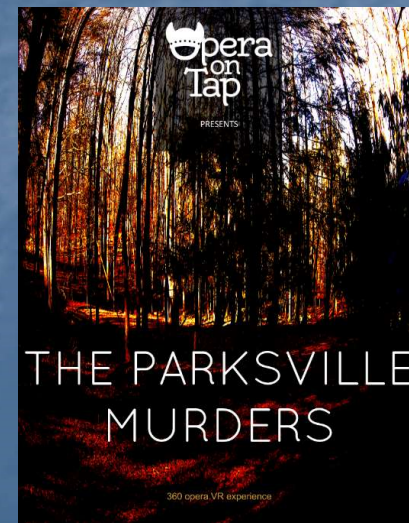
The Metropolitan Opera



Act IV: The Pandemic & What It Inspired

Opera Just Before the Pandemic

- From Opera America's 2020 Annual Field Report (76%):
 - 114 U.S. cities have professional opera companies
 - 28% of operas performed 2018-9 were written after 1970
 - some recent opera media-technology innovations:
 - 2014:
 - IBC special award to Vienna State Opera for 4K streaming with user-selectable views and synchronized score
 - global interactive chandelier control at Dallas Opera's *Death and the Powers*
 - 2016: Opera on Tap *The Parksville Murders* in VR
 - 2019: Experiments in Opera *Looking at You* with data mining and iPad interactivity



Looking at You
at HERE Arts Center

Opera at the Time of the Pandemic

- From Opera America's 2020 Annual Field Report (76%):

COVID-19 Impact on 2020

The COVID-19 pandemic presented significant challenges to the finances and activity of American opera companies. Companies lost an average of 24% of their typical operating budgets due to canceled performances and special events, as well as other interruptions.

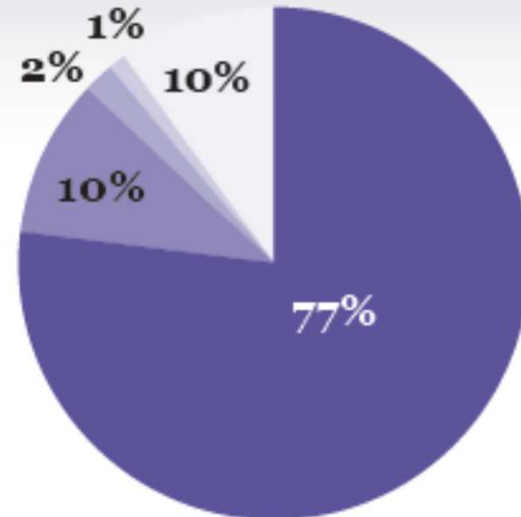
At the same time, the pandemic has accelerated innovations in programming, as opera companies have pivoted their activities to stay connected with their audiences and reach newcomers. Only 19% of the programming offered was originally scheduled as part of the 2020-2021 season.

Financial Impact

\$166 million Total Financial Losses	1,817 Canceled Performances
352 Canceled Productions	15,135 Canceled Artist Contracts

DISTRIBUTION OF LOSSES

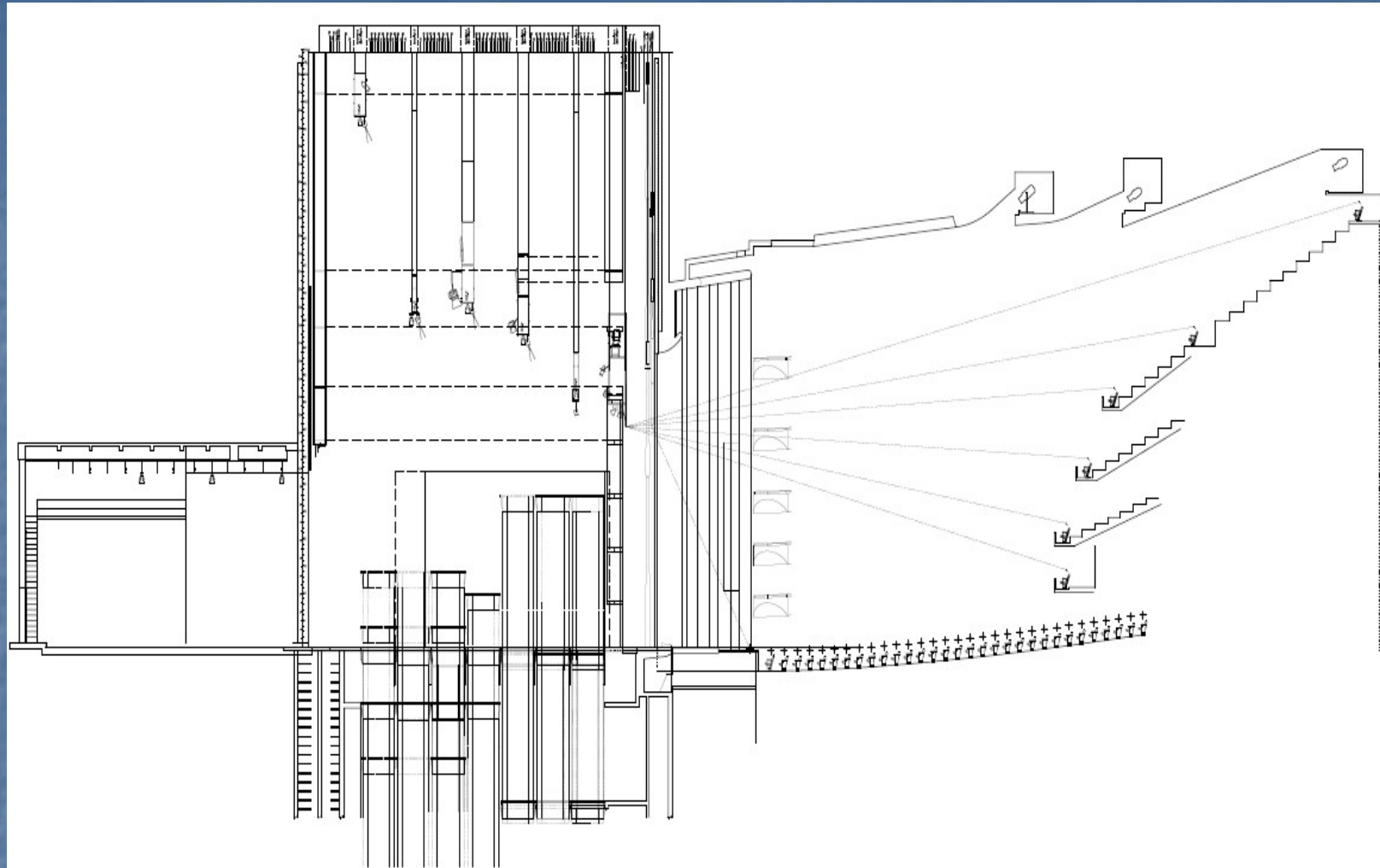
- Box Office
- Gala
- Sponsorship
- Production Rental
- Other



Why Worse Off?

sometimes

- loud singing
- crowded stage
- crammed orchestra pit
 - blown instruments
- huge capacities
 - slew older
- long durations



Metropolitan Opera House



Shooting *This Is Cinerama* (1952)



Barcelona Opera House in the Pandemic



Teatro Real Madrid This Week

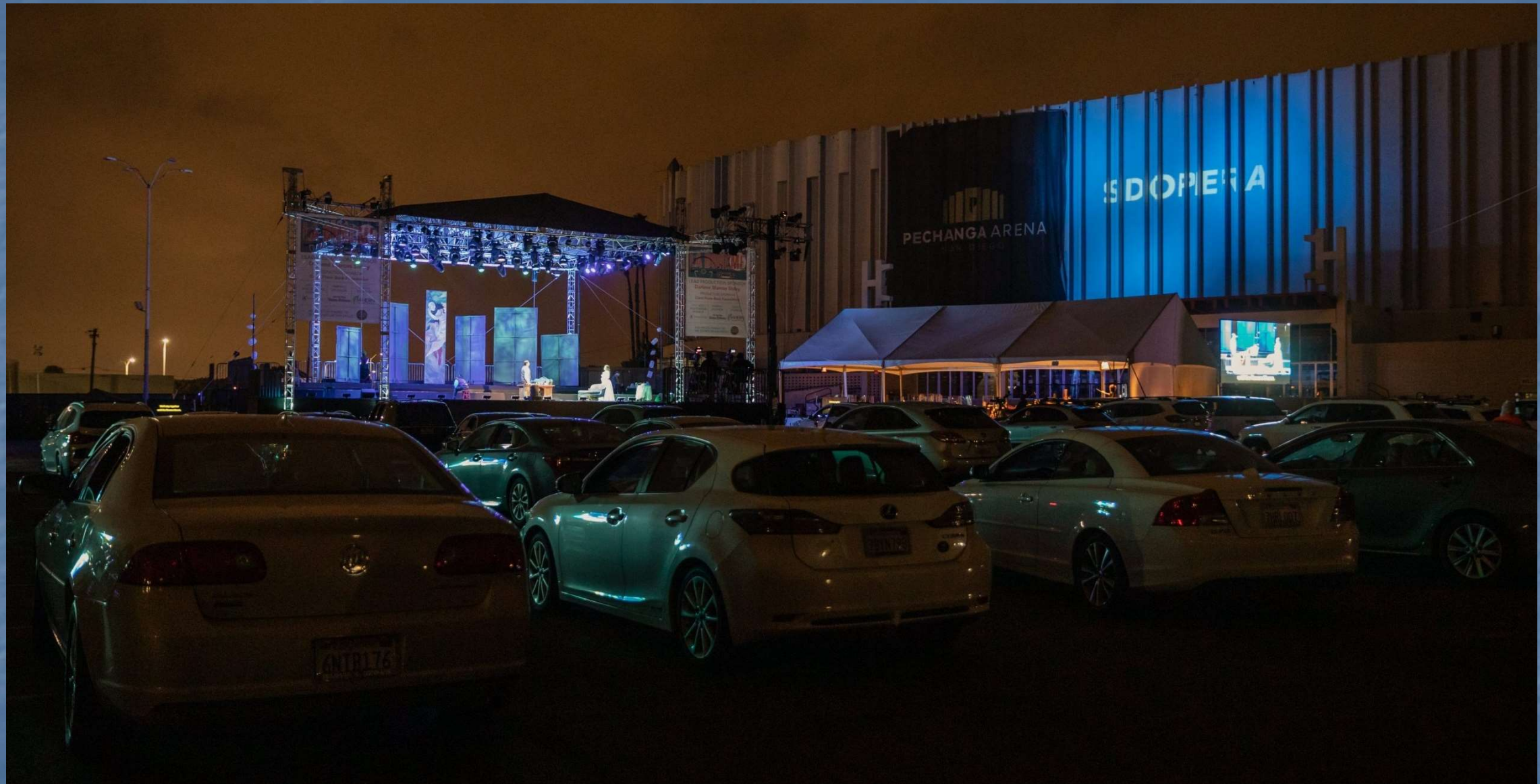


[Emilio Parra Doiztua for The New York Times](#)

Opera Lafayette



San Diego Opera



Tulsa Opera



Paris Opera

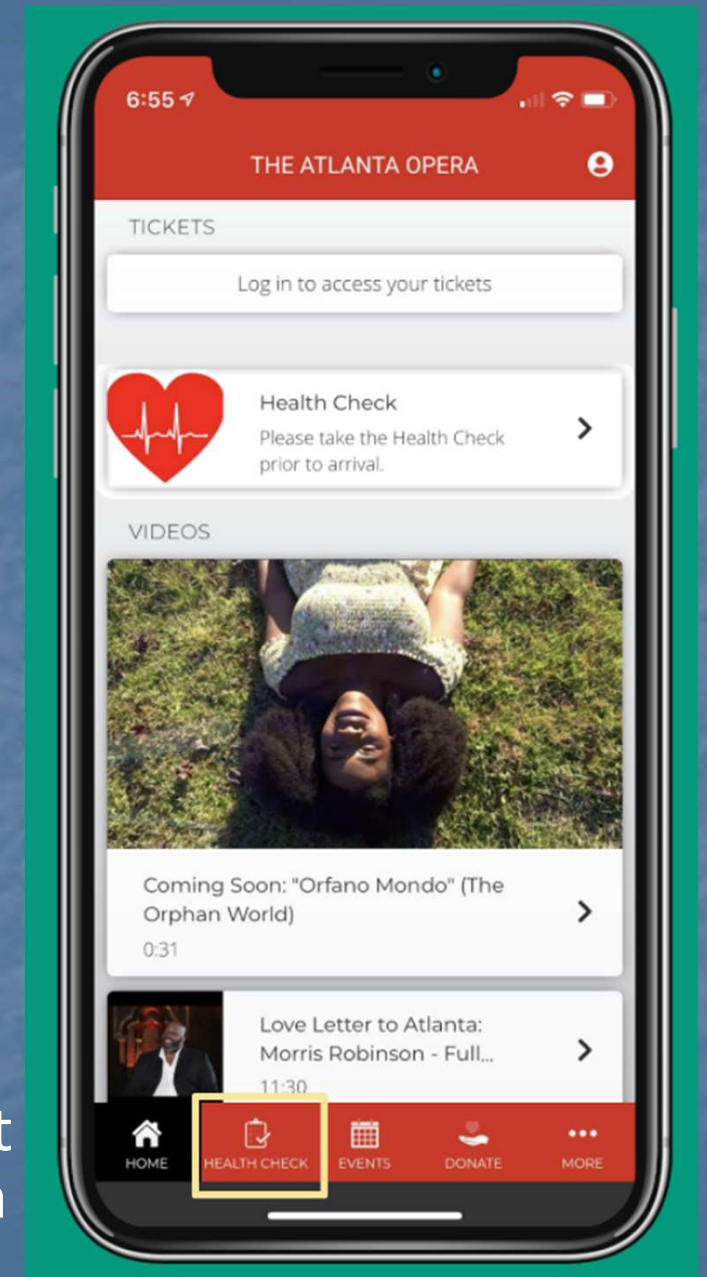


Atlanta Opera



Pagliacci in a big tent, with isolation booths and puppets (photo: Ken Howard)

eticket
health
check



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Mother's Day Zoombomb

zoom ***bomb***



Opera Singers Help Covid-19 Patients Learn to Breathe Again

A six-week program developed by the English National Opera and a London hospital offers customized vocal lessons to aid coronavirus recovery.

masks made by
Alyssa Oania
of Opera San Jose



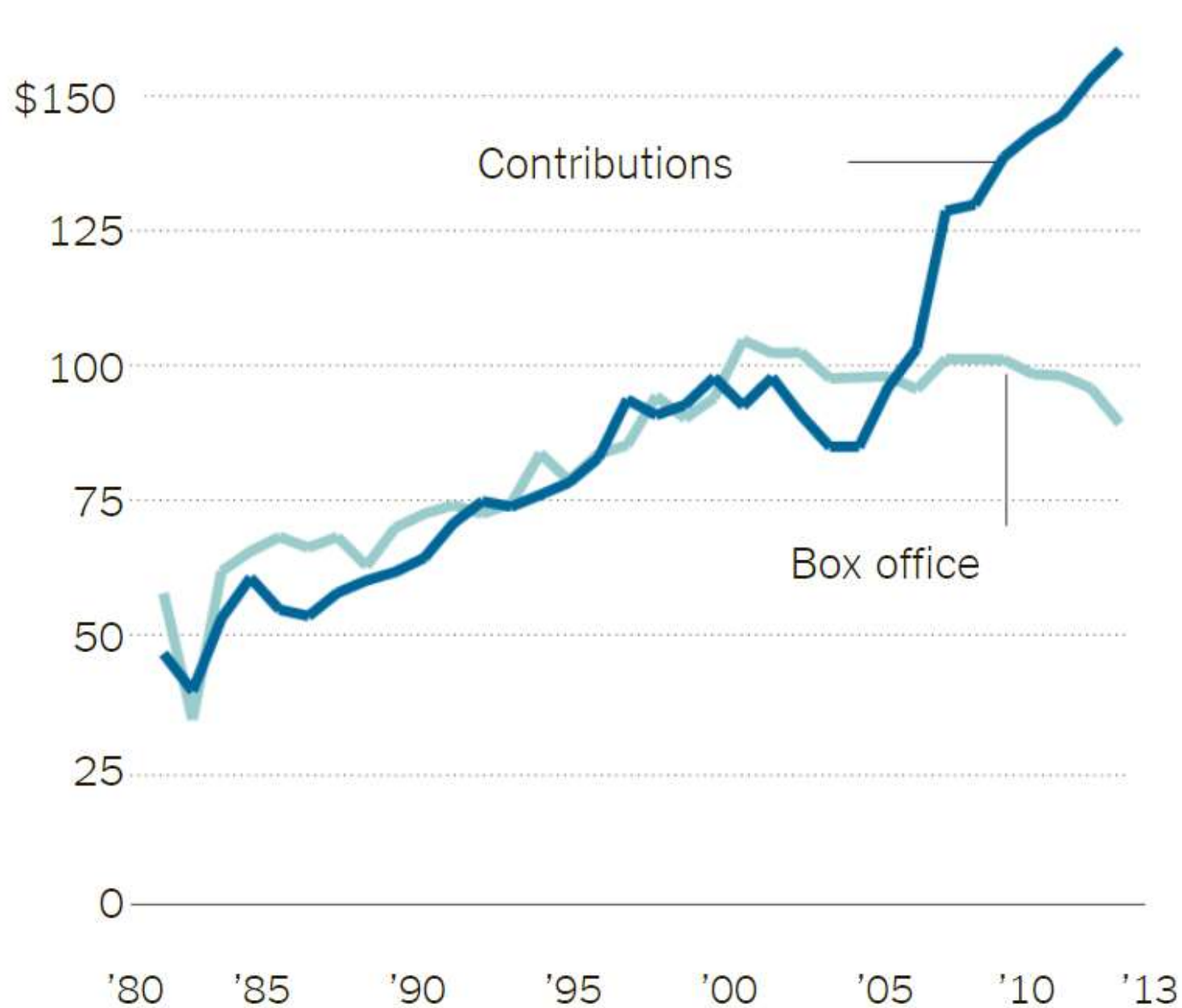
Metropolitan Opera

- a different free streamed opera every day
- a free at-home gala from around the world
 - joint performance begins with the conductor
 - remote design
- Met Stars Live in Concert



Revenue sources

Adjusted for inflation, in millions



Working at Home Collaboratively



since
1994

all decisions will be made by consensus
performed live on 2020 April 25
taking account of Zoom latency
("What I learned from making an opera on Zoom,"
by composer Kamala Sankaram
<https://howlround.com/what-i-learned-making-opera-zoom>)



On Site Opera

■ opera by phone

[nytimes.com/2020/06/22/arts/music/beethoven-opera-virus.html](https://www.nytimes.com/2020/06/22/arts/music/beethoven-opera-virus.html)

Opera Over the Phone Offers Passion in a Pandemic

Through July 6, On Site Opera's "To My Distant Love" recasts a Beethoven song cycle as a one-on-one telephonic encounter.

■ opera by snail mail

[nytimes.com/2020/11/25/arts/music/opera-mail.html](https://www.nytimes.com/2020/11/25/arts/music/opera-mail.html)

CRITIC'S NOTEBOOK

How an Opera Can Fit in a Mailbox

In a year when everything seems deliverable, On Site Opera is presenting "The Beauty That Still Remains," its first production by mail.

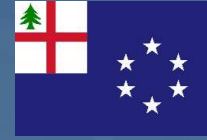
After the final section, I closed the diary and grabbed its envelope. A portrait of Anne Frank fell out from between the pages. I held it in my hands, giving another look at her hopeful smile and thinking about the lilting song in which she shares her greatest wish: to be a writer. The words held their own power; so did the music. With this small photo, both took flight.

■ opera by foot

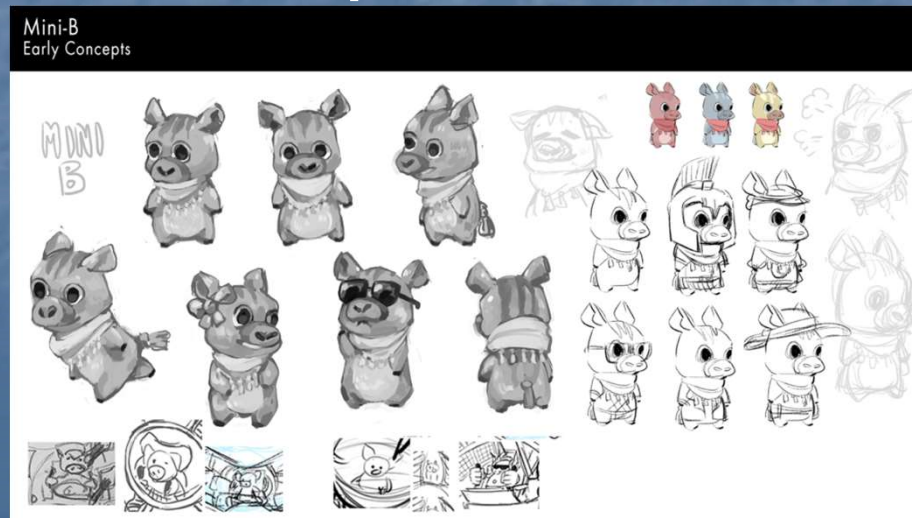


The Road We Came

White Snake Projects

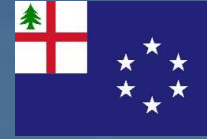


- “committed to transmedia work, which tells stories across multiple platforms and formats using 21st-century digital technologies”
- “partners are Rhode Island School of Design (concept art and design), Lesley Art + Design (art, fabrication, and animation) and Becker College (virtual/augmented reality, real-time motion capture, 3D modeling, and animation)”



<https://www.whitesnakeprojects.org/>

During the Pandemic

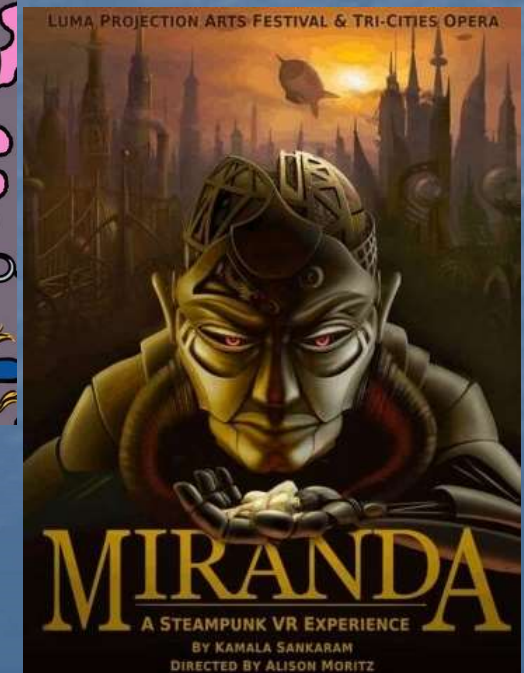


- *Alice in the Pandemic*
 - live distributed performance with real-time motion capture and computer animation integrated with real-world human singer and settings
 - acquired by the Library of Congress for its Performing Arts COVID-19 Response Collection
- *Sing Out Strong: Essential Voices*
 - live distributed performance



Composer Kamala Sankaram

- 1st Zoom opera
 - *all decisions will be made by consensus*
- episodic space opera
 - *Only You Will Recognize the Signal*
- opera podcast series
 - *The Understudy*
- VR steampunk opera with motion capture and live computer graphics
 - *Miranda*



Questions?

pdf of these slides at bit.ly/sne-opera
more links at bit.ly/opera-pandemic