

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

CS 178, Spring 2013



Marc Levoy
Computer Science Department
Stanford University

Outline

- ◆ 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...

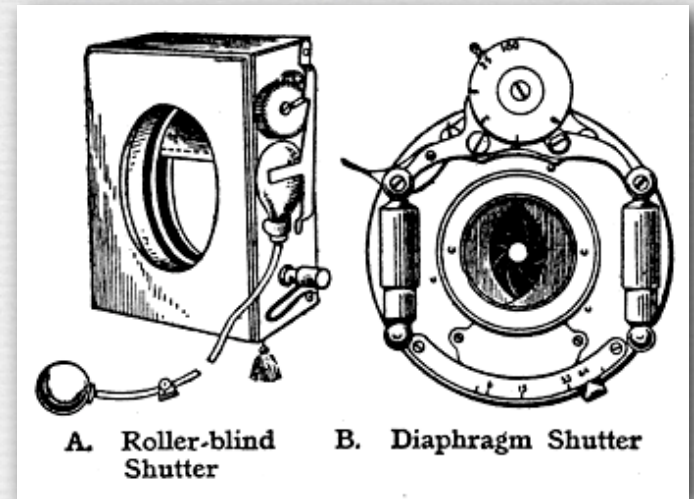
The technology improves

- ◆ 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)

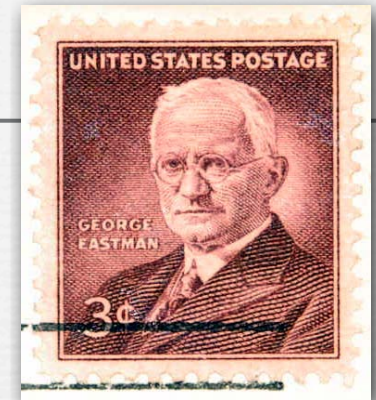


The Kodak Camera

(Newhall)



(brightbytes.com)



George Eastman
(1854-1932)

- ◆ 1888 Kodak camera No. 1
 - fixed-focus, single shutter speed (1/100 sec?)
 - 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)



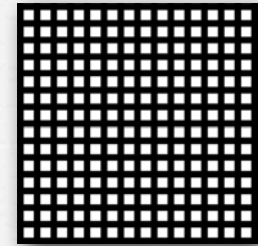
first photograph
printed using
halftoning

- ◆ 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

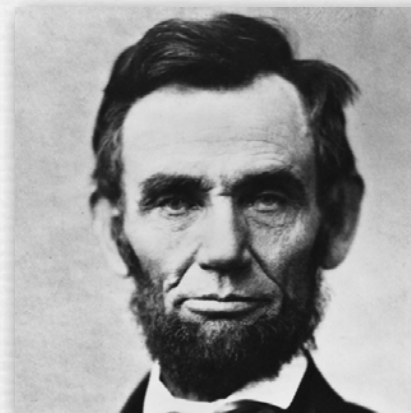
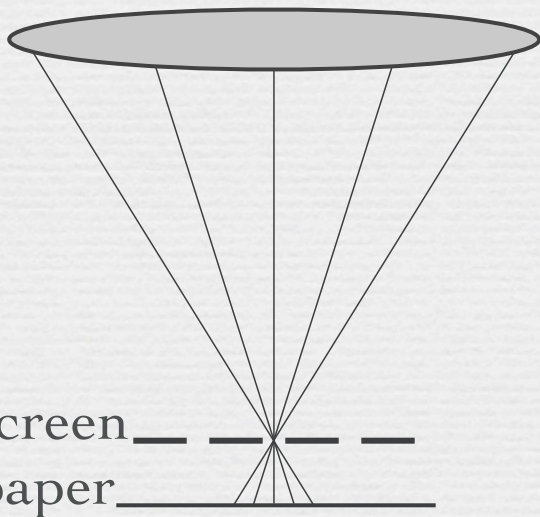
(simulated in Photoshop)

screen
(white
squares
are holes)

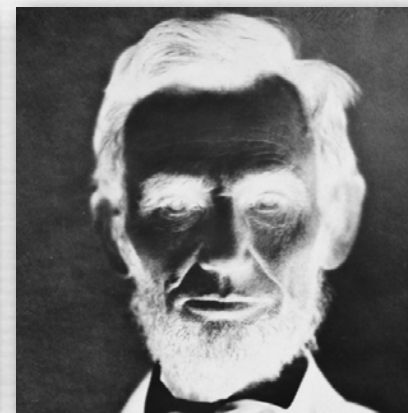


- ◆ since a printing press can only print black or white (no grays), goal is to convert tones into dots of varying size

image
focused
on screen



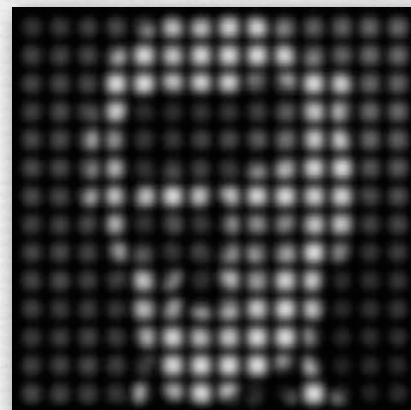
original



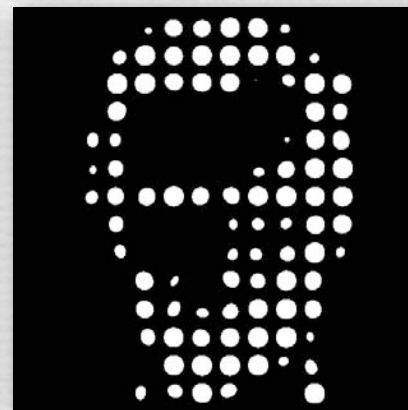
inverted



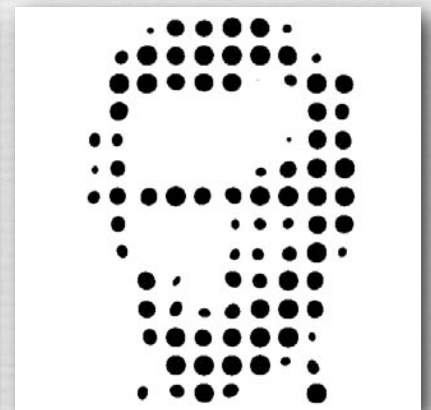
screened



blurred



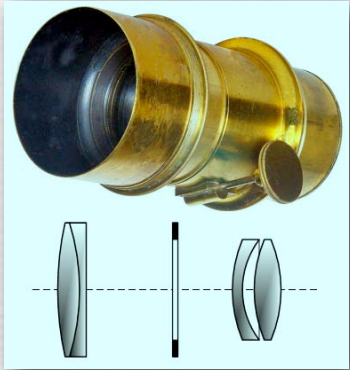
thresholded



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

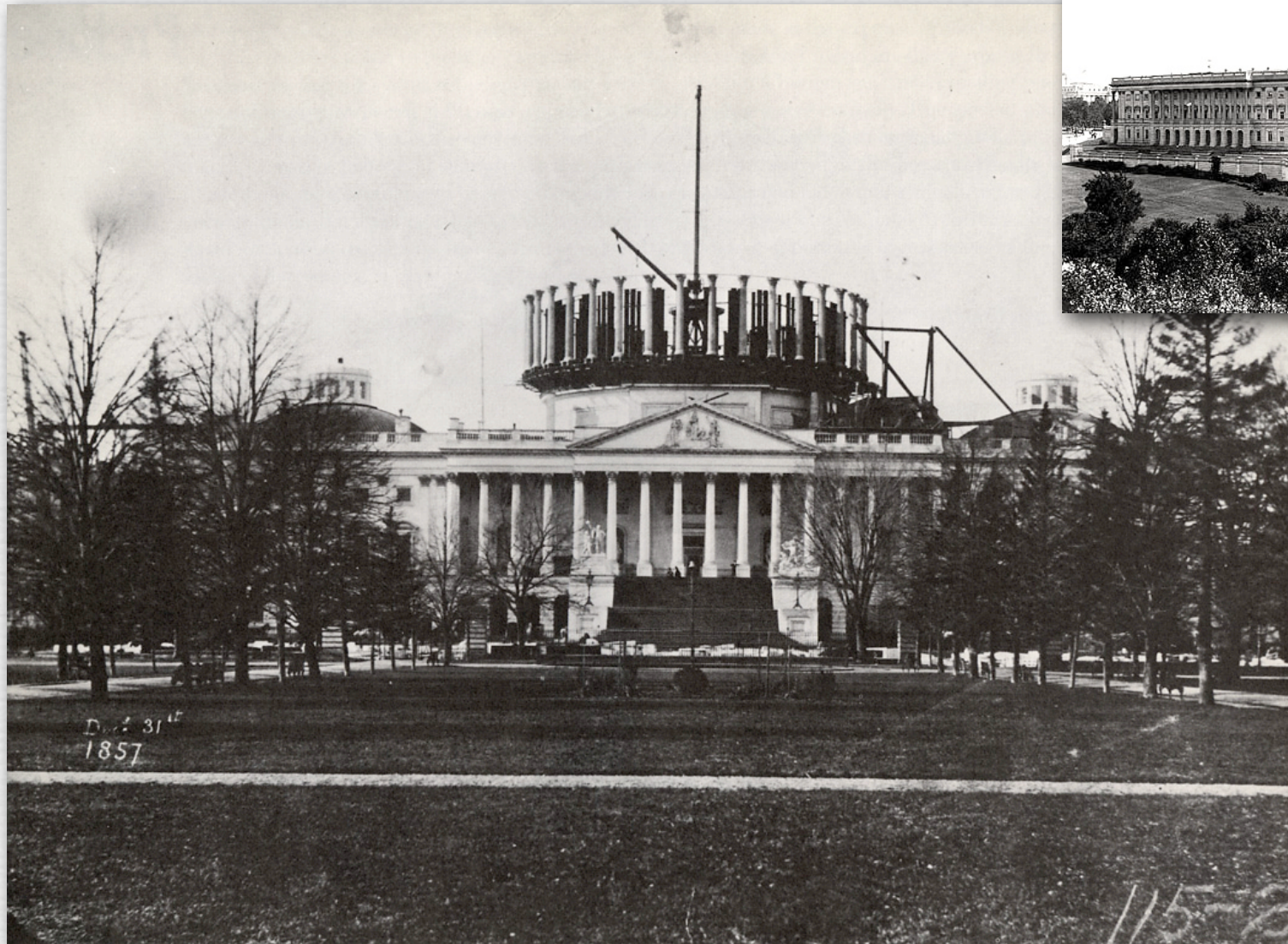
- ◆ before George Eastman, photographers were skilled, photographs were posed, and images were “crafted”
 - ◆ the Kodak camera was cheap, portable, and easy to use
 - ◆ photography became casual, spontaneous, and popular
-
- ◆ concentrated on documenting everyday life
 - ◆ word “snapshot” invented by 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

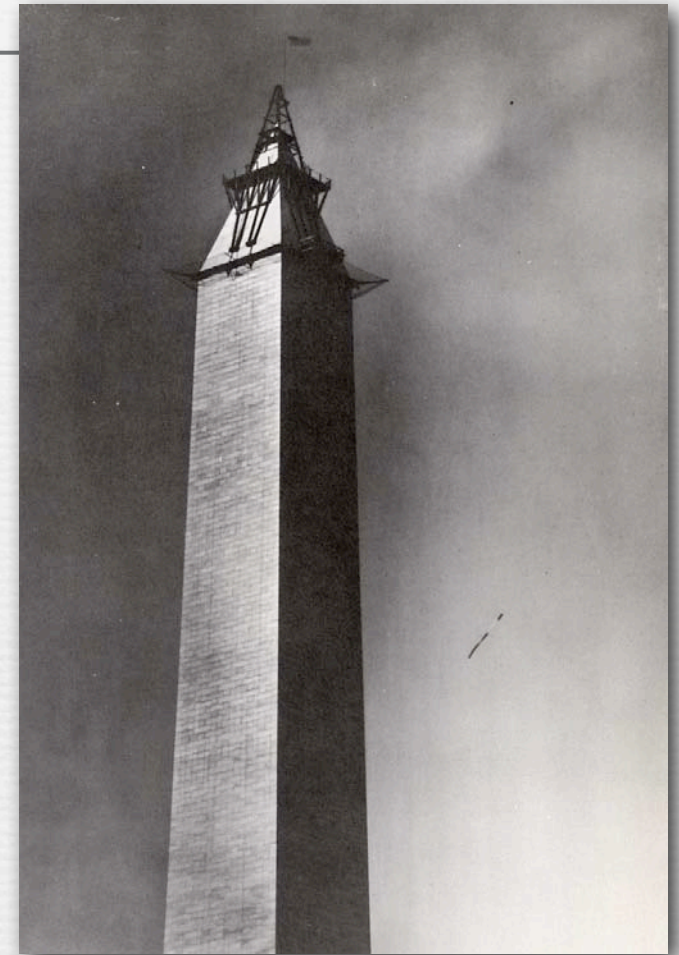
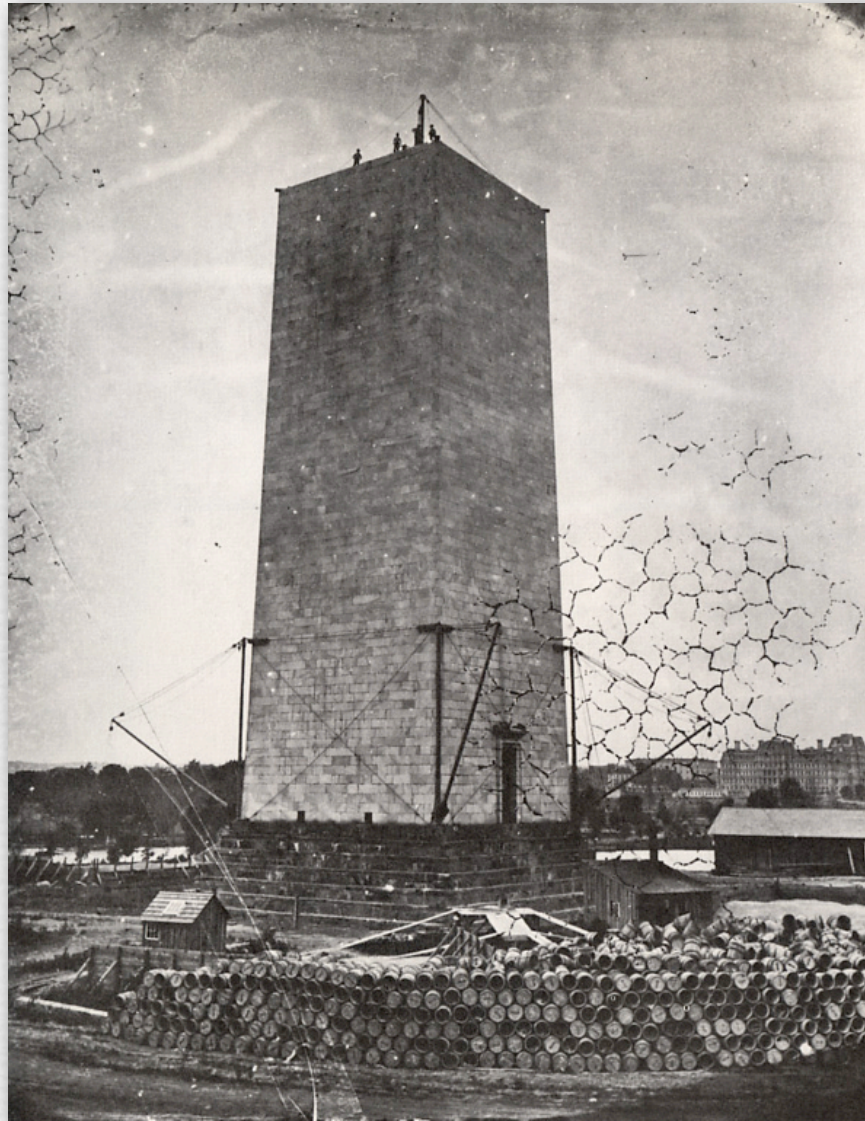


D. C. 31st
1857

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

Documenting the growth of America

(Archives)



view in
1884

Washington Monument, photographer unknown, 1876

Documenting the growth of America



(Frizot)

Railroad viaduct, Ithaca, photographer unknown, 1873

The push west

(Archives)

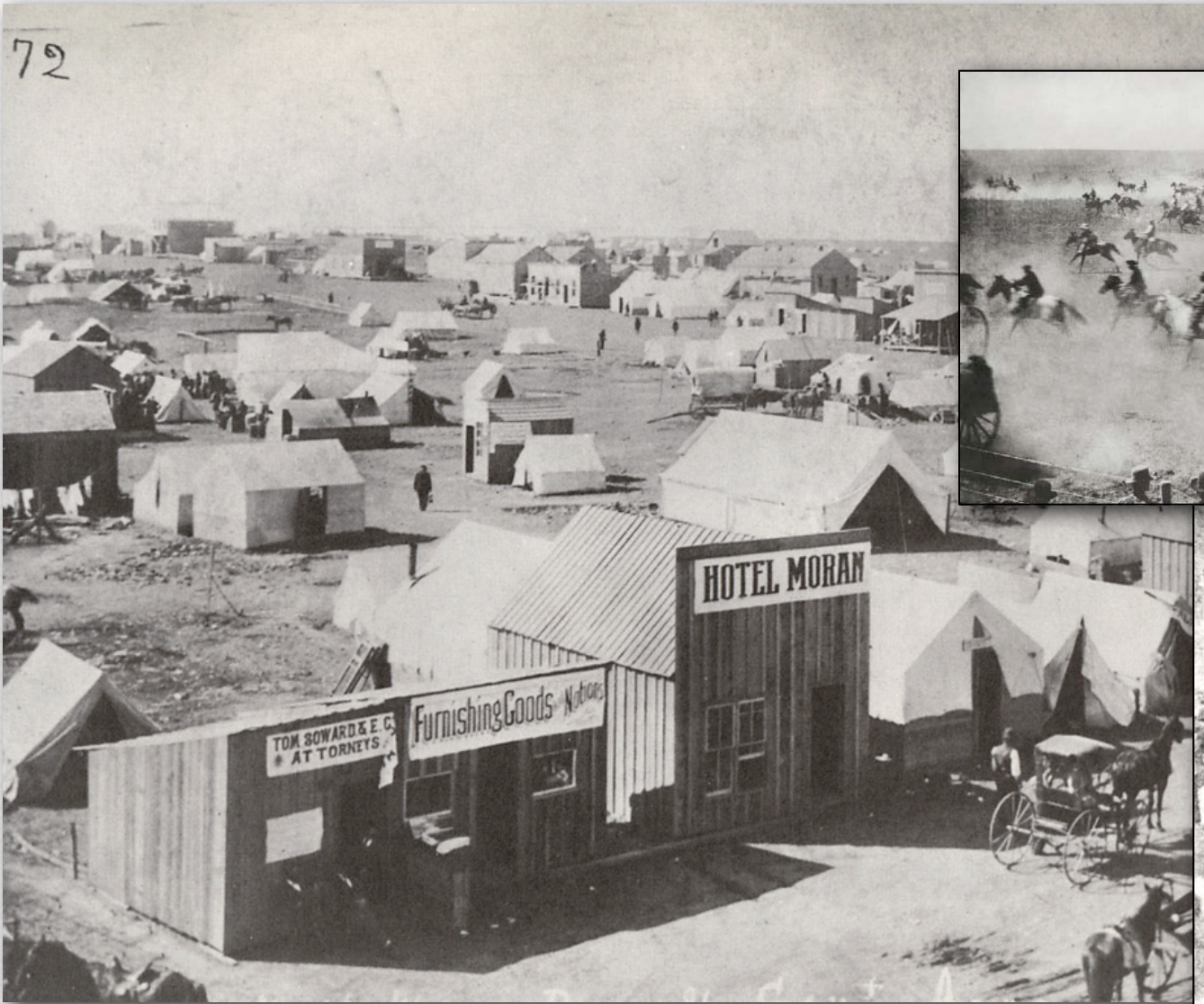
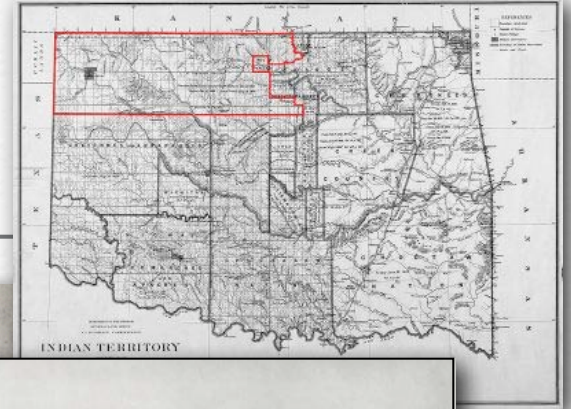


Oklahoma, photographer unknown, 1893

(wikipedia)

The end of the frontier

(Archives)



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

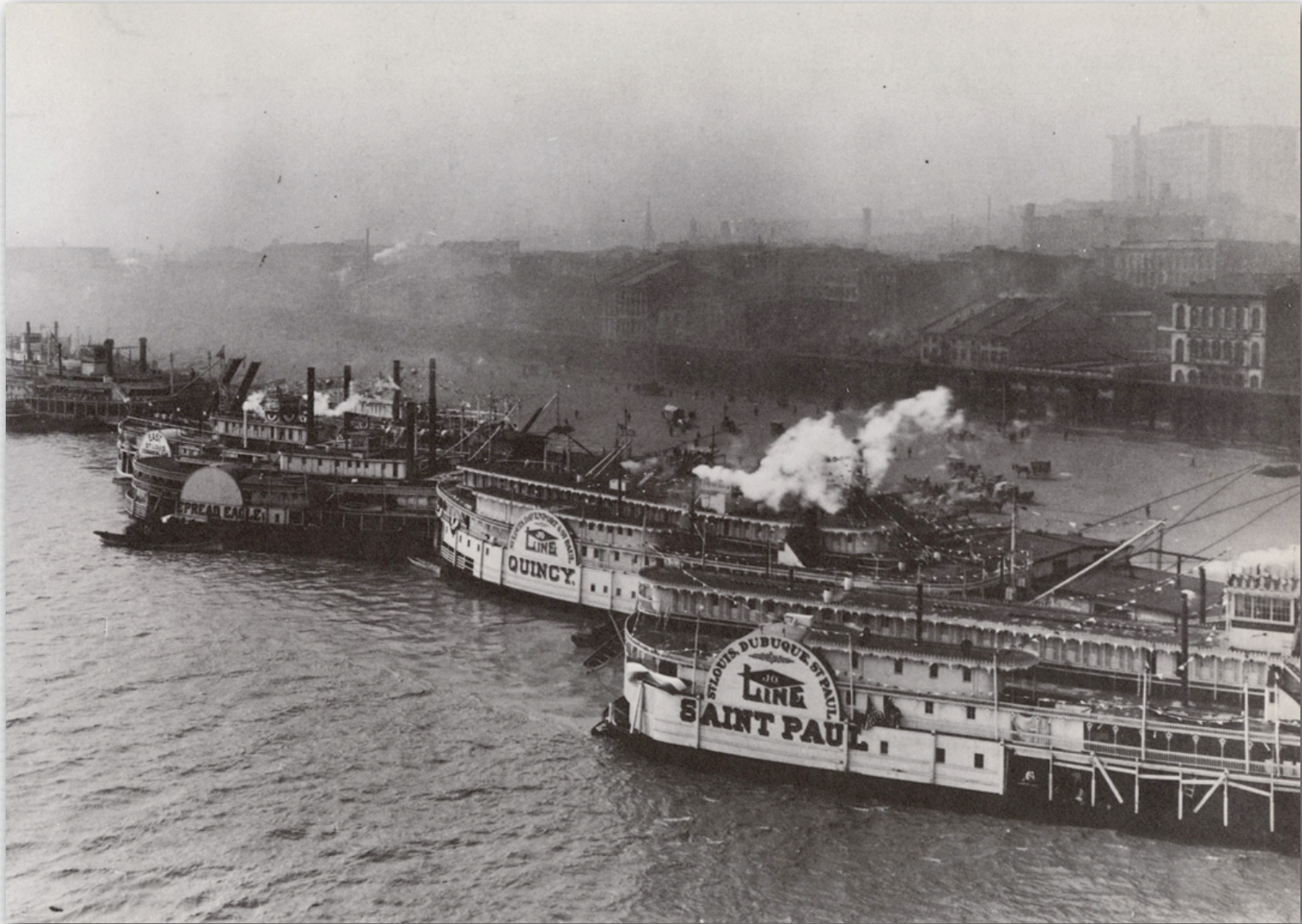
Photography as proof of achievement



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

Industry and commerce

(Archives)



Waterfront at St. Louis, photographer unknown, 1909

Gigantic undertakings



after completion
(mid-1880s)

Brooklyn Bridge, 1881

Gigantic undertakings



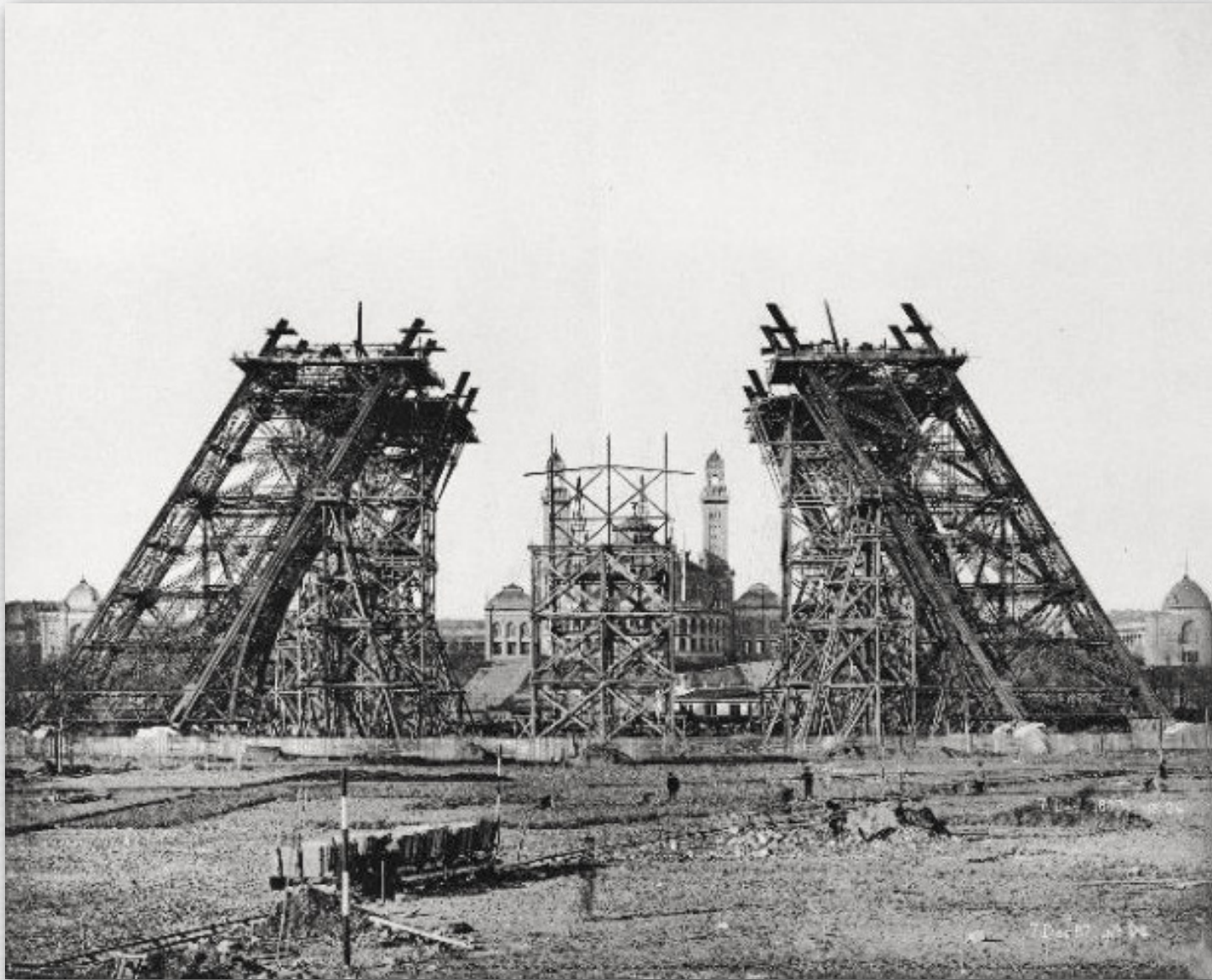
fully assembled
(in Paris)

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

Gigantic undertakings



Gigantic undertakings



Gigantic undertakings



Gigantic undertakings



Gigantic undertakings

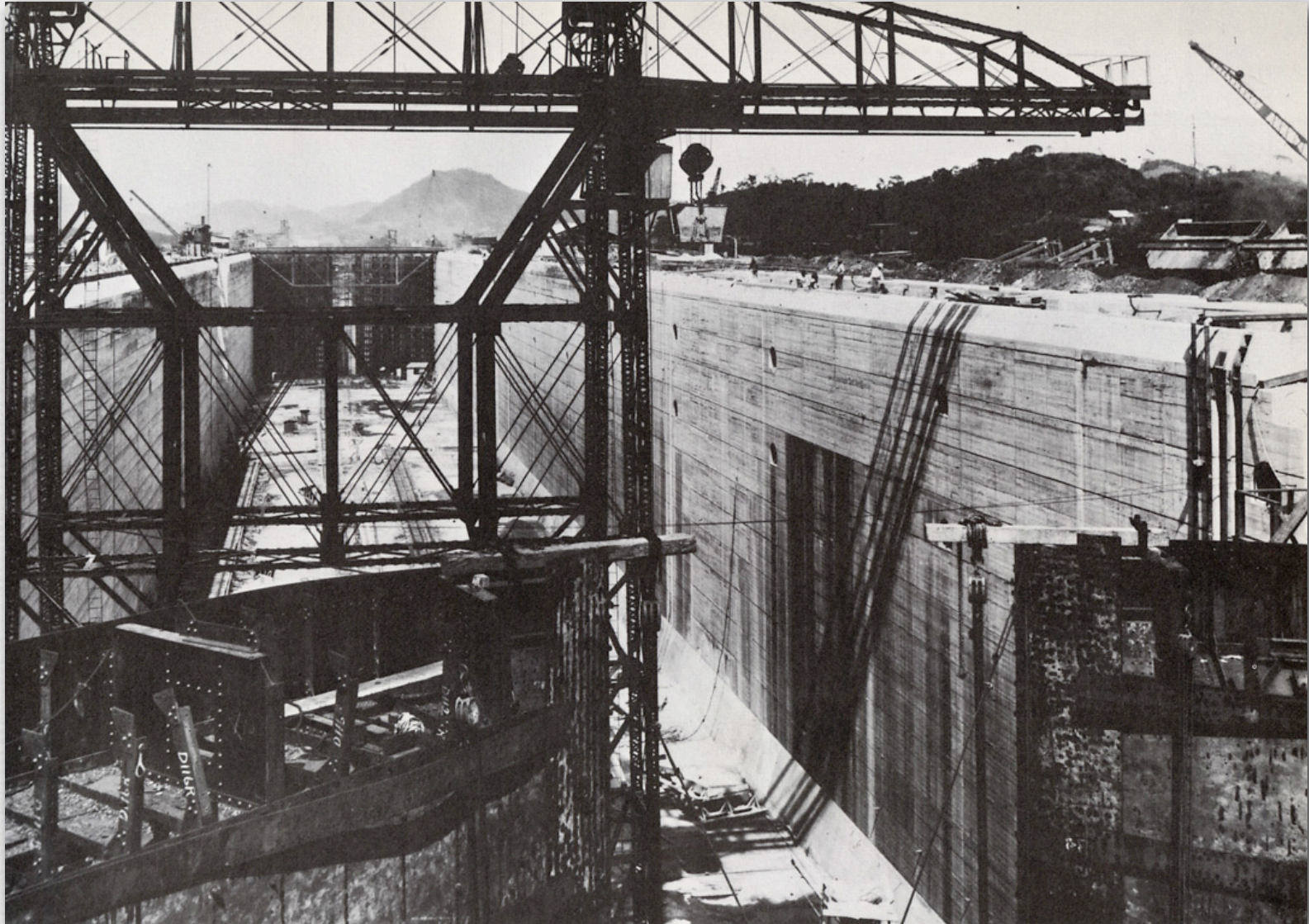


Gigantic undertakings



Gustave Eiffel,
The Eiffel Tower,
1889

Some projects were almost too gigantic



(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

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

James Wallace Black,
Boston from the Air,
1860



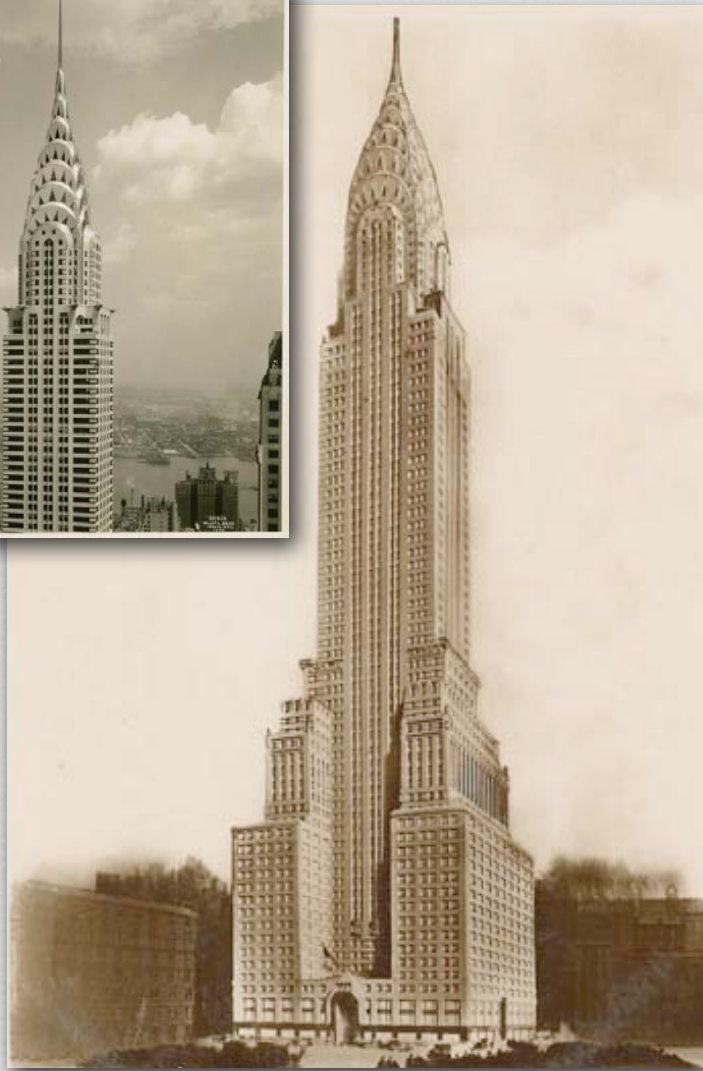
(Rosenblum)

(Rosenblum)



Berenice Abbott,
New York at Night,
1933

Tall buildings

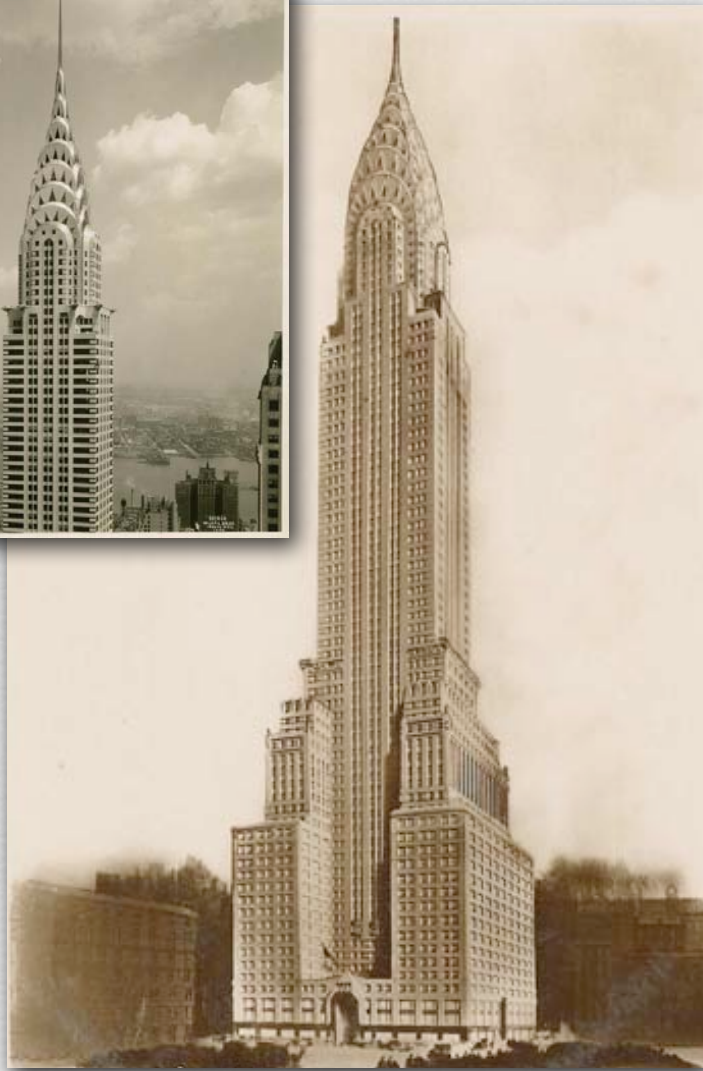


Chrysler Building, 1930
William van Alen, architect



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

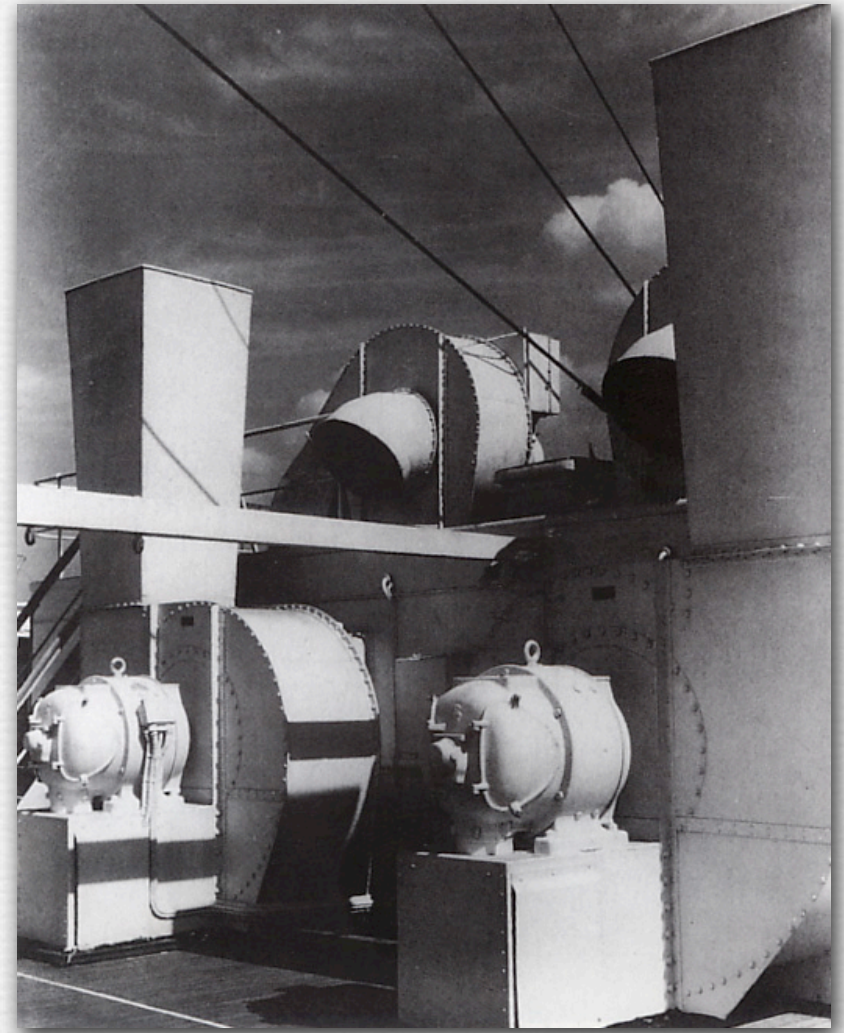
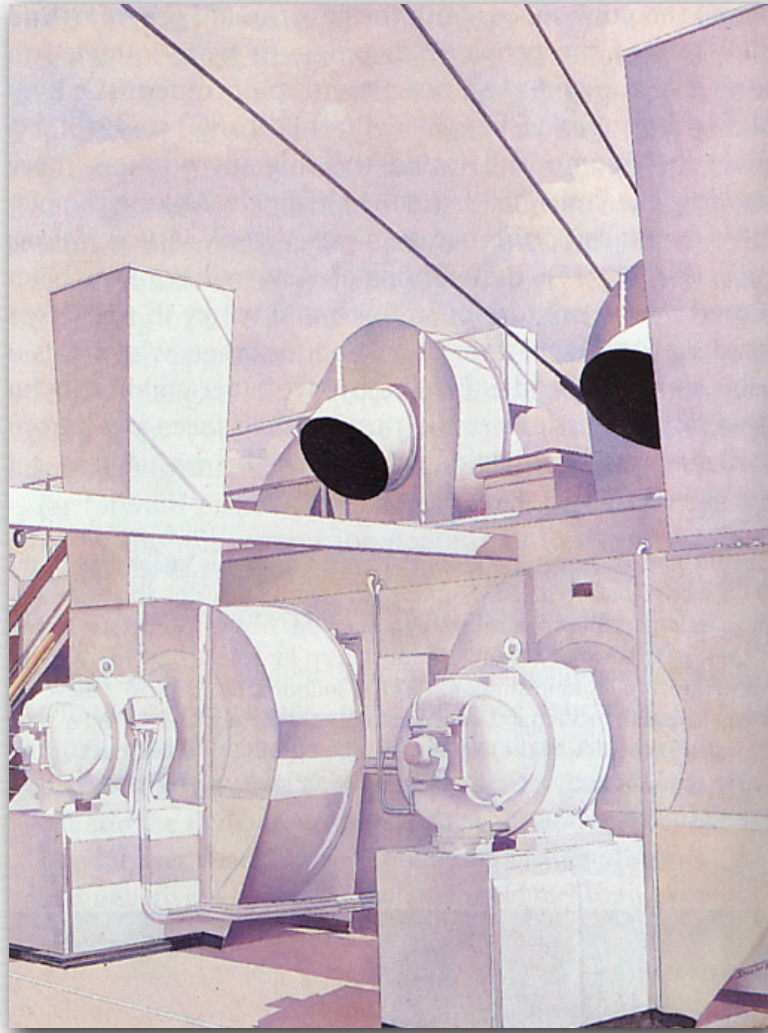


(Newhall)

Charles Sheeler,
Ford Plant, Detroit,
1927

The industrial aesthetic in photography

(Gardner)



Charles Sheeler, *The Upper Deck*, 1929

Lewis Hine,
Powerhouse Mechanic,
1925





Margaret Bourke-White, Fort Peck Dam, 1936

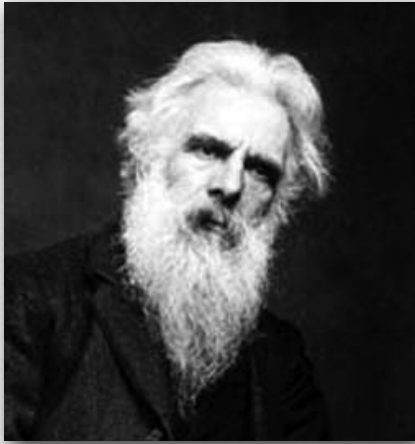


LIFE

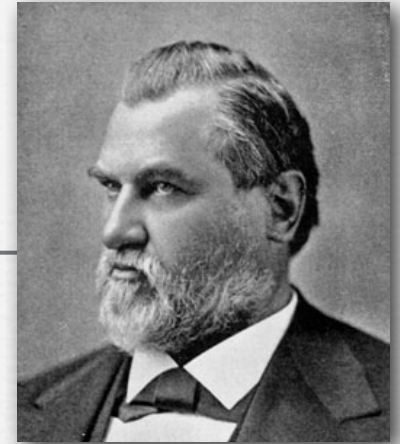
NOVEMBER 23, 1936 **10** CENTS

Scientific uses of photography

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



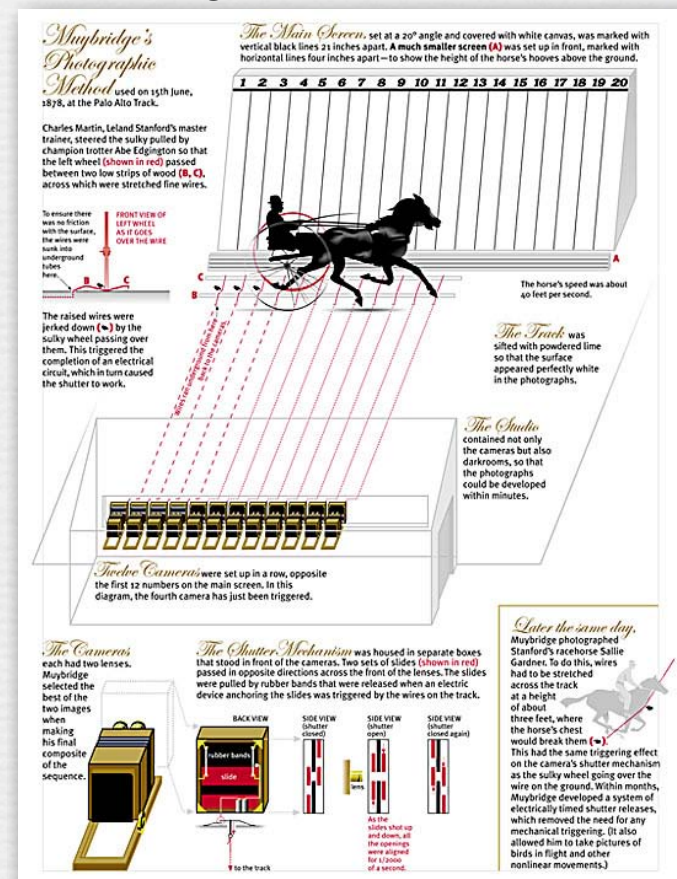
Muybridge and Stanford



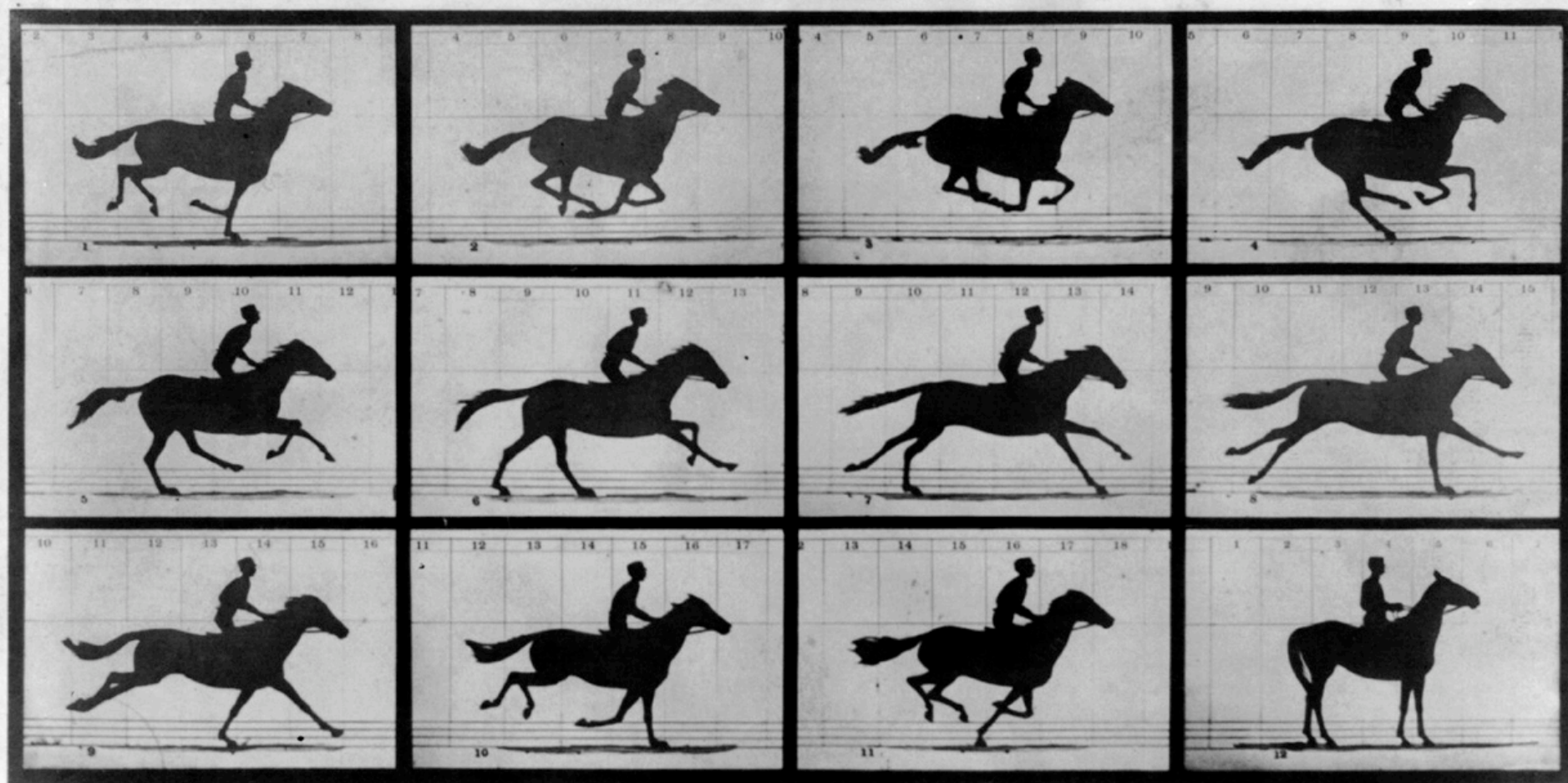
Eadweard Muybridge
(1830-1904)

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.

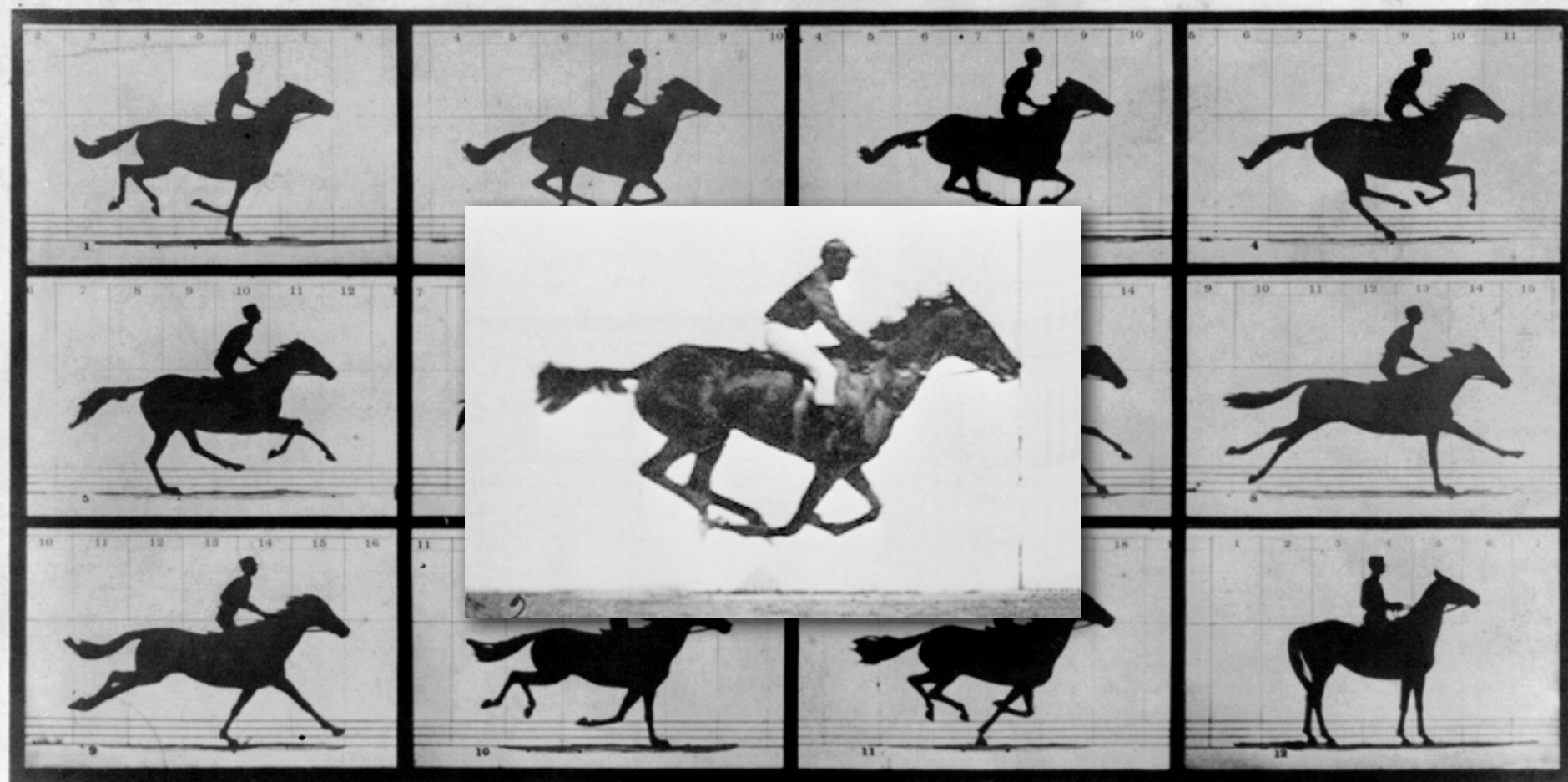
Illustrated by
MUYBRIDGE.

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.

Public demonstration, June 19, 1878



Copyright, 1878, by MUYBRIDGE.

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

THE HORSE IN MOTION.

Illustrated by
MUYBRIDGE.

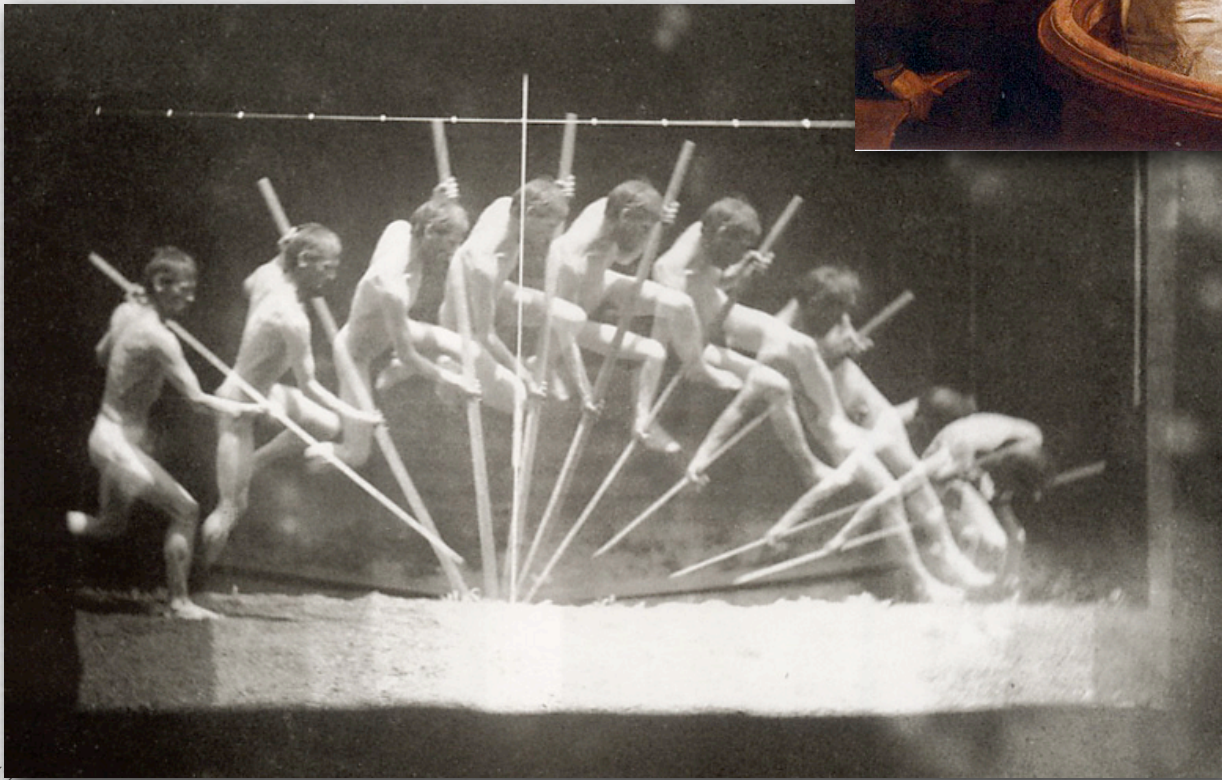
AUTOMATIC ELECTRO-PHOTOGRAPH.

"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.

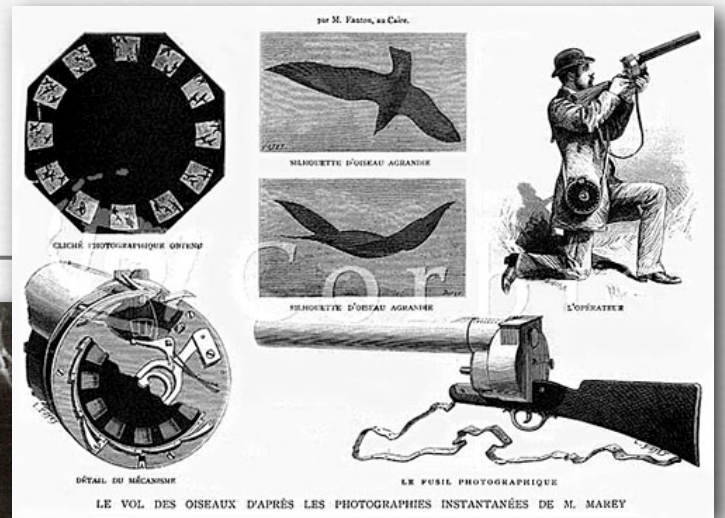
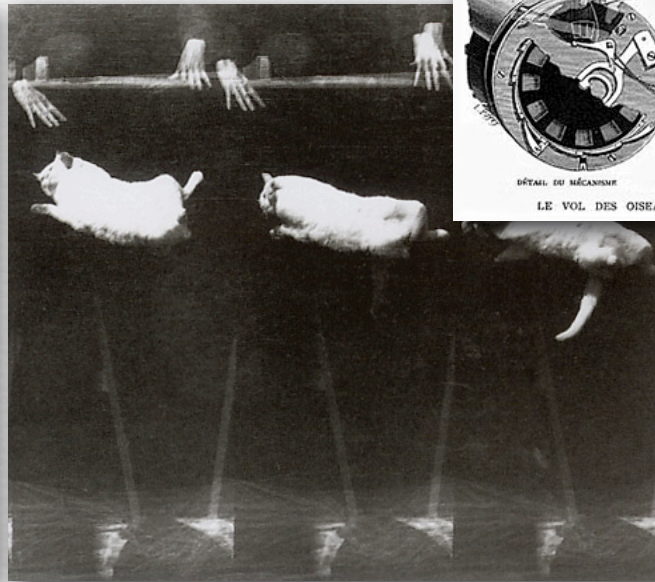
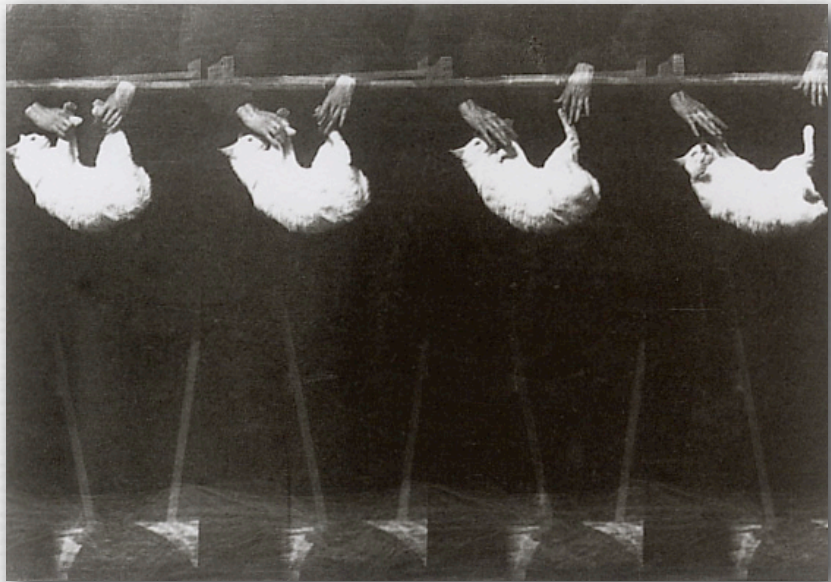
Thomas Eakins

History of a Jump, 1884

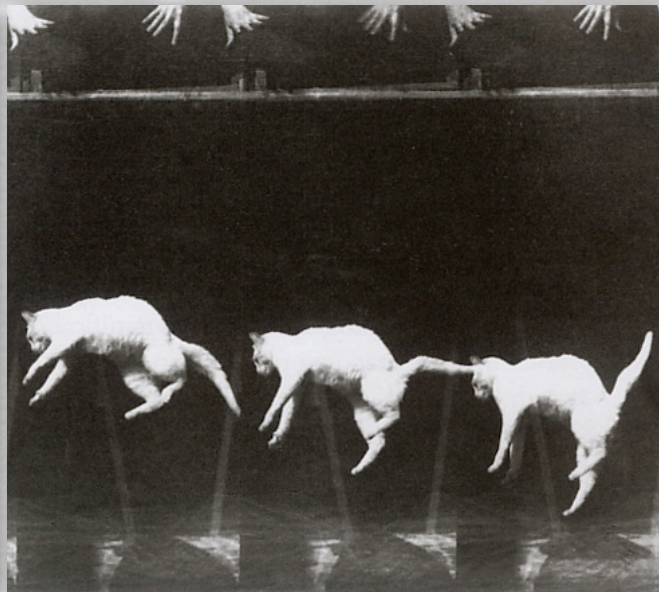
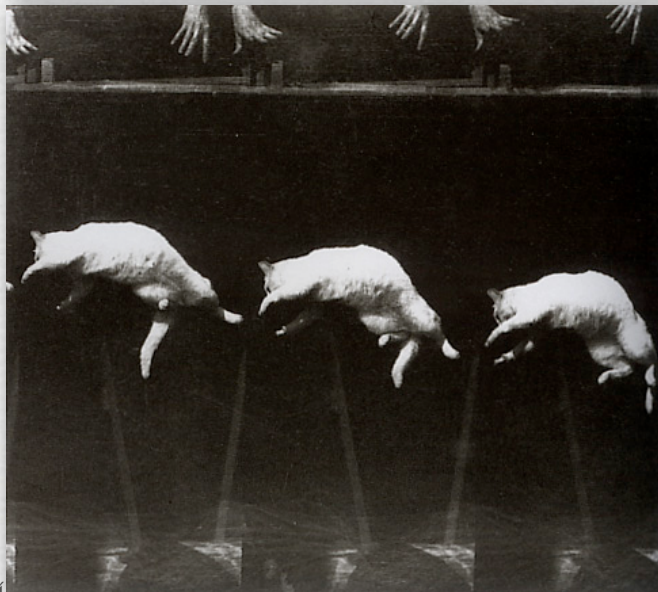


The Agnew Clinic, 1889

Etienne Jules Marey



Falling Cat,
1880s



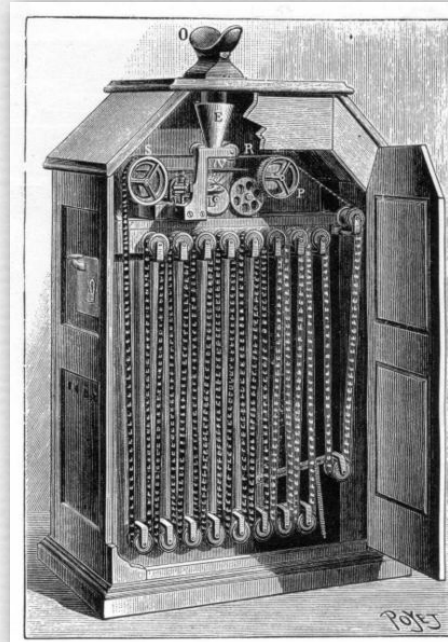
The birth of cinematography

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



The birth of cinematography

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

- ◆ Muybridge's images could be viewed using a Zoopraxiscope (invented by him)
- ◆ 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
- ◆ concurrent work by Lumière brothers in France



(wikipedia)



workers leaving the
Lumière factory

© Marc Levoy

Documenting the social scene

- ◆ 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 American brought about by industrialization
 - ◆ given impetus by late 19th 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

(Rosenblum)



Marie Cabannis,
Syrian Bedouin
Women, 1870

Showing the success of relief programs

(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

- ◆ 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

(Rosenblum)



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

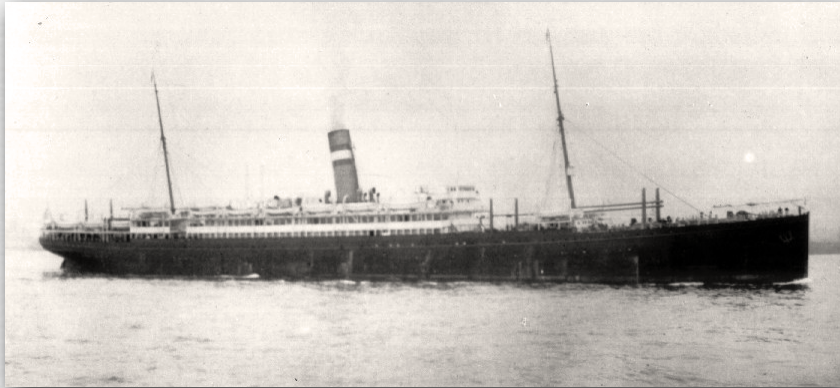
Immigrant ghettos

(Rosenblum)

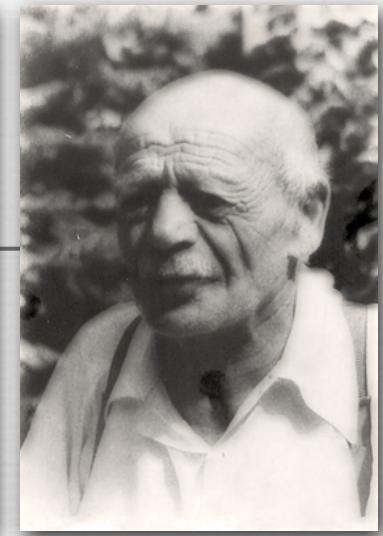


Jacob Riis,
Five Cents
Lodging, 1889

Sarah and Jacob Chesler



S.S. Rijndam



HOLLAND-AMERICA LINE.

26 List **14**

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

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* *11th March, 1906* Arriving at Port of *NEW YORK*, *MAR 27 1906*, 1906

No. on List	NAME IN FULL	Age Yrs. Mos.	Sex	Married or Single	Calling or Occupation	Alta to— Resid. Write.	Nationality (Country of which citizen or subject.)	* Race or People.	Last Residence. (Last permanent residence, Country and City or Town.)	Final Destination. (State, City, or Town.)	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? If Yes— Year or month of visit. Where?	Whether going to join a relative or friend; and if so, what relative or friend, and his name and complete address.	Ever in prison or confined in a hospital for insanity or in a lunatic asylum or in a reformatory or in a workhouse (If so, with)?	Whether a Polygamist.	Whether an Anarchist.	Whether sane by certificate of a physician or other qualified person (If so, with)?	Condition of Health, Mental and Physical.	Deformed or Crippled. Nature, length of time, and cause.
X	Melba Mearnsby	23	F	m	none	yes	Austrian	Hebrew	Magister Boston	Boston	yes	S. Mearns	—	—	husband William Mearns 3 Park Street Boston Mass	✓	no	no	no	good	—
X	Morish	2	F	s	1774-7/17/83	no	"	"	"	"	—	father	—	—	father	✓	"	"	"	"	"
X	Chaim	21	M	s	"	no	"	"	"	"	—	—	—	—	"	✓	"	"	"	"	"
X	Sara Chesler	17	F	m	"	no	"	"	Slavonic New York	New York	—	husband	—	—	husband Jacob Chesler 98 East Street New York	✓	"	"	"	"	"
X	Sarah	11	F	s	"	no	"	"	"	"	—	father	—	—	"	✓	"	"	"	"	"
X	Hubert	9	M	s	"	no	"	"	"	"	—	—	—	—	"	✓	"	"	"	"	"
X	Charles	8	M	s	"	no	"	"	"	"	—	—	—	—	"	✓	"	"	"	"	"
X	Abram	1	M	s	"	no	"	"	"	"	—	—	—	—	"	✓	"	"	"	"	"
9	Moses Goldenberg	19	M	s	2x 16 706-536	no	Austrian	"	Hasiatyn	"	—	self	—	—	cousin Charles Goldenberg 153 Rector St New York	✓	"	"	"	"	"
X	Chay Munkraub	26	M	m	"	no	Austrian	"	Alton	"	—	husband	—	—	husband Chay Munkraub 633 E. 41 st Street New York	✓	"	"	"	"	"

Child labor

(Archives)



Lewis Hine,
Breaker Boys,
1911



Lewis Hine, Carolina Cotton Mill, 1908

The Great Depression

- ◆ 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



Rural poverty

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

(Rosenblum)





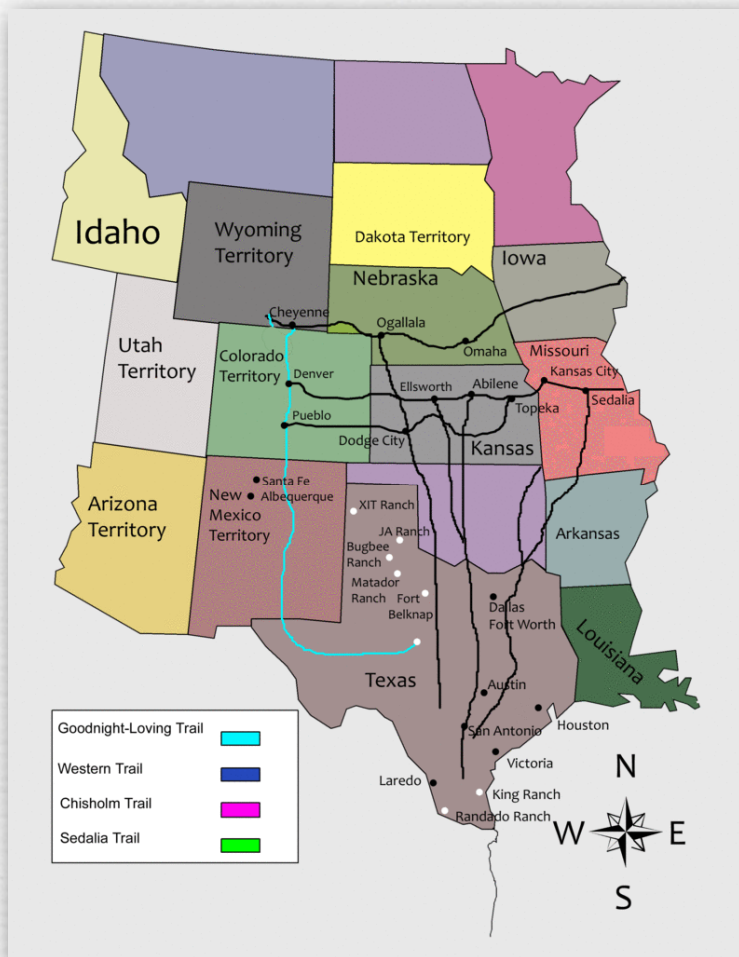
Margaret Bourke White, Louisville, Kentucky, 1937

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

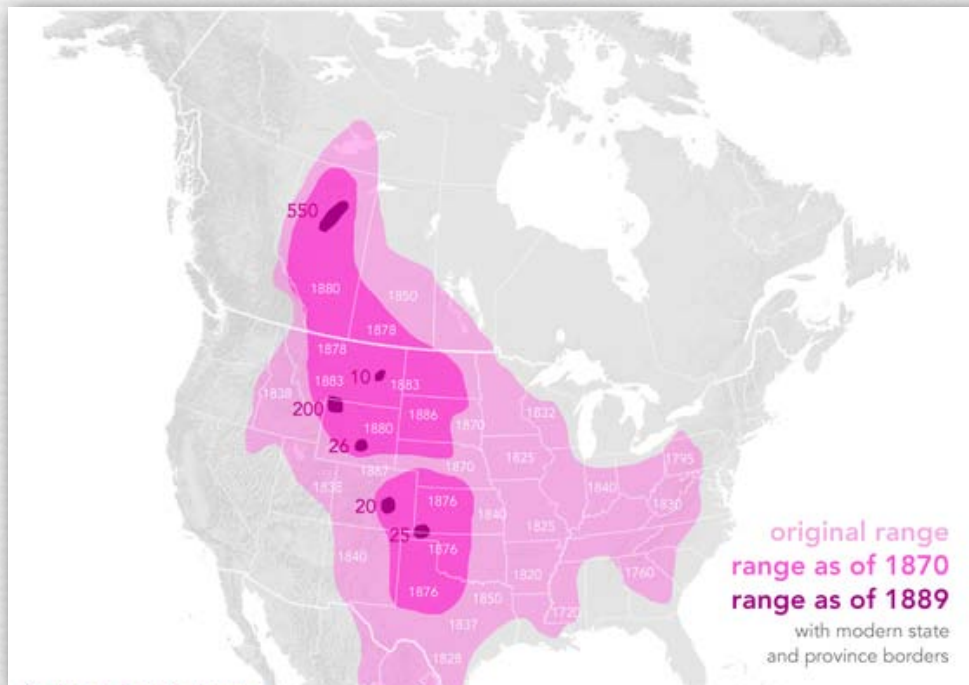
The Dust Bowl

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

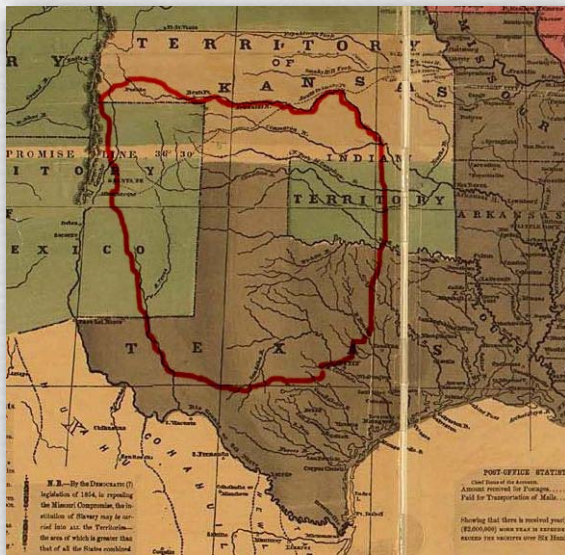
The Dust Bowl

prequel: settlement on the High Plains

- ◆ 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

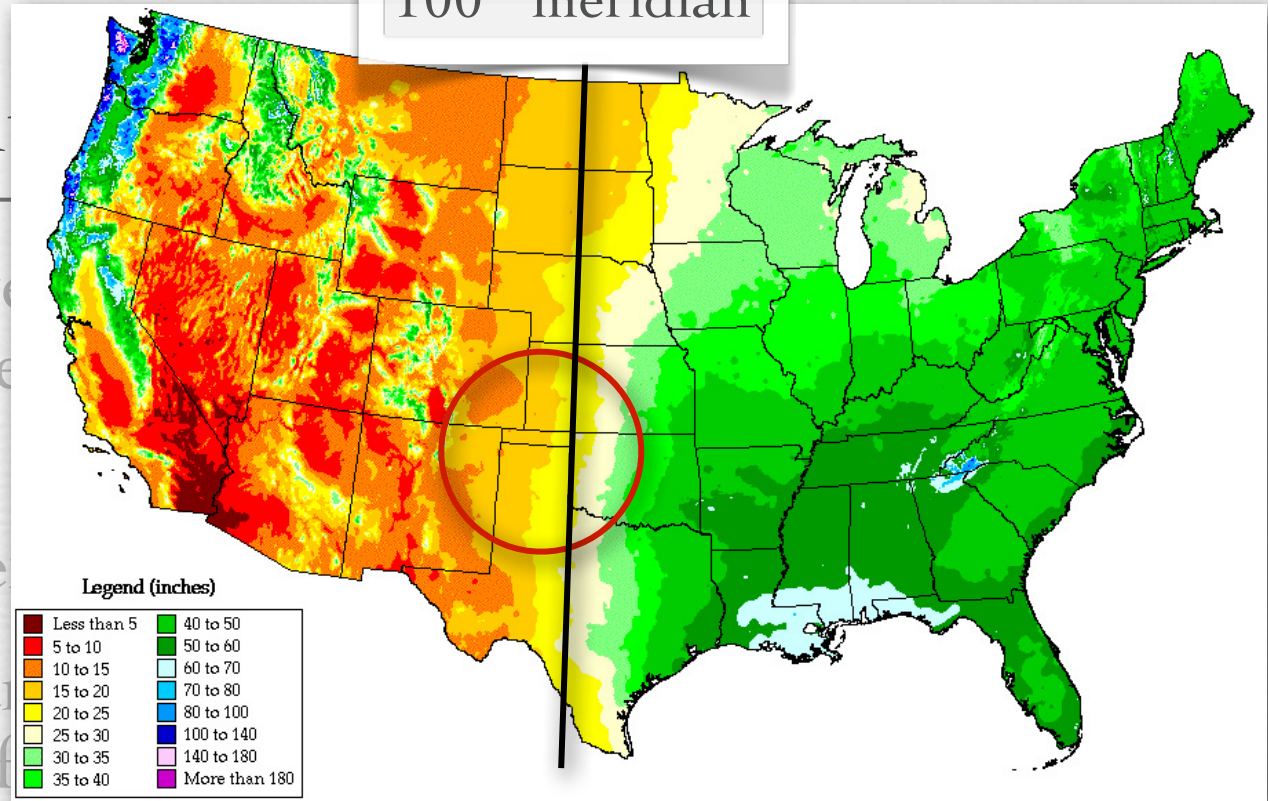
The Dust Bowl prequel: settlement

- ◆ 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”

100th meridian

(Oregon Climate Service)

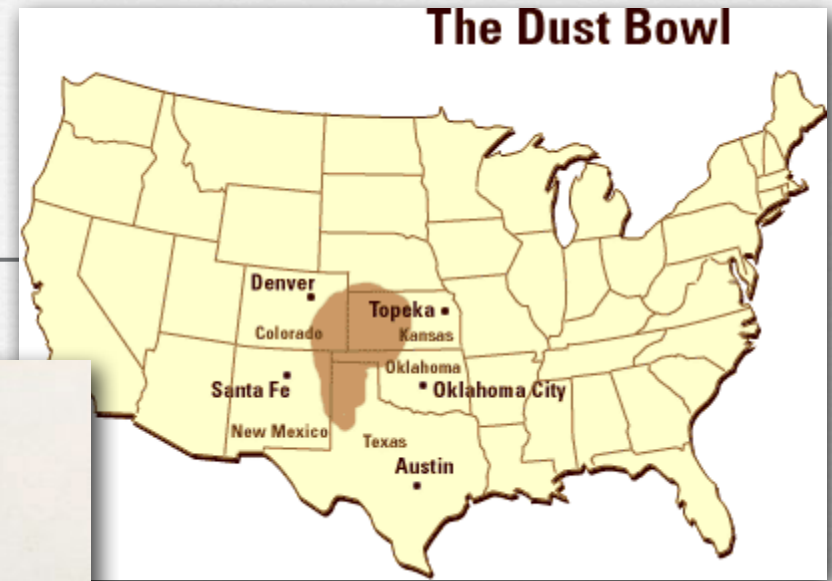


average annual rainfall, 1961-1990



sod house, 1901

The Dust Bowl



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

Dorothea Lange,
Tractored Out, 1938

The Dust Bowl



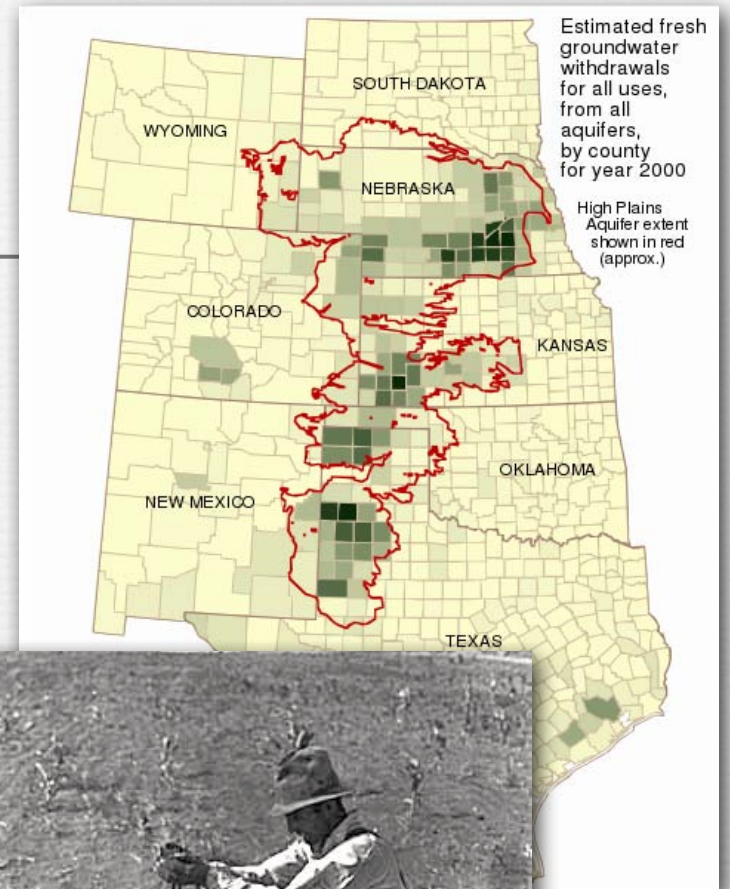
Black Sunday,
April 14, 1935

The Dust Bowl



Dodge City, Kansas
April 14, 1935

The Great American Desert



(Laurie Winslow)



Abandoned farmhouse, Kansas

(Laurie Winslow)



Winslow farm, Dalton, Kansas

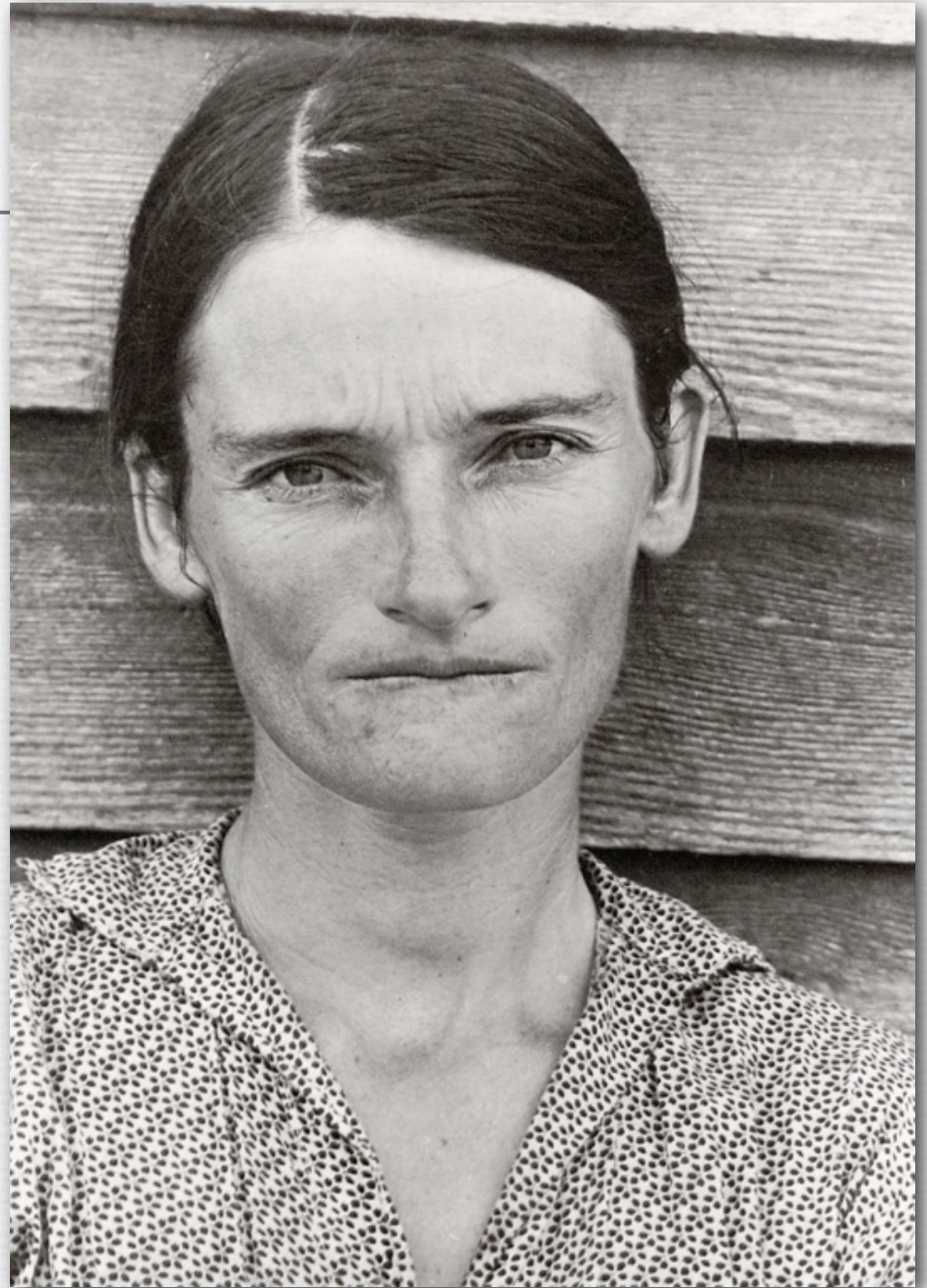
Farm Security Administration

- ◆ 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

Walker Evans,
Wife of a Cotton Sharecropper,
1936

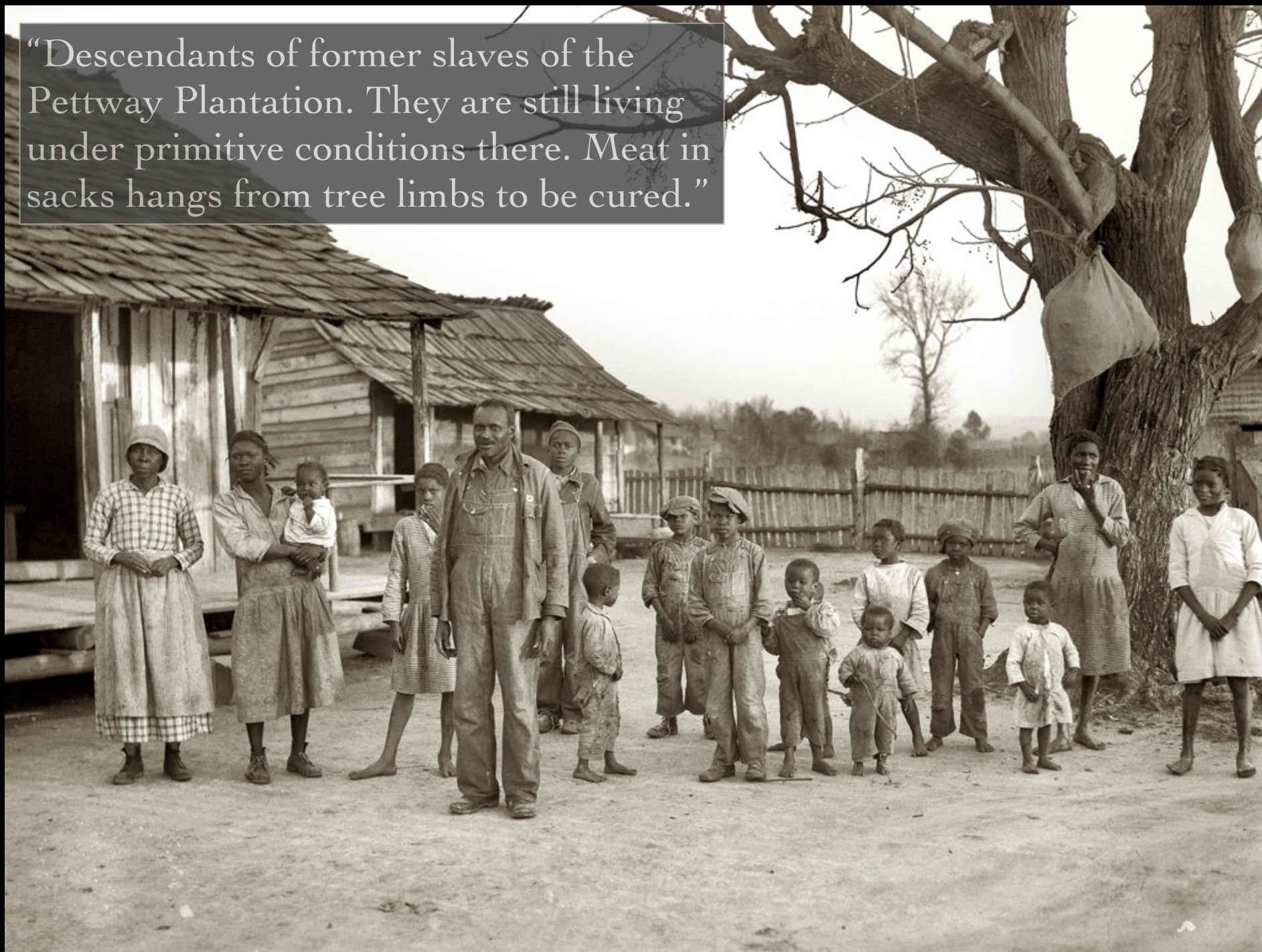
(Newhall)





Walker Evans, Garage in Atlanta, Georgia, 1936

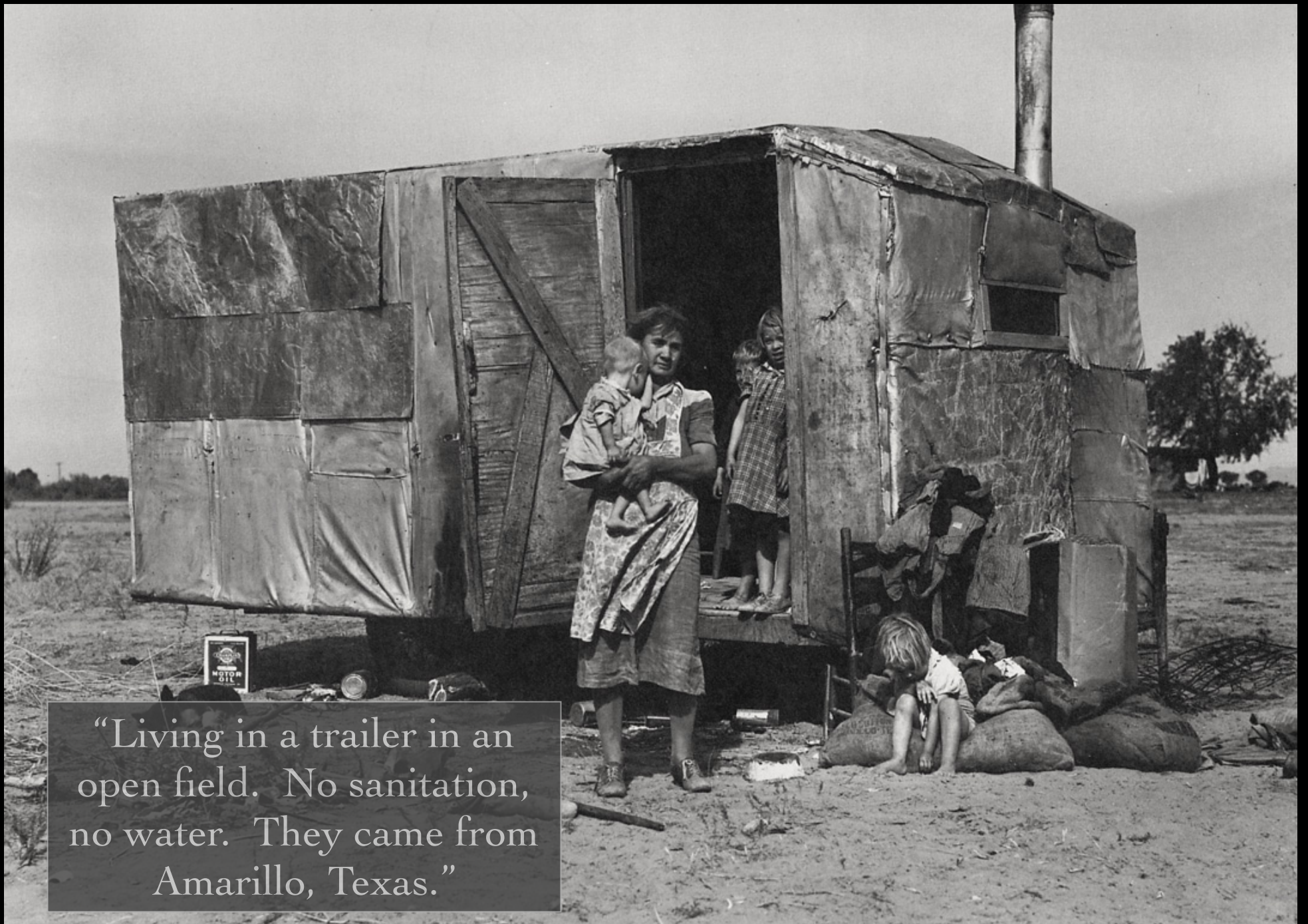
“Descendants of former slaves of the Pettway Plantation. They are still living under primitive conditions there. Meat in sacks hangs from tree limbs to be cured.”



Arthur Rothstein, Gee's Bend, Alabama, 1937



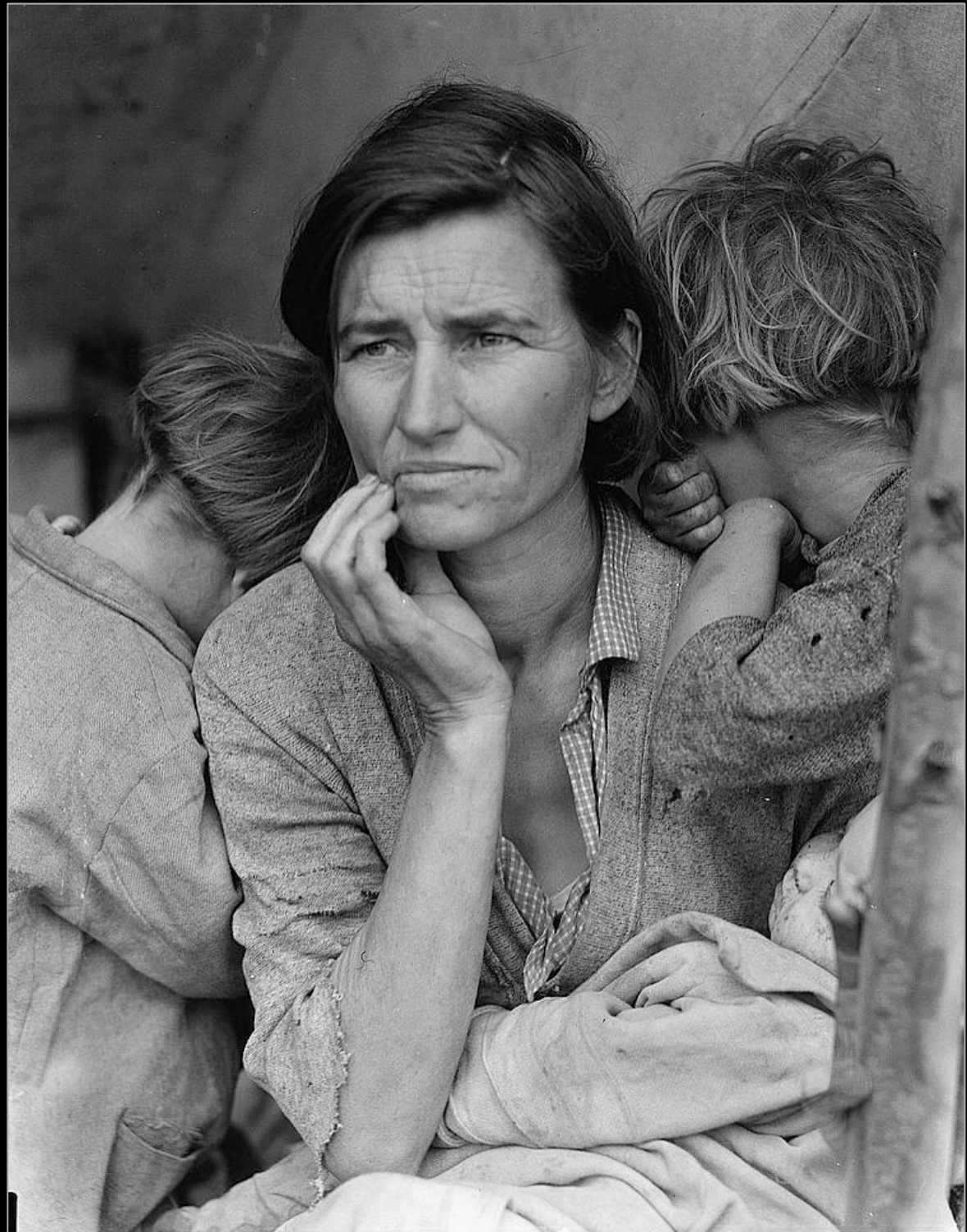
Arthur Rothstein,
Dust Storm, 1937



“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 Family,
1936

Slide credits

◆ Fredo Durand

- ◆ Newhall, B., *The History of Photography*, Little, Brown & Co., 1982.
- ◆ Rosenblum, N., *A World History of Photography* (4th ed.), Abbeville Press, 2007.
- ◆ National Archives, *The American Image: Photographs from the National Archives, 1860-1960*, Pantheon Books, 1979.
- ◆ Frizot, M., ed., *A New History of Photography*, Könemann, 1998.
- ◆ Bonnett, W., *A Pacific Legacy: A Century of Maritime Photography 1850-1950*, Chronicle Books, 1991.
- ◆ Egan, T., *The Worst Hard Time*, Houghton-Mifflin, 2006.