

# History of photography (part 4): photography as a tool

CS 178, Spring 2014

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Marc Levoy  
Computer Science Department  
Stanford University

# Outline

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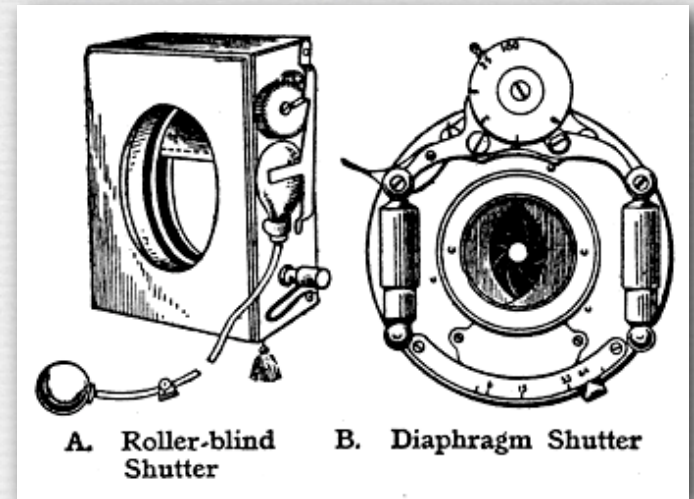
- ◆ the technology improves
- ◆ popularization of photography
- ◆ documenting the growth of America
- ◆ gigantic undertakings (around the world)
- ◆ the industrial aesthetic
- ◆ scientific uses of photography
- ◆ documenting the social scene
- ◆ the Great Depression and the Dust Bowl
- ◆ profile: photographers of the Farm Security Administration
  
- ◆ still to come: photojournalism, modern art photography...

# The technology improves

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- ◆ 1878 dry-plate photography (Richard Maddox, Charles Bennett)
  - hardened gelatin-silver bromide
  - exposure time under one second
  - plates could be stored, separating shooting from processing
  
- ◆ 1885 paper roll film (Arthur Melhuish, George Eastman)
  - gelatin coated onto paper (or film)
  - exposures under 1/10 second
  - multiple pictures without fiddling
  
- ◆ 1880s shutters (many people)
  - needed as films became more sensitive
  - focal plane (roller blind), leaf (diaphragm)

(wikipedia)



# The Kodak Camera

(Newhall)



(brightbytes.com)



George Eastman  
(1854-1932)

- ◆ 1888 Kodak camera No. 1
  - fixed-focus, single shutter speed (1/100 sec?), circular images
  - 100 shots per roll, then mail the camera back for reloading
  - “You press the button, we do the rest”
  - \$25 for the camera, \$10 per roll to process
  - contribution was not a single invention, but a system

# Related technologies



platinum print  
(you have to see  
one in person)

(Tim Page)

(wikipedia)

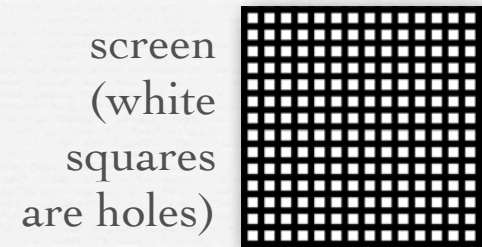


first photograph  
printed using  
halftoning

- ◆ 1870s German chemistry / dye / drug industries:  
new processes and compounds, purity, standardization
- ◆ 1880 flash photography (using flash powder)
- ◆ 1890 platinum paper printing (matte but with a deep black)
- ◆ 1873 screen-based halftone printing for mass publication

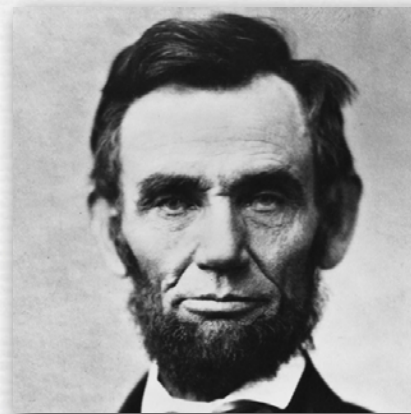
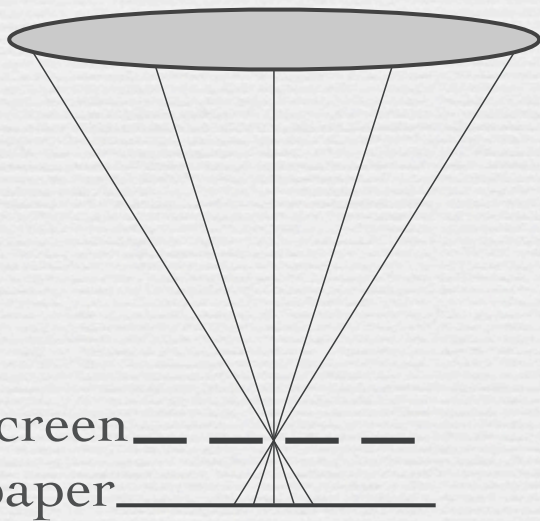
# Screen-based halftoning

(simulated in Photoshop)

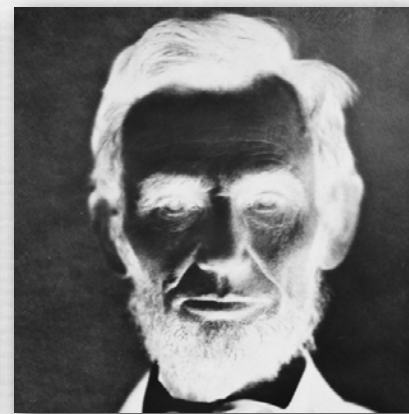


- ◆ since a printing press can only print black or white (no grays), goal is to convert tones into dots of varying size

image  
focused  
on screen



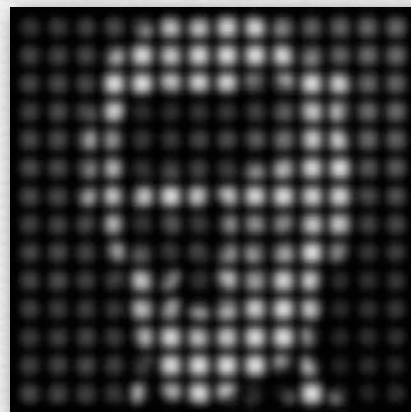
original



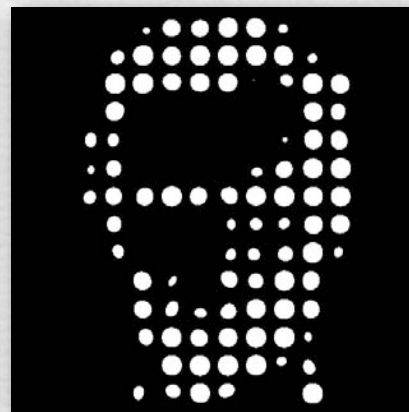
inverted



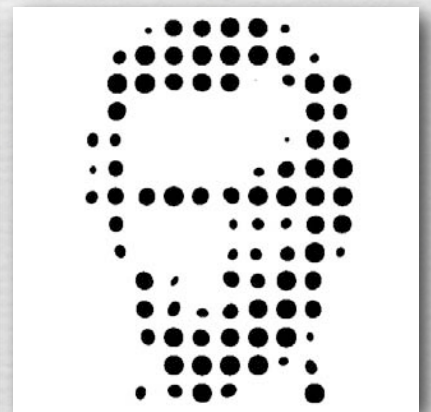
screened



blurred



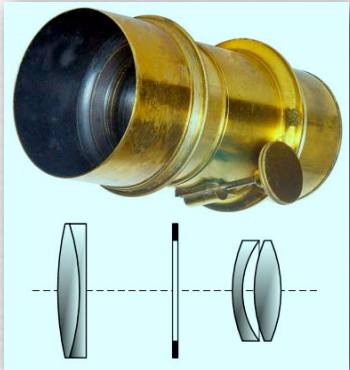
thresholded



inverted

now largely replaced  
with digital halftoning

# Later technologies



1



3



5



7

1. 1850s telephoto lenses (Petzval Portrait Lens)
2. 1890s anastigmatic lenses - corrects for all aberrations
3. 1925 35mm camera (Leica I)
4. 1932 photoelectric meter
5. 1930s zoom lenses for cinema (Cooke Vario 40-120mm)
6. 1960s zoom lenses for still cameras
7. 1981 autofocus SLR (Pentax ME-F)

*diffraction-limited*

# Digital photography



640×480



1.5 Mpix

- ◆ 1994 mass-market digital camera (Apple QuickTake)
- ◆ 1992 digital SLR (Nikon-Kodak DCS 200)
- ◆ 1990 Photoshop 1.0



John Knoll.  
Photo by Jeff Schewe.



Thomas Knoll.  
Photo by Jeff Schewe.



Photoshop  
toolbar from  
version 1.07



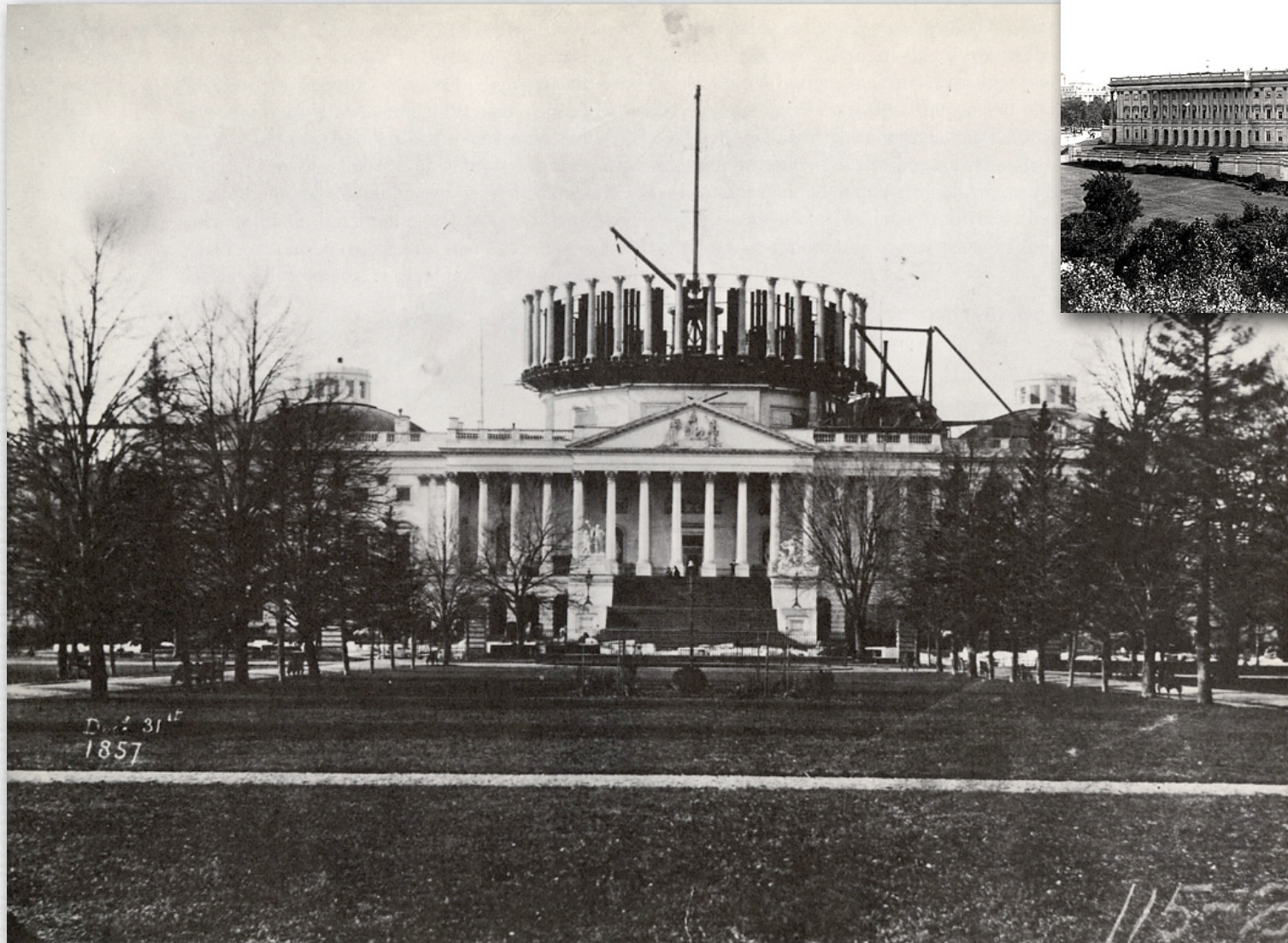
# Popularization of photography

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- ◆ before George Eastman, photographers were skilled, photographs were posed, and images were “crafted”
  - ◆ the Kodak camera was cheap, portable, and easy to use
  - ◆ photography became casual, spontaneous, and popular
- 
- ◆ concentrated on documenting everyday life
  - ◆ word “snapshot” invented by Herschel
  - ◆ privacy became an issue (it still is)
  - ◆ women started taking pictures - so subjects changed
- 
- ◆ Walter Benjamin, *The Work of Art in the Age of Mechanical Reproduction* (1935)

# Documenting the growth of America

(Archives)



view in  
1906

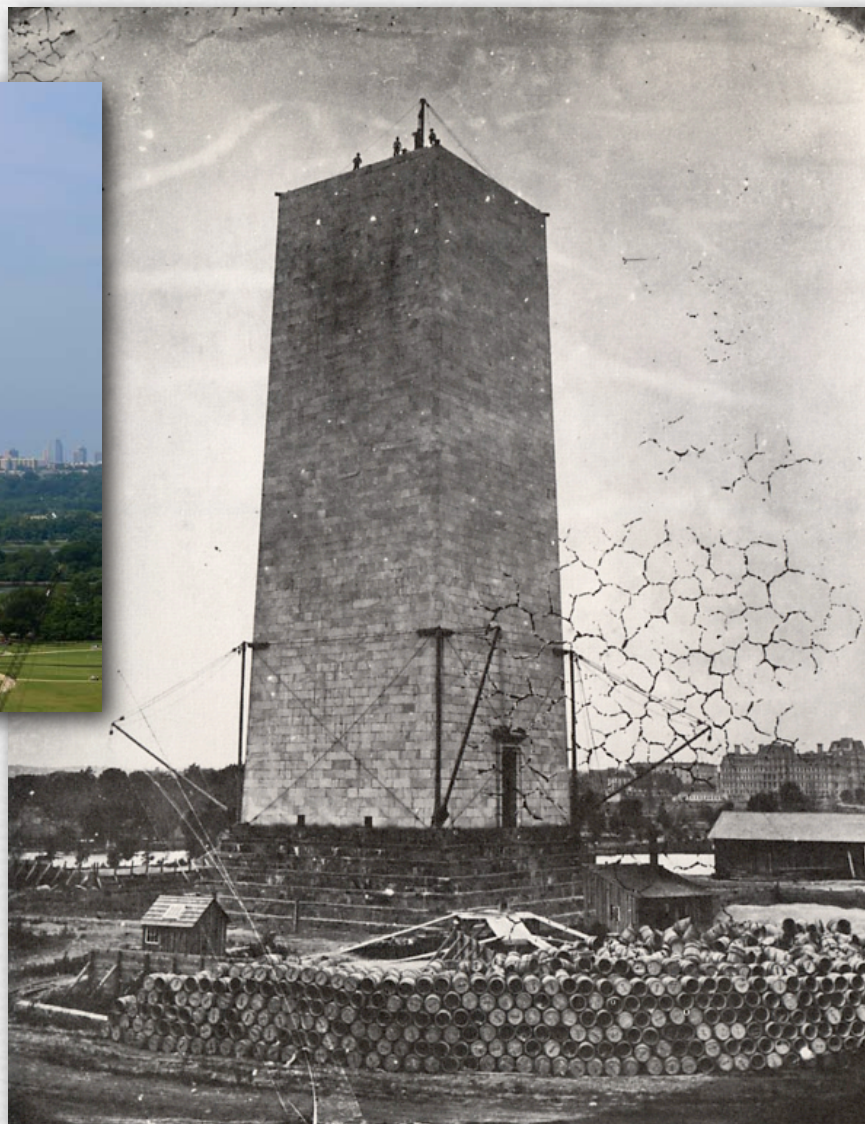
Dome of the U.S. capitol, photographer unknown, 1857

# Documenting the growth of America

(Archives)



(wikimedia)



view in  
1884

Washington Monument, photographer unknown, 1876

# Documenting the growth of America

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(Frizot)

Railroad viaduct, Ithaca, photographer unknown, 1873

# The push west

(Archives)

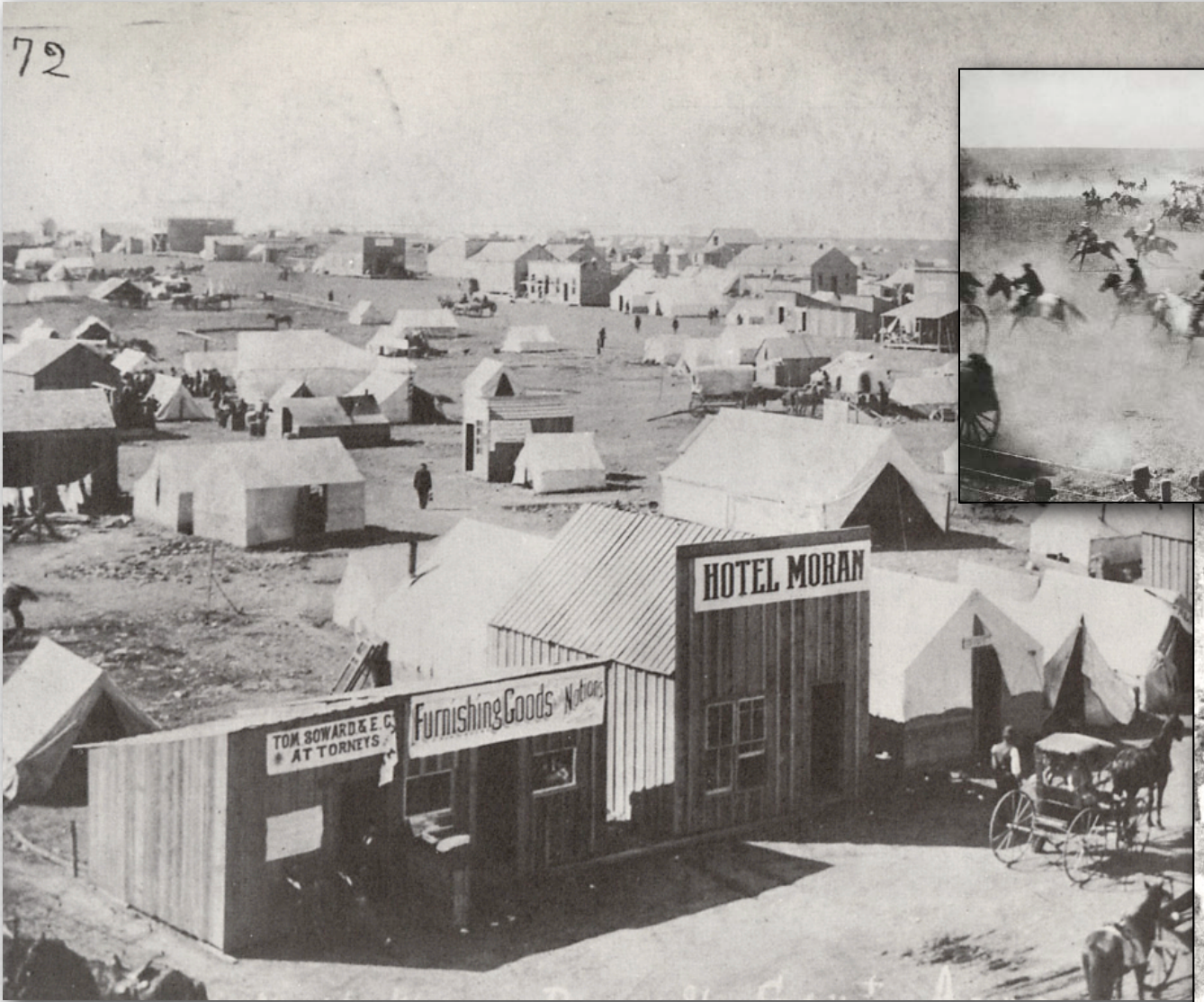
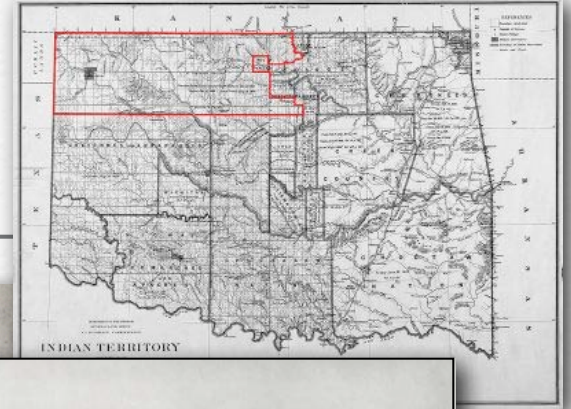


Oklahoma, photographer unknown, 1893

(wikipedia)

# The end of the frontier

(Archives)



Opening the Cherokee Strip, W.A. Flower, 1893

# Photography as proof of achievement

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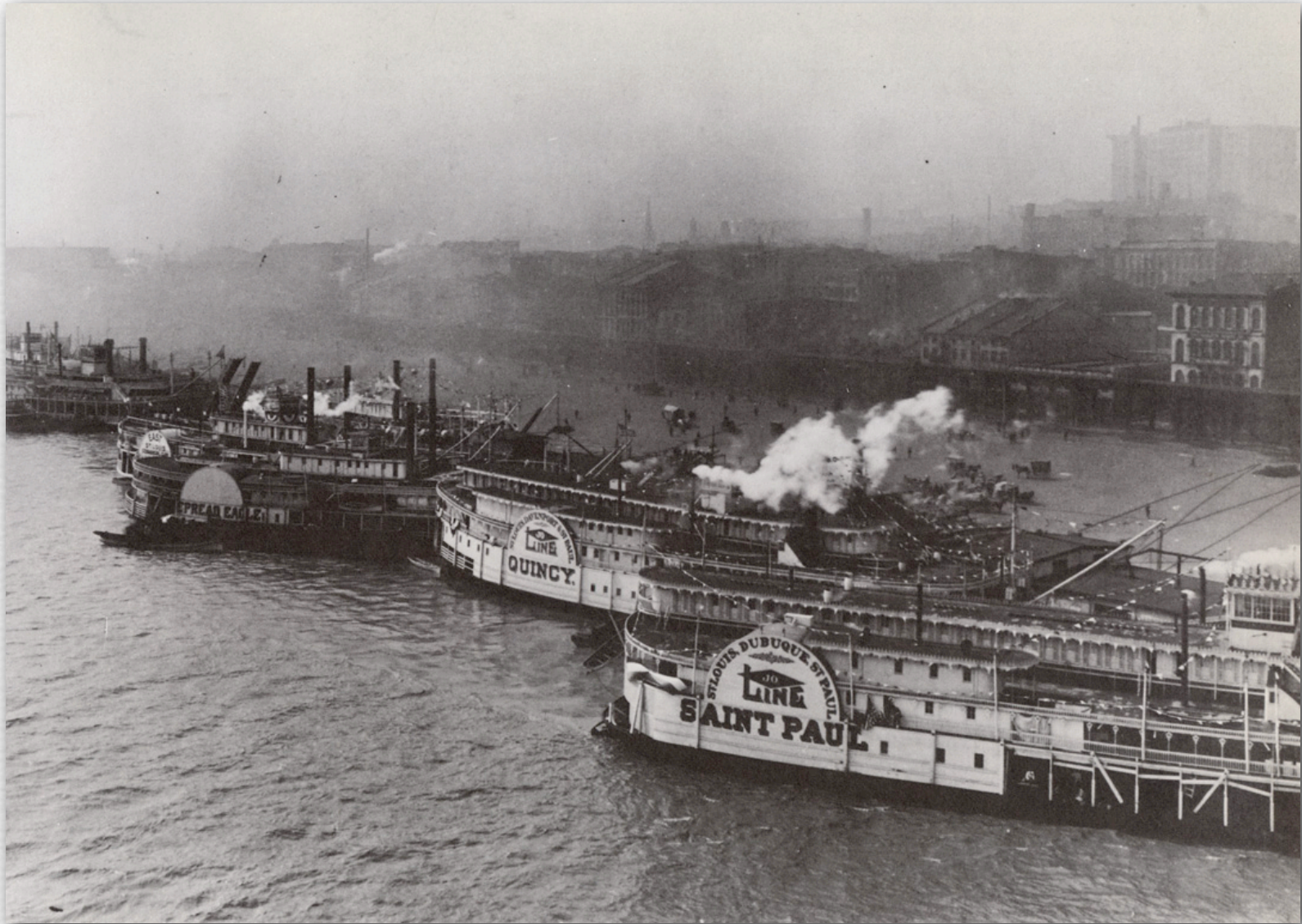


First Flight, Kitty Hawk, 1903,  
photographed by John Daniels

# Industry and commerce

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(Archives)



Waterfront at St. Louis, photographer unknown, 1909



# Gigantic undertakings



after completion  
(mid-1880s)

Brooklyn Bridge, 1881

# Gigantic undertakings



fully assembled  
(in Paris)

Statue of Liberty in Bartholdi's Parisian workshop, 1882?

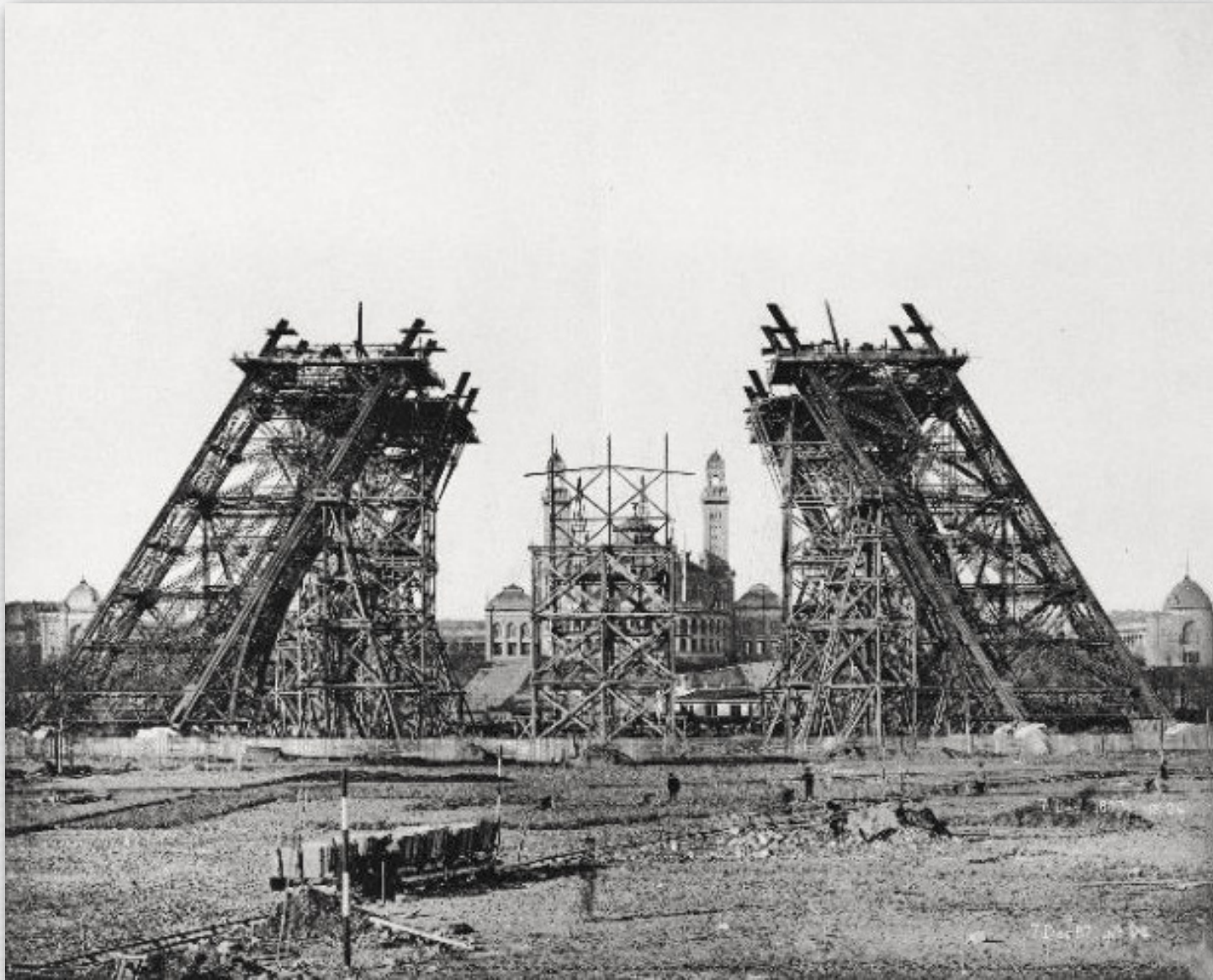
# Gigantic undertakings

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# Gigantic undertakings

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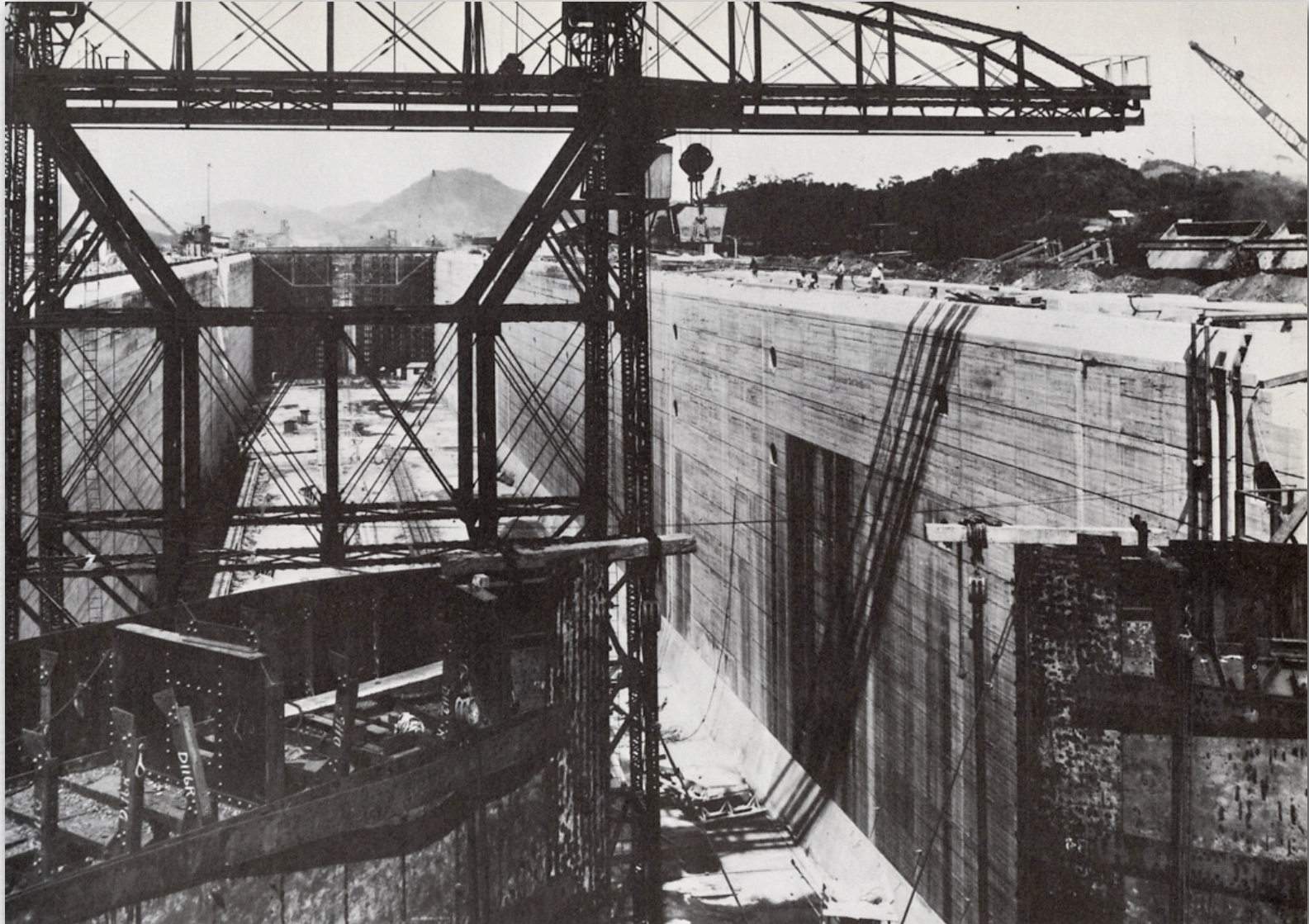


Gustave Eiffel,  
The Eiffel Tower,  
1889



# Some projects were almost too gigantic

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(Archives)

Panama Canal, Miraflores Locks, photographed by Ernest Hallen, 1913



The ship Lord Templeton traverses the  
Panama Canal's Culebra Cut, 1915



The bark Passat in heavy seas while rounding Cape Horn,  
photographed by Capt. H. Piening



Port Blakeley Mill Company Dock,  
Puget Sound, photographed by Wilhelm Hester 1905

# Aerial photography

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- ◆ from balloons
- ◆ from tall buildings
- ◆ from airplanes
- ◆ from space

James Wallace Black,  
Boston from the Air,  
1860



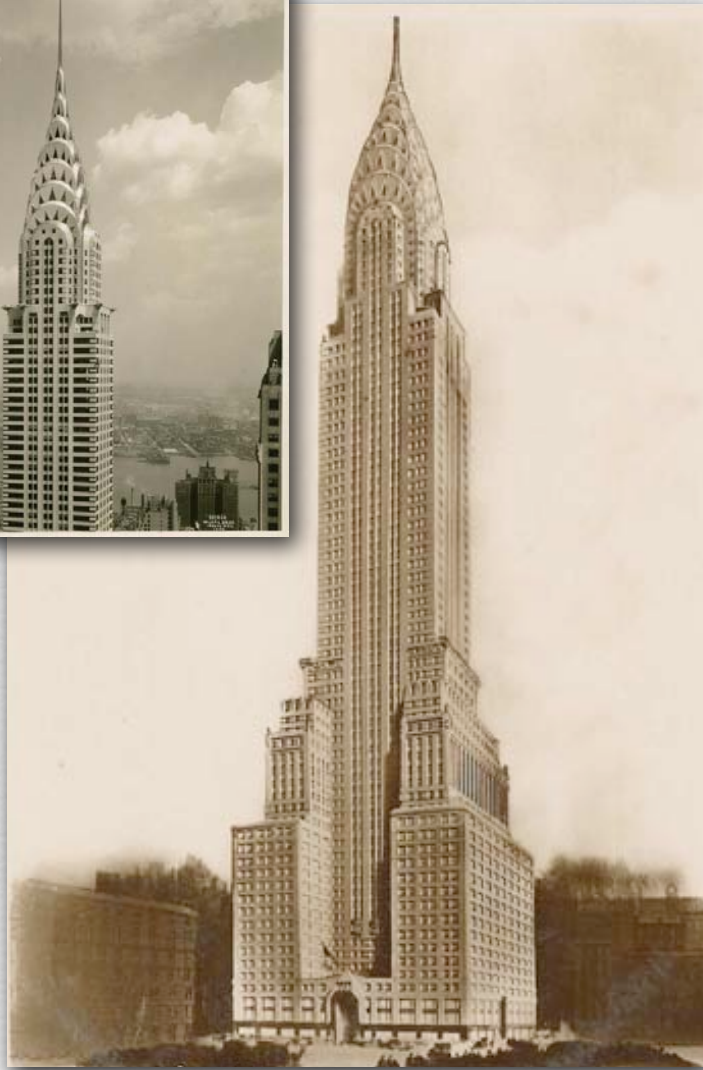
(Rosenblum)

(Rosenblum)



Berenice Abbott,  
New York at Night,  
1933

# Tall buildings

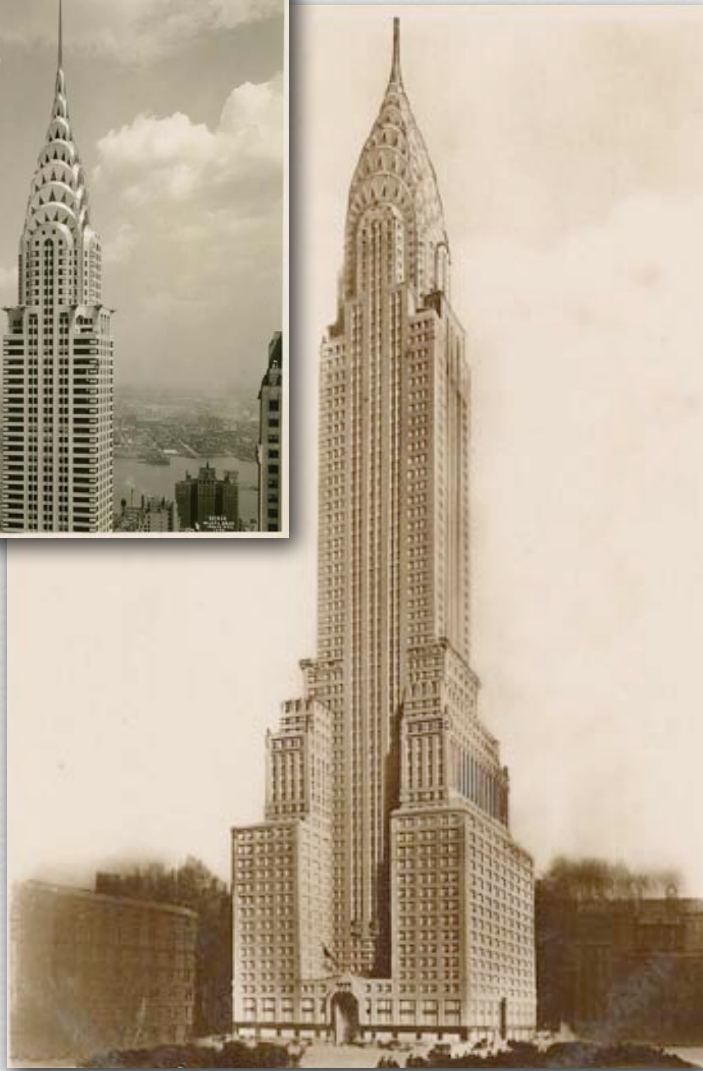


Chrysler Building, 1930  
William van Alen, architect



Margaret Bourke-White  
atop the Chrysler Building

# Tall buildings



Chrysler Building, 1930  
William van Alen, architect



Burj Khalifa, Dubai, 2010  
tallest structure in world (2717')



# The industrial aesthetic in photography

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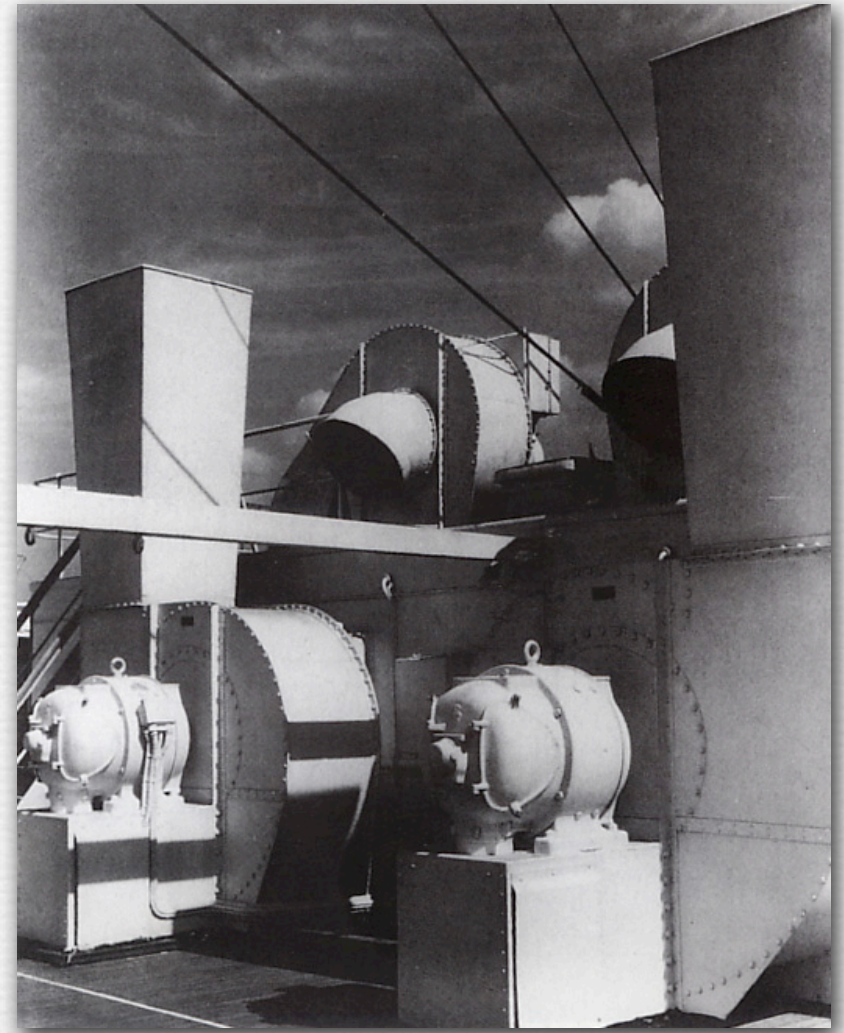
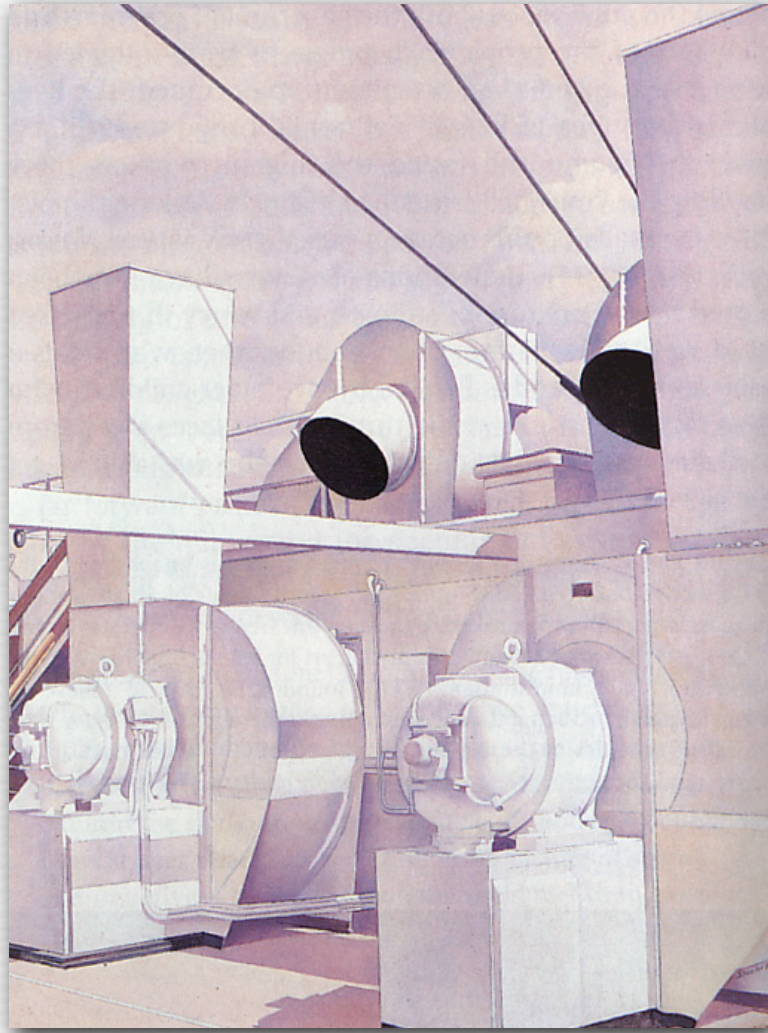
(Newhall)

Charles Sheeler,  
Ford Plant, Detroit,  
1927

# The industrial aesthetic in photography

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(Gardner)



Charles Sheeler, *The Upper Deck*, 1929

Lewis Hine,  
Powerhouse Mechanic,  
1925





Margaret Bourke-White, Fort Peck Dam, 1936



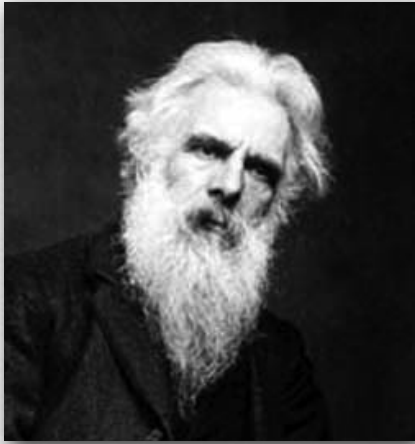
**LIFE**

NOVEMBER 23, 1936 **10** CENTS

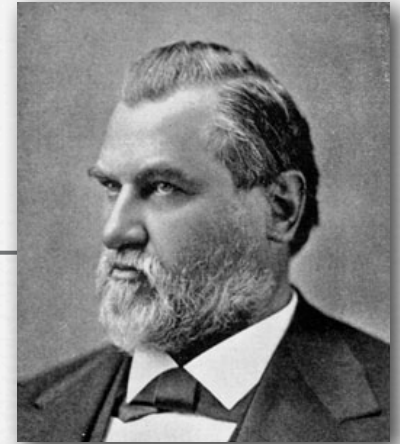
# Scientific uses of photography

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- ◆ aerial photography (already shown)
- ◆ freezing motion
- ◆ the birth of cinematography



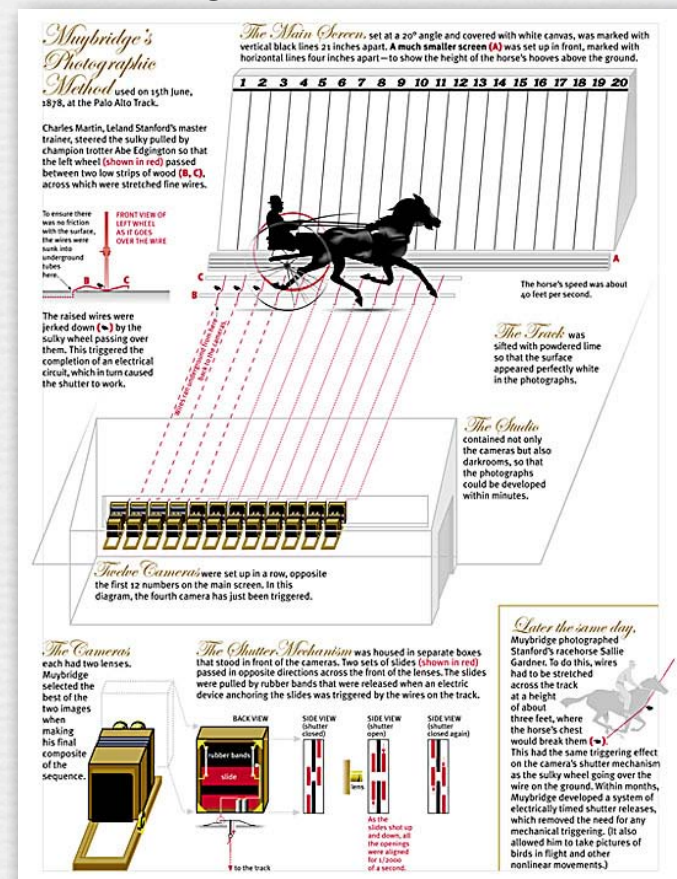
# Muybridge and Stanford



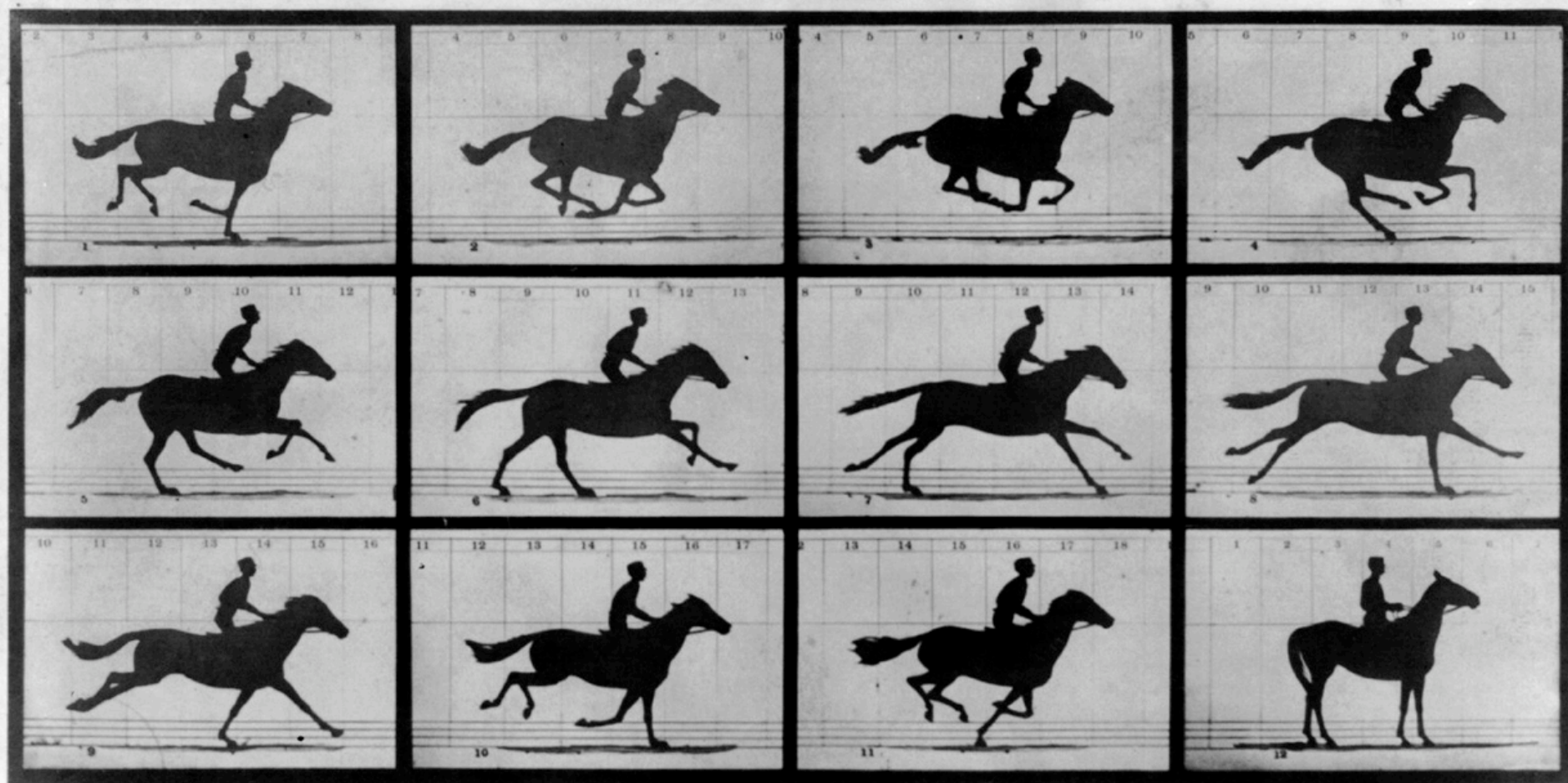
Eadweard Muybridge  
(1830-1904)

Leland Stanford  
(1824-1893)  
(Stanford magazine)

- ◆ In a galloping horse, are all four hooves in the air at once?
- ◆ collaborative effort; Stanford suggested using trigger wires
- ◆ experiments spanned 1872-1878, in Palo Alto & Sacramento, with an interruption in 1874 when Muybridge was tried for the murder of his wife's lover



# Public demonstration, June 19, 1878



Copyright, 1878, by MUYBRIDGE.

MORSE'S Gallery, 417 Montgomery St., San Francisco.

## THE HORSE IN MOTION.

Illustrated by  
MUYBRIDGE.

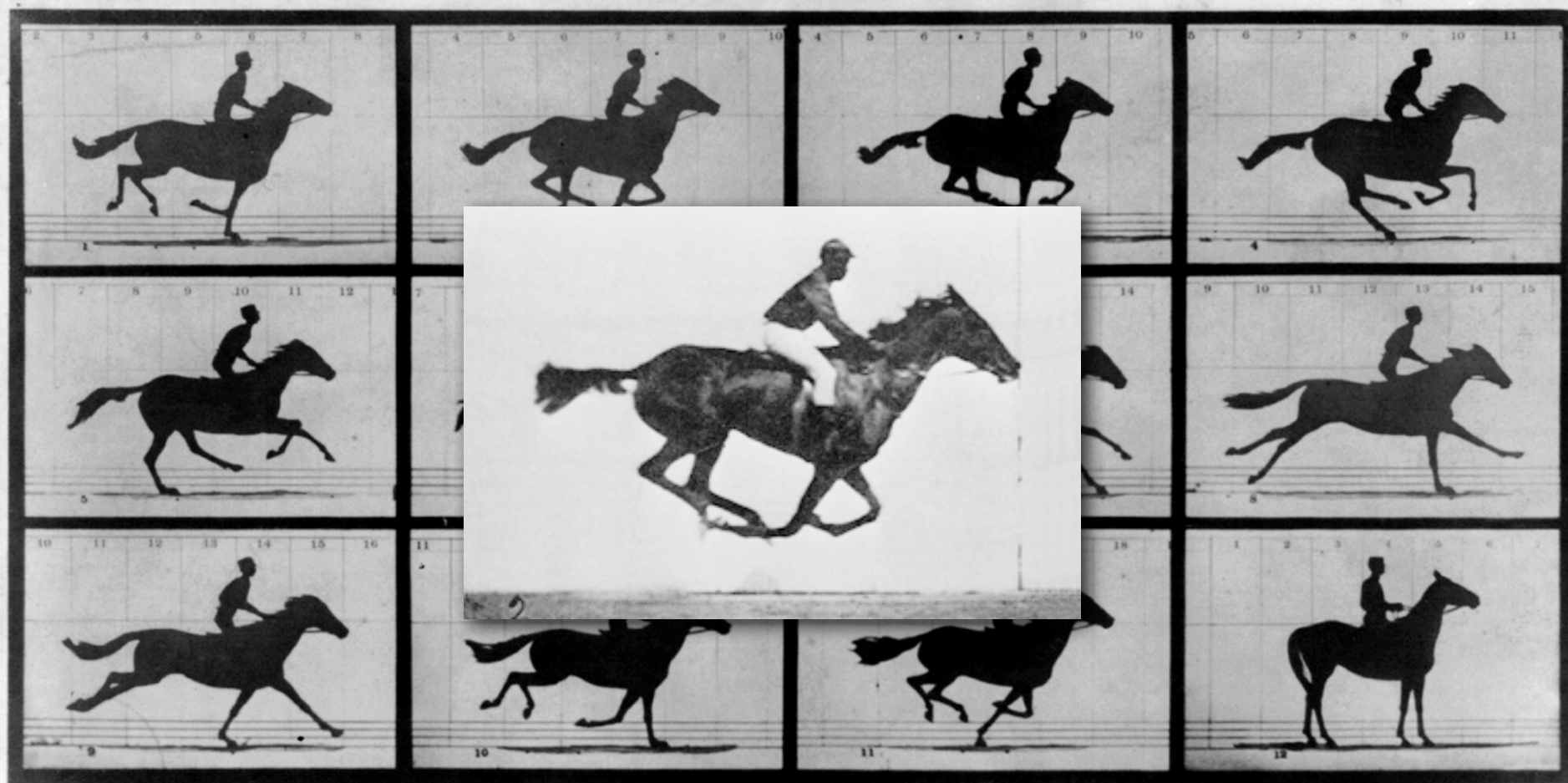
AUTOMATIC ELECTRO-PHOTOGRAPH.

"SALLIE GARDNER," owned by LELAND STANFORD; running at a 1.40 gait over the Palo Alto track, 19th June, 1878.

The negatives of these photographs were made at intervals of twenty-seven inches of distance, and about the twenty-fifth part of a second of time; they illustrate consecutive positions assumed in each twenty-seven inches of progress during a single stride of the mare. The vertical lines were twenty-seven inches apart; the horizontal lines represent elevations of four inches each. The exposure of each negative was less than the two-thousandth part of a second.



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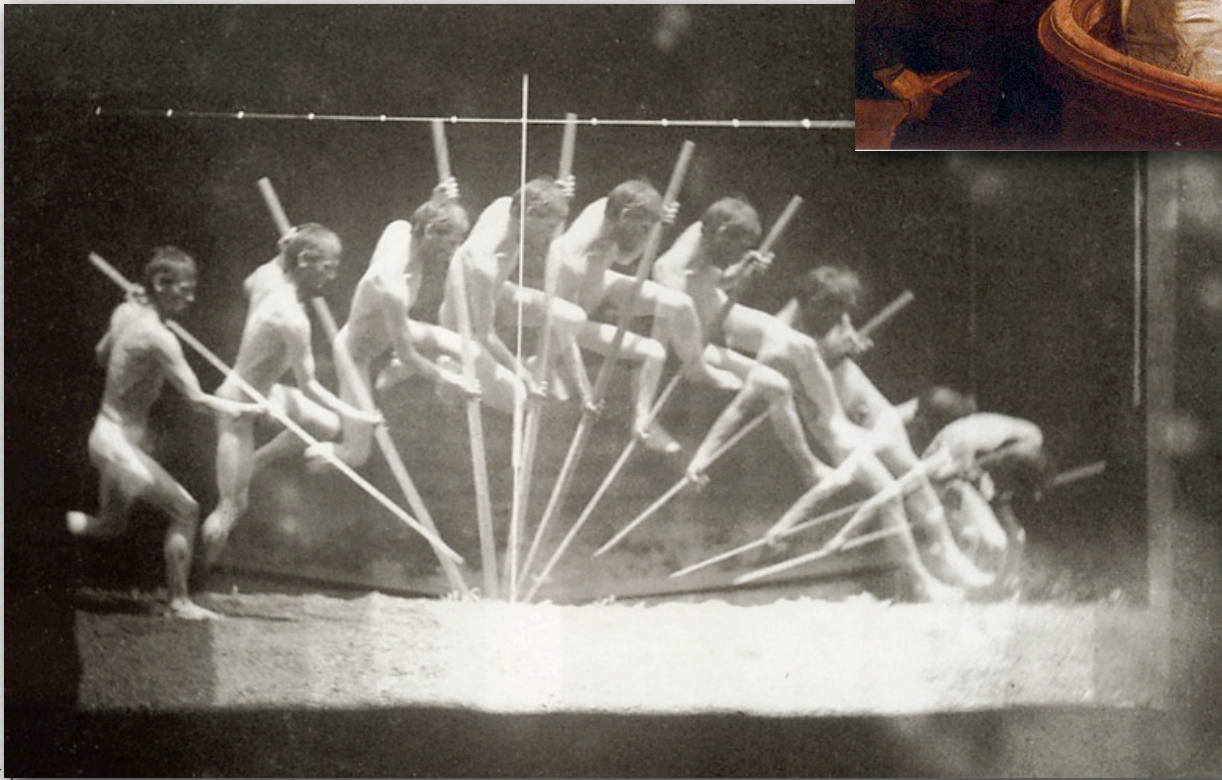
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# Thomas Eakins

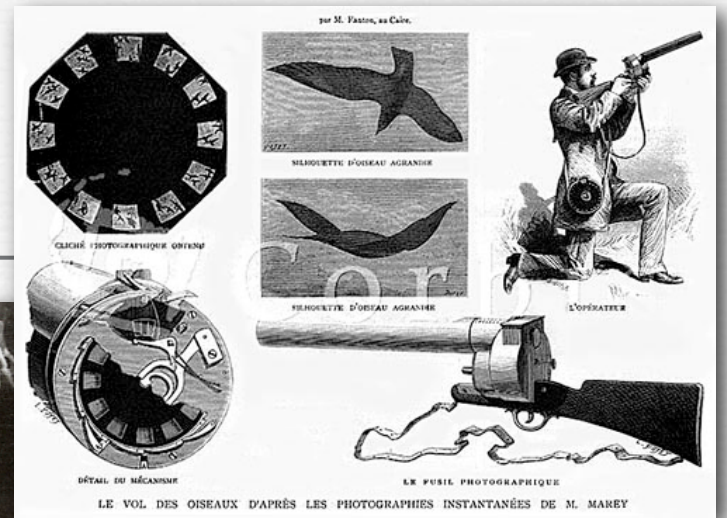
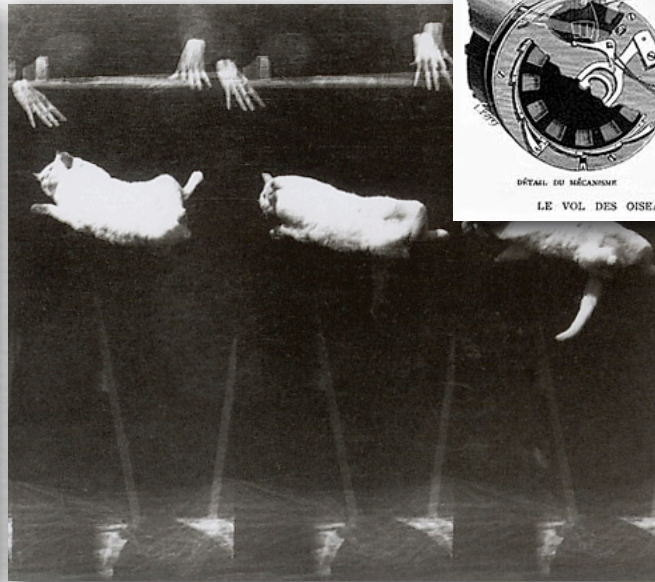
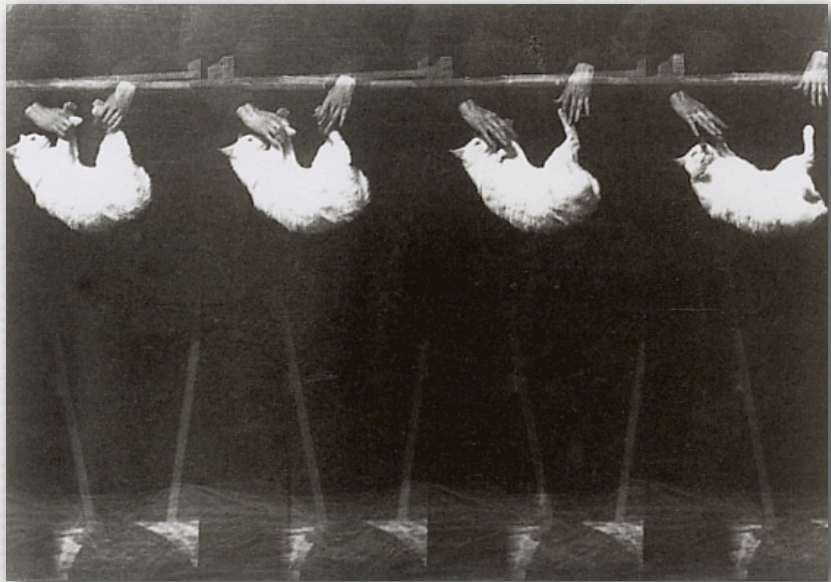
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History of a Jump, 1884

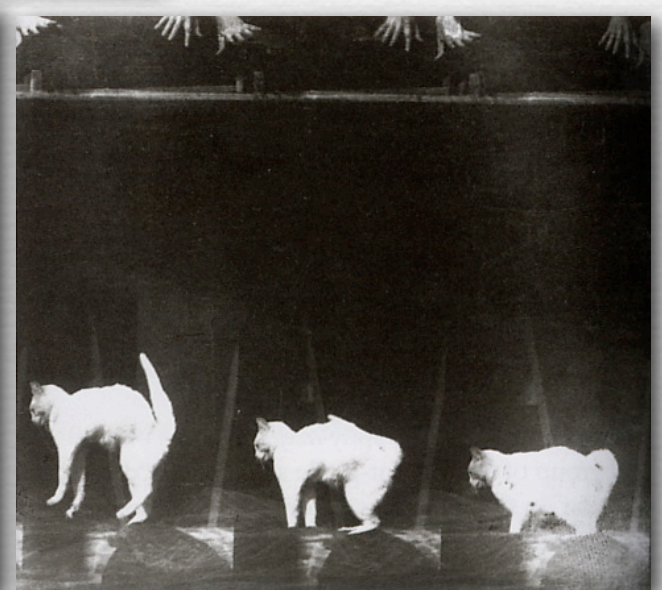
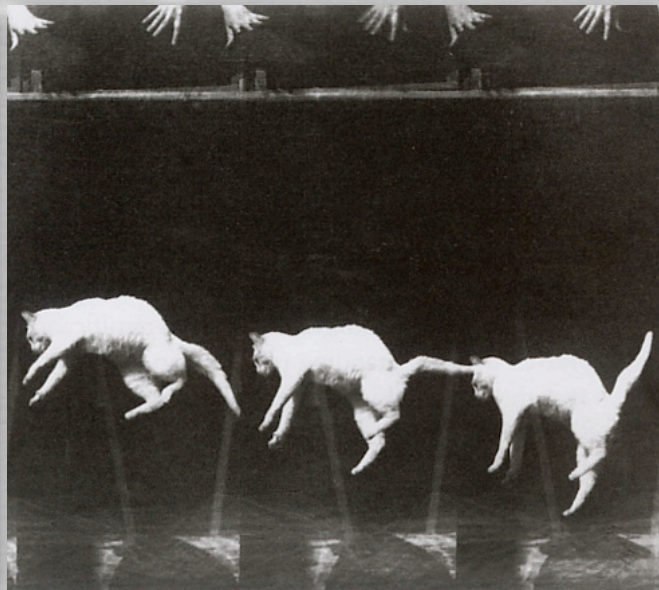
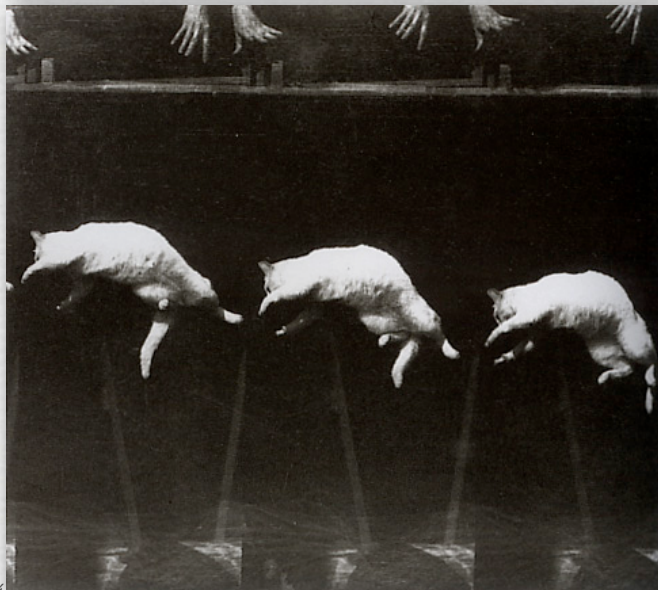


The Agnew Clinic, 1889

# Etienne Jules Marey



Falling Cat,  
1880s



# The birth of cinematography

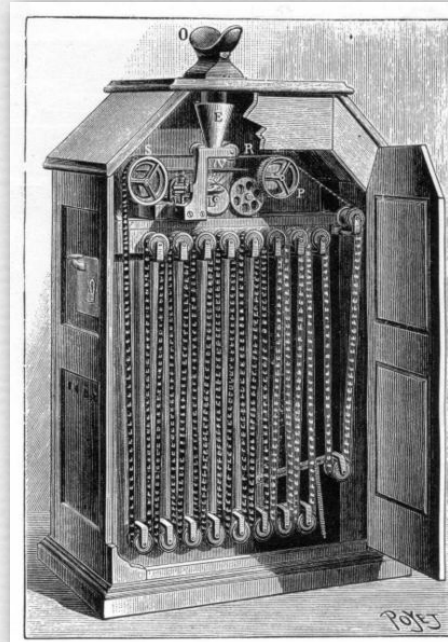
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- ◆ Muybridge's images could be viewed using a Zoopraxiscope (invented by him in 1879)



# The birth of cinematography

- ◆ Muybridge's images could be viewed using a Zoopraxiscope (invented by him in 1879)
- ◆ first practical unlimited-duration recording technology was Edison's 1893 Kinetograph (with William Dickson)
  - perforated 35mm-wide strip of celluloid film
  - intermittent pull-down at 30 frames per second
- ◆ looped, backlit filmstrip displayed to individual viewers using Edison's Kinetoscope



**Edison Kinetoscopic  
Record of a Sneeze,  
January 7, 1894**  
**©January 9, 1894**  
**W.K.L. Dickson**

Fred Ott's sneeze

# The birth of cinematography

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- ◆ concurrent work by Lumière brothers in France



(wikipedia)



workers leaving the  
Lumière factory

© Marc Levoy

# Documenting the social scene

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- ◆ photography recognized early as a force for social change
  - ◆ social conscience initially awakened by seeing inequity in Europe's colonial possessions: Egypt, Cuba, Africa, India, etc.
  - ◆ government-funded projects undertaken to document ethnic groups and their living conditions, for lectures or pamphlets
  - ◆ expanded to include the economic hardship in Europe and America brought about by industrialization
  - ◆ given impetus by late 19<sup>th</sup> century moral reform movements, many of them religious in origin
- 
- ◆ before paper film, photographs were carefully posed, so they seldom represented real living or working conditions
  - ◆ ability to influence public opinion needed the power of the printing press, not individual prints hanging in an art gallery

# Recording non-European cultures

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(Rosenblum)



Marie Cabannis,  
Syrian Bedouin  
Women, 1870



# Showing the success of relief programs

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(Rosenblum)



Raja Lala Deen  
Dayal, famine  
relief program  
in Aurangabad,  
1899

# Showing the success of relief programs

---

(Rosenblum)



Raja Lala Deen  
Dayal, famine  
relief program  
in Aurangabad,  
1899

# Advertising social programs at home

(Rosenblum)



unknown  
photographer,  
1875

# The Progressive era

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- ◆ transition from religious charity to social agitation
- ◆ gradual realization that urban poverty arose from economic laws, not the moral inadequacy of slumdweller
- ◆ seminal work was Jacob Riis's 1890 book "How the Other Half Lives", about the tenements of New York

# Venturing into the slums

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(Rosenblum)



Jacob Riis,  
Bandit's Roost,  
New York, 1888

# Immigrant ghettos

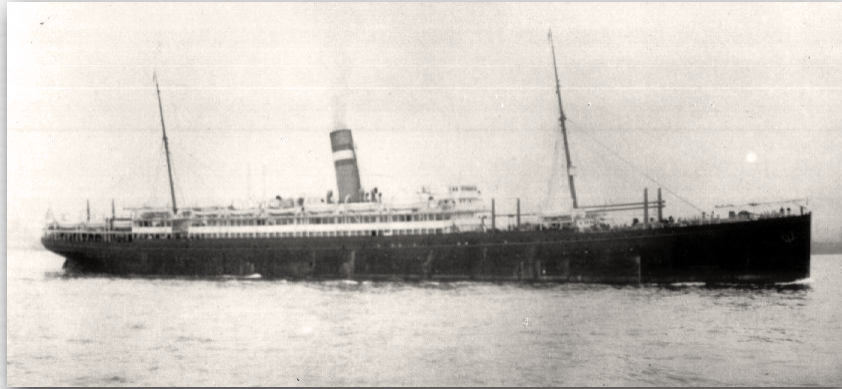
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(Rosenblum)

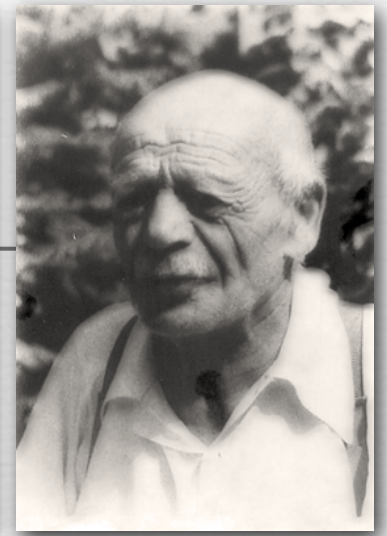


Jacob Riis,  
Five Cents  
Lodging, 1889

# Sarah and Jacob Chesler



S.S. Rijndam



**HOLLAND-AMERICA LINE.**

26

BALOON, CADIN, AND STEERAGE ALIENS MUST BE COMPLETELY MANIFESTED.  
THIS SHEET IS FOR STEERAGE PASSENGERS.

List **14**

**LIST OR MANIFEST OF ALIEN PASSENGERS FOR THE U. S. IMMIGRATION OFFICER AT PORT OF ARRIVAL.**

Required by the regulations of the Secretary of Commerce and Labor of the United States, under Act of Congress approved March 3, 1903, to be delivered to the U. S. Immigration Officer by the Commanding Officer of any vessel having such passengers on board upon arrival at a port in the United States.

S. S. *Rijndam* sailing from *Rotterdam* *11<sup>th</sup> March, 1906* Arriving at Port of *NEW YORK*, *MAR 27 1906*, 1906

No. on List	NAME IN FULL	Age	Sex	Married or Single	Calling or Occupation	Alta to—	Race or People	Last Residence	Final Destination	Whether having a ticket to such final destination	By whom was passage paid?	Whether in possession of \$50, and if less, how much?	Whether ever before in the United States, and if so, when and where?	Whether going to join a relative or friend, and if so, what relative or friend, and his name and complete address.	Even in prison or otherwise, has the individual been convicted of a crime or offense involving moral turpitude?	Whether a Polygamist	Whether an Anarchist	Whether sane and of sound mind and memory at the time of his or her departure from the country of origin?	Condition of Health, Mental and Physical	Deformed or Crippled. Nature, length of time, and cause.
X	Malka Mawinsky	23	F	m	none	yes	Russian	Hobart	Boston	yes	S. S. Chesler	5		husband, William Mawinsky 3 Park Street Boston Mass	✓	no	no	no	good	no
X	Maisie	2	F	s	1 M 2174-7/17/05	no	"	"	"	✓	father			father	✓	"	"	"	"	"
X	Chaim	21	M	s	"	no	"	"	"	✓	father			"	✓	"	"	"	"	"
X	Sara Chesler	17	F	m	"	no	"	Slavonic	New York		husband			husband, Mendel Chesler 98 East Street New York	✓	"	"	"	"	"
X	Sarah	11	F	s	"	no	"	"	"		father			"	✓	"	"	"	"	"
X	Hubert	9	M	s	"	no	"	"	"		father			"	✓	"	"	"	"	"
X	Charles	8	M	s	"	no	"	"	"		father			"	✓	"	"	"	"	"
X	Abraham	1	M	s	"	no	"	"	"		father			"	✓	"	"	"	"	"
3	Moses Goldenberg	19	M	s	2X 16706-536	no	"	Polish	Polish		self	6		cousin Charles Goldenberg 153 Rector St New York	✓	"	"	"	"	Conjunctivitis
X	Chay Weintraub	26	M	m	"	no	"	"	"		husband			husband, Elie Weintraub 633 E. 41 <sup>st</sup> Street New York	✓	"	"	"	"	"

# Child labor

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(Archives)



Lewis Hine,  
Breaker Boys,  
1911





Lewis Hine, Carolina Cotton Mill, 1908

# The Great Depression

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- ◆ causes included an uncontrolled stock market, unstable banking system, inequitable distribution of income, and agricultural collapse caused by excessive production and misuse of marginal farmland
- ◆ milestone was the October 1929 stock market crash, but the market didn't bottom out until 1933
- ◆ marked by bank failures, high unemployment, labor unrest, and agricultural hardship, exacerbated by draught in the early 1930s

# Soup kitchens and breadlines

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# Rural poverty

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Margaret Bourke-White,  
Two Women, Lansdale,  
Arkansas, 1936

(Rosenblum)





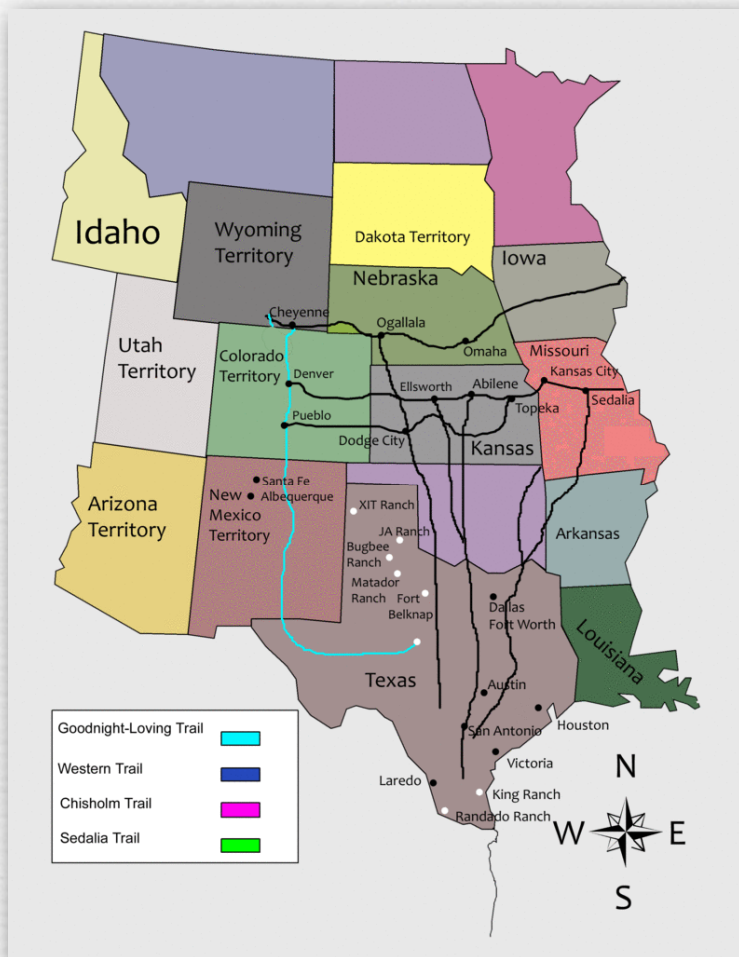
Margaret Bourke White, Louisville, Kentucky, 1937

# The Dust Bowl

## prequel: settlement on the High Plains

a chuckwagon,  
S. Dakota, 1887

- ◆ 1870s - cattle drives from Texas to the transcontinental railroad



along the Goodnight-Loving trail

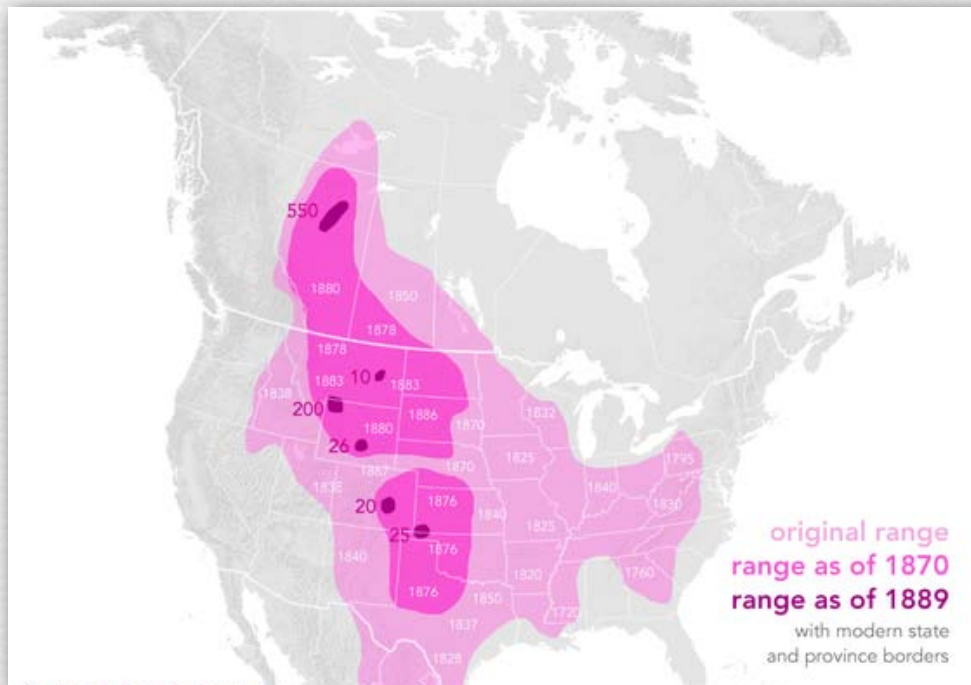
# The Dust Bowl

## prequel: settlement on the High Plains

- ◆ 1870s - cattle drives from Texas to the transcontinental railroad
- ◆ 1880s - American Bison (Buffalo) hunted nearly to extinction



buffalo stampede, 1917



range of the American Bison



buffalo skulls, 1870

# The Dust Bowl

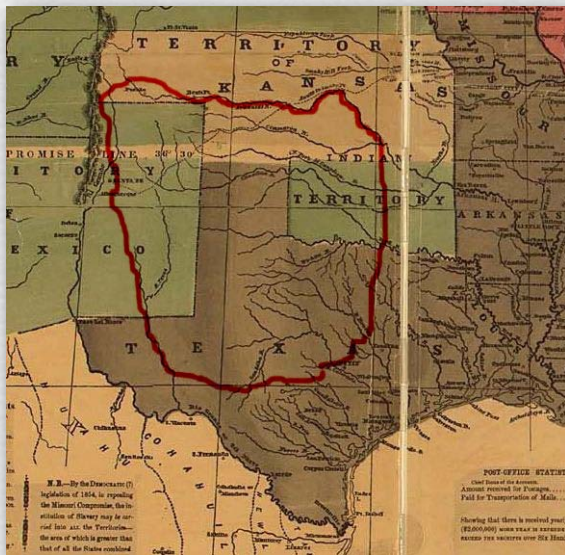
## prequel: settlement on the High Plains

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- ◆ 1870s - cattle drives from Texas to the transcontinental railroad
- ◆ 1880s - American Bison (Buffalo) hunted nearly to extinction
- ◆ 1890s - Indian wars end, Comanches confined to reservations

Edward Curtis,  
The Vanishing Race, 1904

range of the  
Comanches  
prior to 1850



(Rosenblum)





Commanche warriors, photographer unknown, 1874

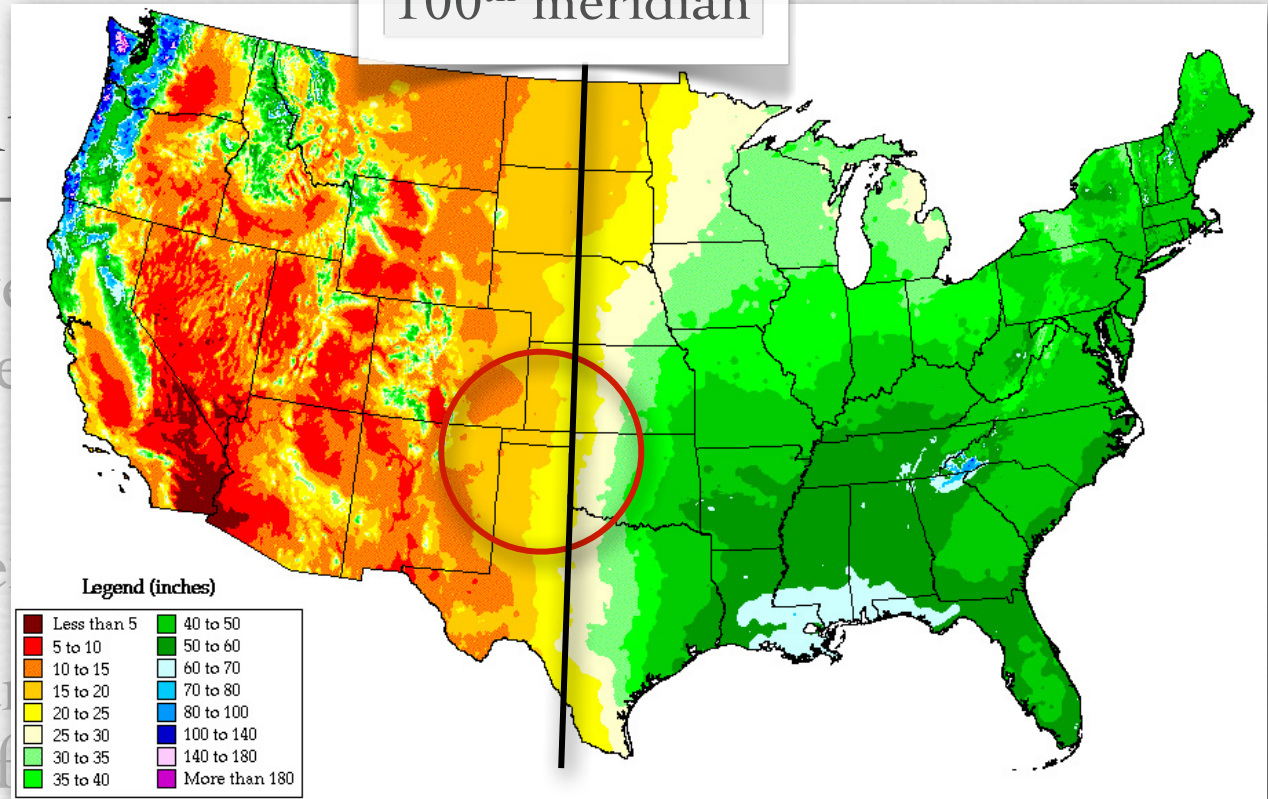
# The Dust Bowl prequel: settlement

- ◆ 1870s - cattle drive to the transcontinent
- ◆ 1880s - American hunted nearly to e
- ◆ 1890s - Indian war  
Commanches conf  
reservations

- ◆ 1900s - settlers encouraged to plow and plant
  - “sodbusters”
  - “Rain will follow the plow”

100<sup>th</sup> meridian

(Oregon Climate Service)



average annual rainfall, 1961-1990

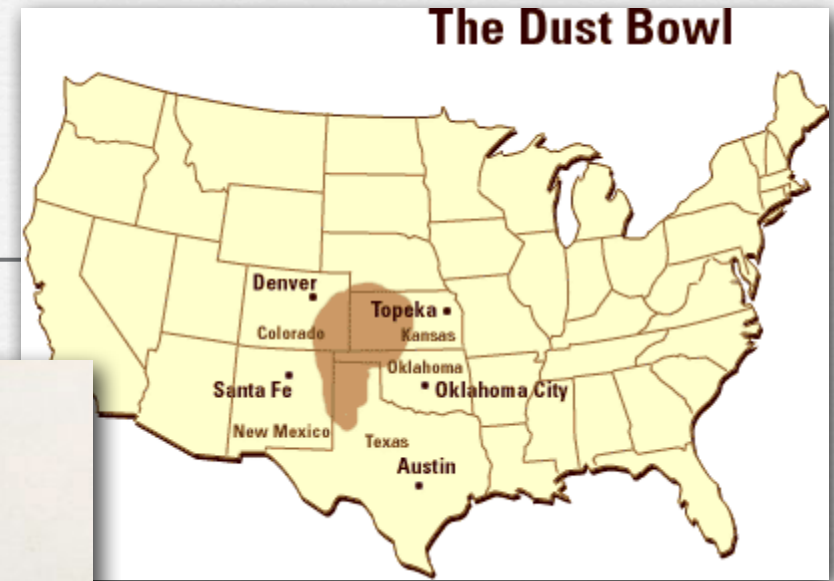


sod house, 1901

# The Dust Bowl



Dorothea Lange,  
Tractored Out, 1938



- ◆ deep plowing by new, gasoline-powered tractors stripped the land of its protective, deep-rooted grasses
- ◆ nutrient-hungry cotton planted on draught-prone land

# The Dust Bowl

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Black Sunday,  
April 14, 1935

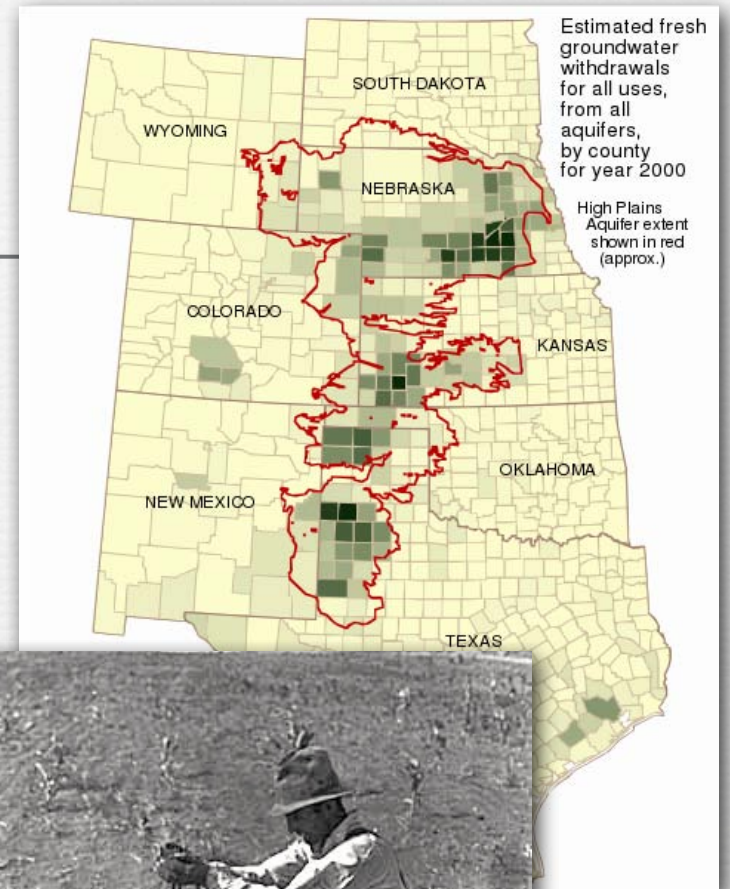
# The Dust Bowl

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Dodge City, Kansas  
April 14, 1935

# The Great American Desert



(Laurie Winslow)



Abandoned farmhouse, Kansas

# Farm Security Administration

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- ◆ created by Franklin Roosevelt in 1935 as the Resettlement Administration, to combat rural poverty
- ◆ under Roy Stryker, photographers were hired to record the agricultural disaster unfolding on the High Plains, to help justify relief programs
  - Walker Evans
  - Arthur Rothstein
  - Dorothea Lange, and 8 others
- ◆ related effort
  - Margaret Bourke-White

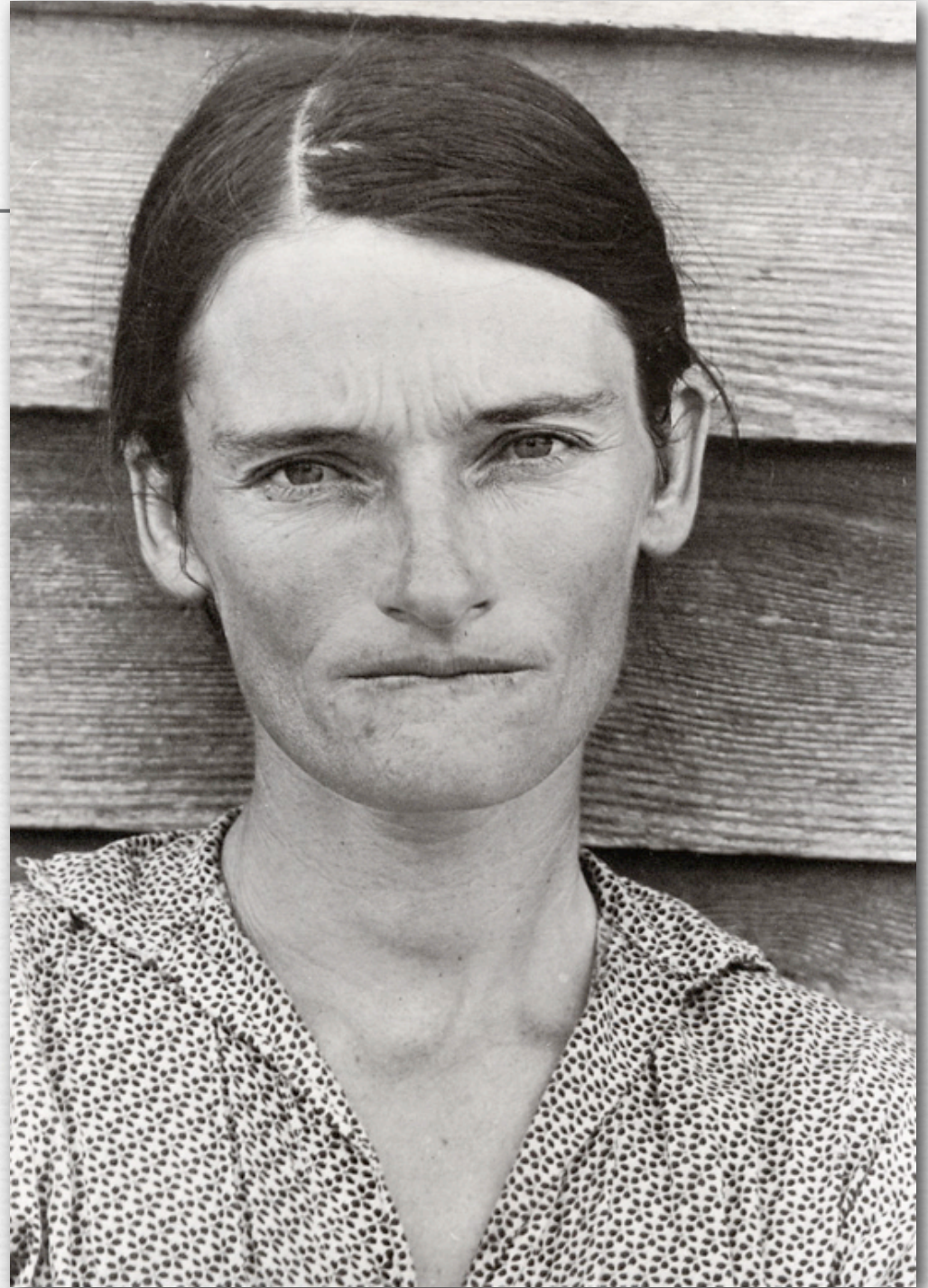


# FSA photographs

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Walker Evans,  
Wife of a Cotton Sharecropper,  
1936

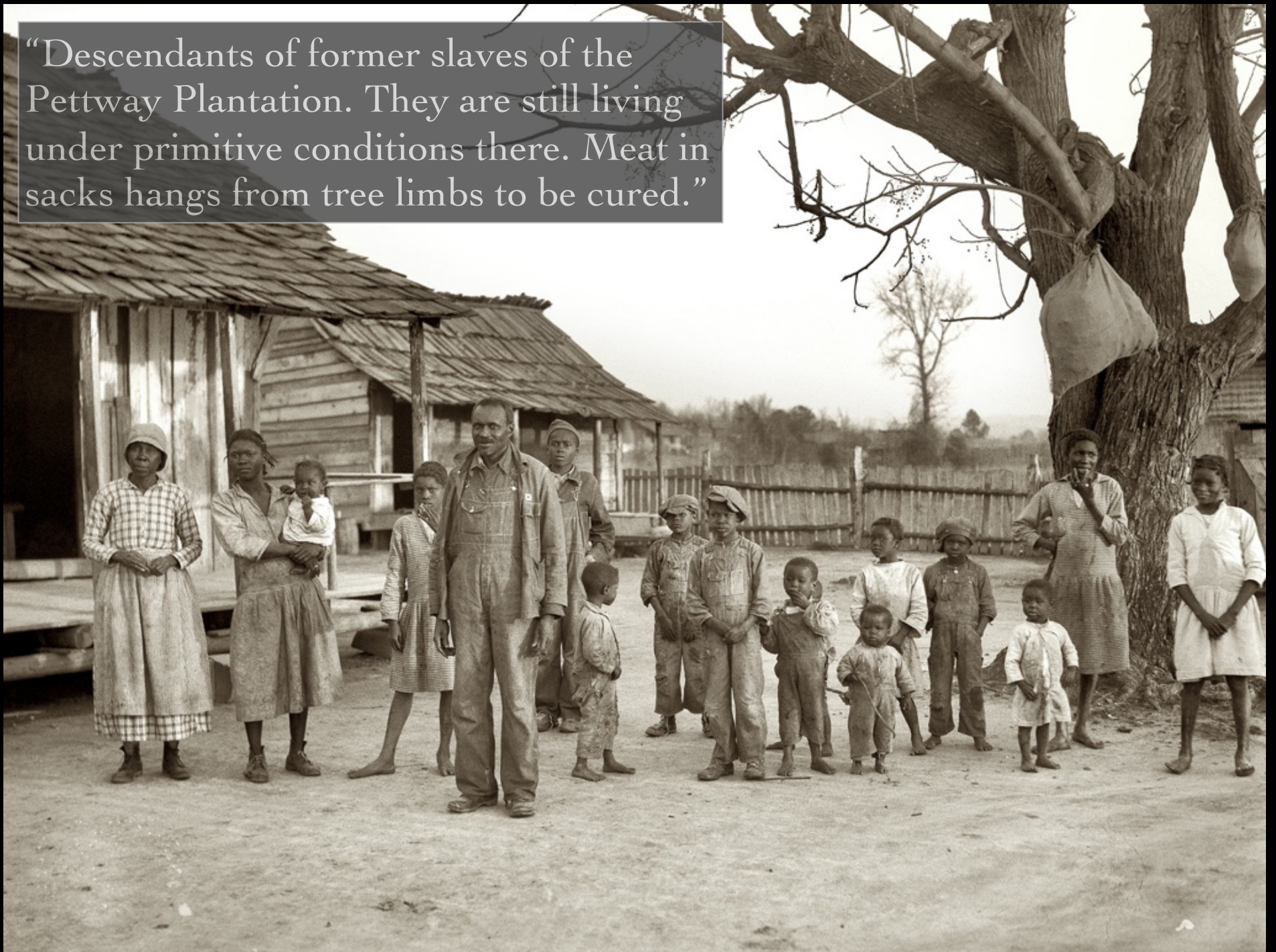
(Newhall)





Walker Evans, Garage in Atlanta, Georgia, 1936

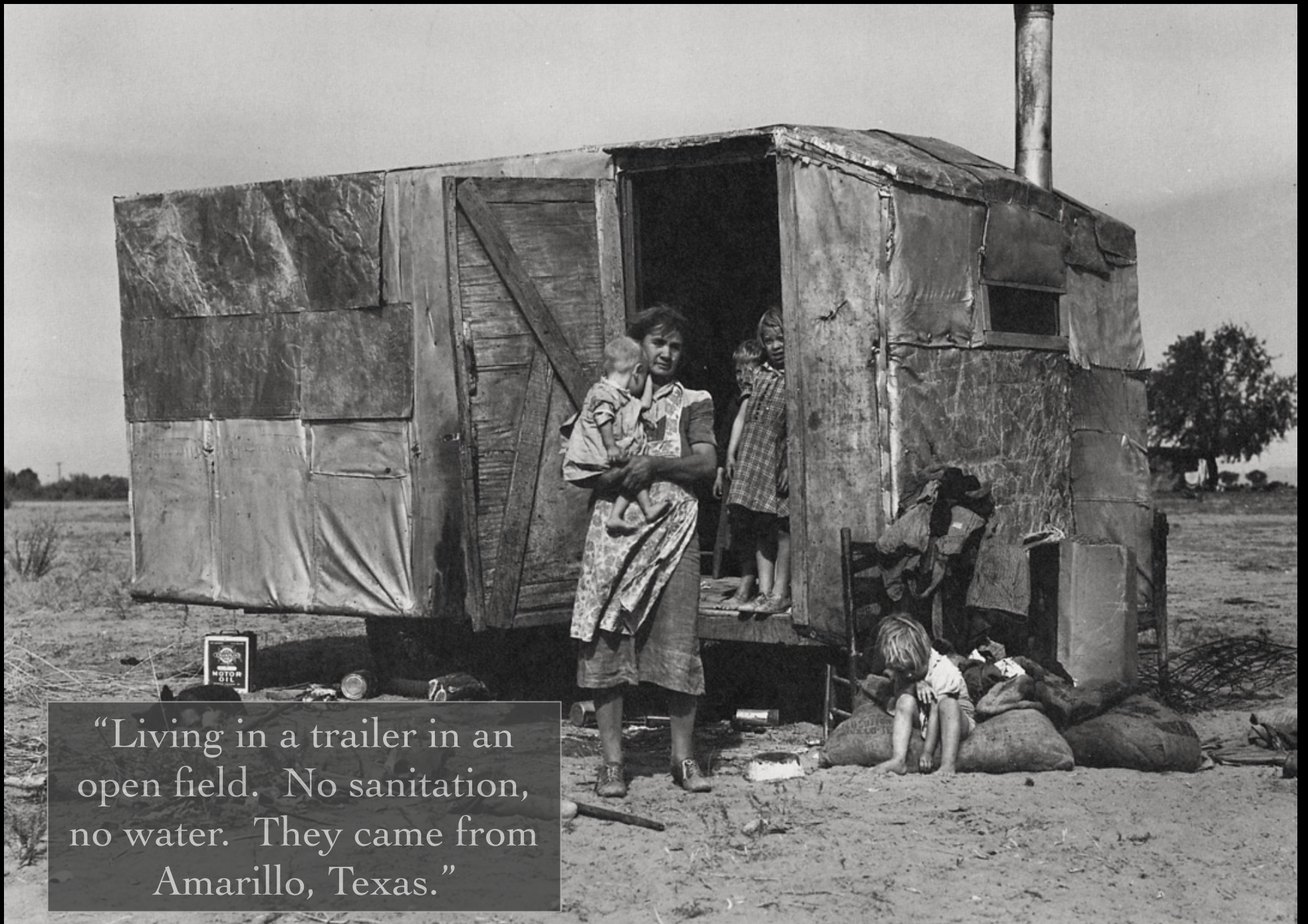
“Descendants of former slaves of the Pettway Plantation. They are still living under primitive conditions there. Meat in sacks hangs from tree limbs to be cured.”



Arthur Rothstein, Gee's Bend, Alabama, 1937



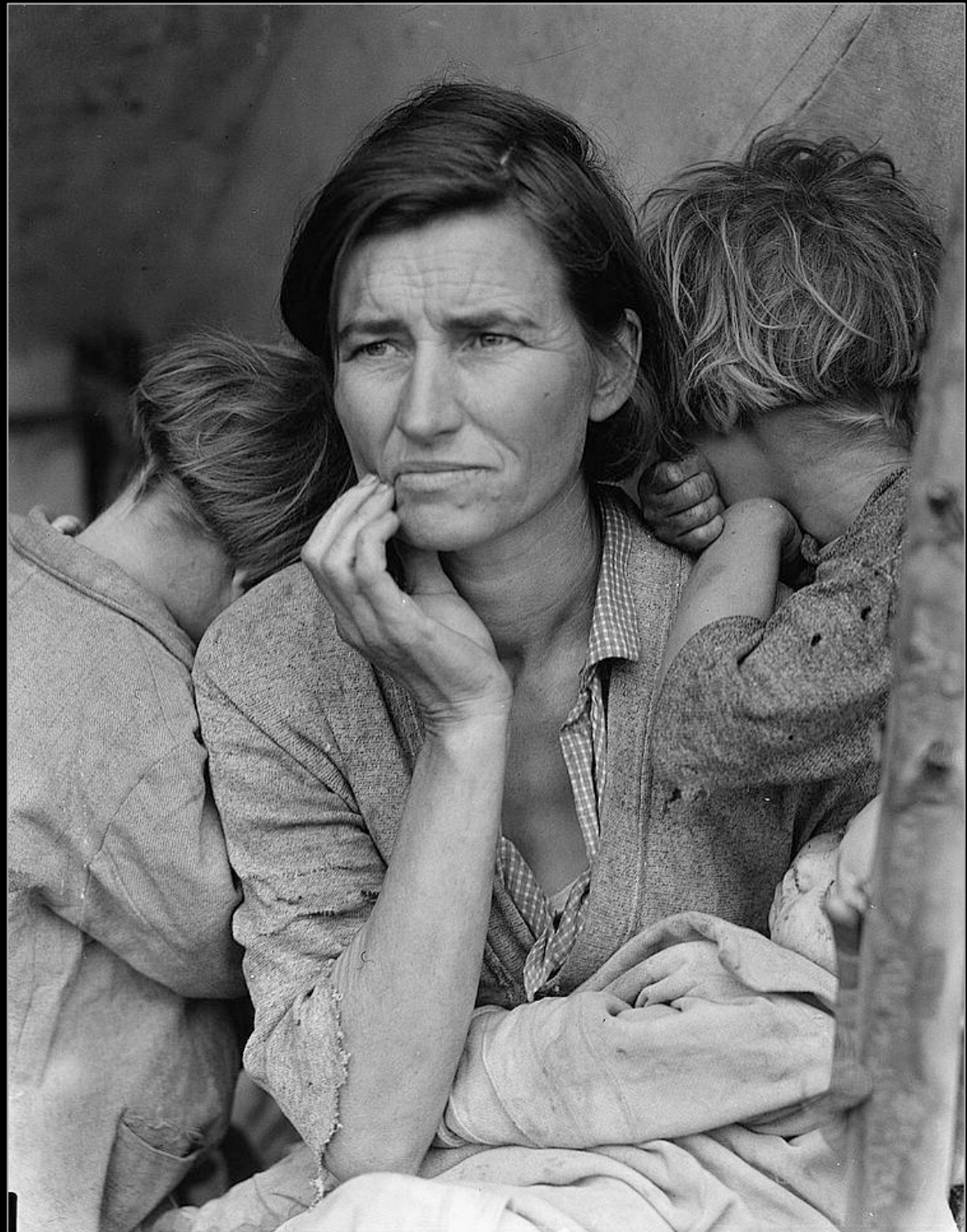
Arthur Rothstein,  
Dust Storm, 1937



“Living in a trailer in an open field. No sanitation, no water. They came from Amarillo, Texas.”

Dorothea Lange, Migrant Family, 1940

(Archives)



Dorothea Lange,  
Migrant Mother,  
1936

# Slide credits

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