

# Influential Cars of the 20<sup>Th</sup> Century

## Session I

Jim Rauf

# Influential Cars of the 20<sup>th</sup> Century

- “Automobiles” originated in Europe
- 1886”First automobile” - **Benz Patent Motor Car**
  - First high speed single cylinder four stroke engine
  - Not a converted carriage but an independent , integral design
  - **Karl Benz’s** patent is considered the “birth certificate” of the automobile



# Influential Cars of the 20<sup>th</sup> Century

- March 8, 1886, **Gotlieb Daimler** took a horse drawn carriage and adapted it so that it could hold his engine
- In the process, he ended up designing the world's first four-wheeled automobile



## Influential Cars of the 20<sup>th</sup> Century

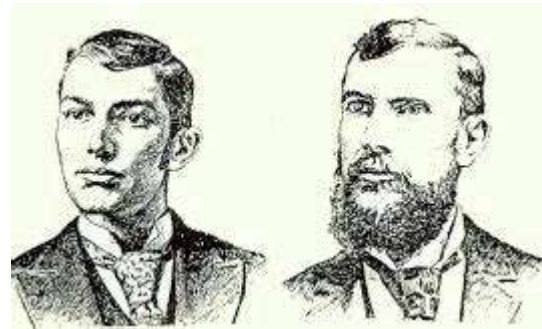
- 1887 American **William Morrison** produced the first electric automobile
  - It was not successful
- 1890 Morrison built a second more successful electric automobile
- It was based on a carriage built for his automobile by a carriage maker
- A total of about 12 Morrison Electric cars were made



- Morrison's electric car had a range of about 100 miles
- At speed from six to twelve miles per hour

# Influential Cars of the 20<sup>th</sup> Century

- Most of the early automobiles in the U.S. were made by “tinkerers” inspired by European efforts
- The 1896 **Duryea** was the first U.S. “production” automobile
- Built by the **Duryea brothers**
- 13 cars of same design built



Frank and Charles Duryea





# Influential Cars of the 20<sup>th</sup> Century

- **Henry Ford** was inspired by **Duryea's** automobile and set out to build a car
- He worked on his "car" in his home workshop after his 10 hour a day job as an engineer at Edison Illuminating Co
- He made almost every part by hand
- June 4, 1896 Henry Ford at the age of thirty-two, completed his first experimental automobile
- He called the car the "**Quadricycle**," because it ran on four bicycle tires
- The success of the little vehicle fueled Ford's automobile ambitions, leading ultimately to the founding of Ford Motor Company in 1903



# Influential Cars of the 20<sup>th</sup> Century

## 1896 Ford Quadricycle

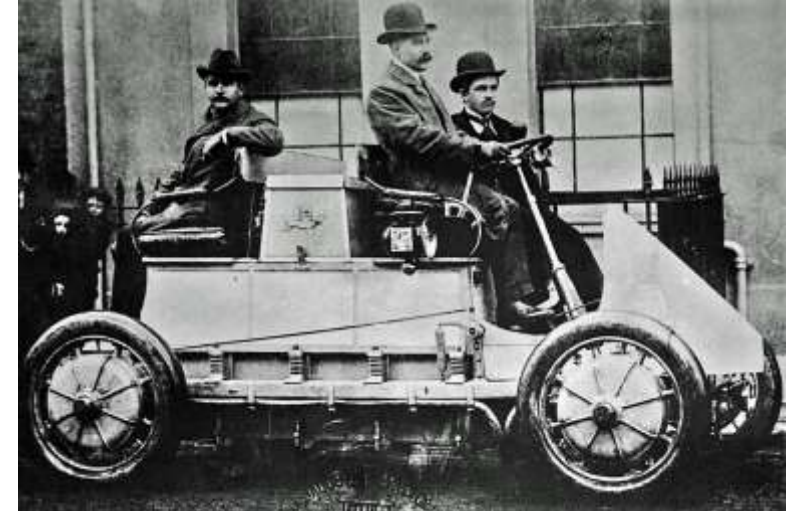
- Tiller steering.  
2 cylinder, 4 cycle gasoline engine
  - Bore:2.5"
  - Stroke:6.0"
- Power transmitted from motor to rear wheels by chain
- Gasoline tank:3 gallons
- Transmission:2 speeds (10 and 20 m.p.h.)
  - No reverse
- To stop, clutch had to be released and foot brake applied.
- Weight of vehicle: 500 lbs
- Length: 78.5 "
- Width 45.5 "
- Wheelbase: 49"
- Diameter of wheels: 26"
- Tread: 38.5



1896 Ford Quadricycle

# Influential Cars of the 20<sup>th</sup> Century

- 1900 **Lohner–Porsche** Mixed Hybrid vehicle was developed by **Ferdinand Porsche** at the Austrian **Lohner -Werke**
- First prototypes were two-wheel drive, battery-powered electric vehicles with two front-wheel hub-mounted motors
- A later version was a series hybrid using hub-mounted electric motors in each wheel powered by batteries and a gasoline-engine generator
- The **Lohner-Porsche Electromobile**
  - The first front wheel drive vehicle
  - The first all wheel drive vehicle
  - The first hybrid electric vehicle



	<b>Lohner–Porsche Electromobile</b>	
Production	1900–1905	
Designer	Ferdinand Porsche	
Class	Horseless Carriage	
Body style	2-seater convertible	
	4-seater	
Engine	10–14 hp Two/four hub-mounted electric motors, driven by battery and/or petrol engine	
	driven by gasoline engine	
Curb weight	3,307 lb	



# Influential Cars of the 20<sup>th</sup> Century

- Fire destroyed **Olds Motor Works** factory in Detroit
  - “**Curved Dash**” roadster was only model saved forcing **Olds** to manufacture this model
  - 425 “**Curved Dash**” **Oldsmobile** were manufactured in 1901
- January 10, 1901 the **Texas Spindletop** oil field came in
  - Crude oil dropped below 5 cents/barrel
- Cheap oil/gasoline and production of gasoline powered **Oldsmobile** help gasoline power take lead over from **steam** and **electric power**
  - Range
    - Energy density
  - Ability to refuel quickly
  - Get underway quickly



- “**Curved Dash Olds**” runabout
- Single cylinder engine 95.4 cubic inches ran at 500 rpm
- “One chug per telegraph pole”
- The first mass produced automobile in the world
- Sale price of~ \$650

# Influential Cars of the 20<sup>th</sup> Century

- **Ransom E. Olds** of the **Olds Motor Vehicle Company** created the **assembly line** to build the **Oldsmobile Curved Dash** car
- **Olds** couldn't manufacture enough vehicles to meet demand, so he invented the assembly line to speed up production
- The assembly line allowed **Olds** to scale from building 425 cars in 1901 to 2,500 a year later
- By 1904, he was building and selling 5,000 cars a year



## Influential Cars of the 20<sup>th</sup> Century

# The PASSING of the HORSE

The silent horse power of this runabout is measurable, dependable and spontaneous—the horse-power generated by supplies of hay and oats is variable, uncertain and irresponsible. There is “Nothing to watch but the road” when you drive

## The Oldsmobile

*The Best Thing on Wheels*

You see it everywhere. Doctors, Lawyers, and Merchants find the Oldsmobile the most practical vehicle for business purposes. Ladies and children can readily understand its mechanism. Unvarying reliability proves it is built to run *and does it*

**Price \$650.00**

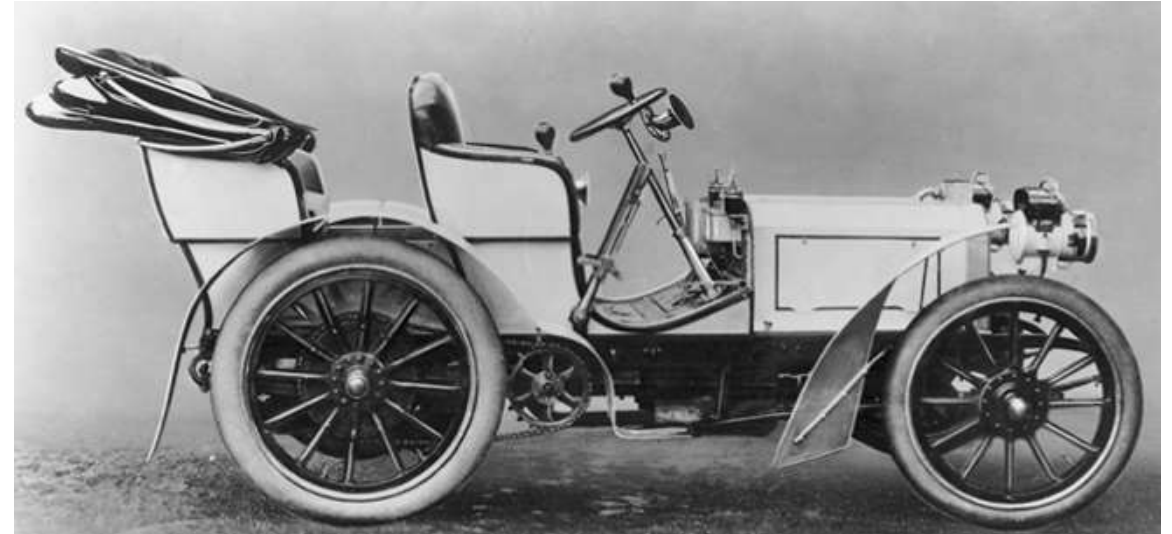
Selling Agencies are established in all the larger cities where you will be gladly accorded the privilege of trying the Oldsmobile on the road. Write for illustrated book to Dept. 17

**Olds Motor Works**  
Detroit, Mich.  
FACTORIES, DETROIT AND LANSING

The first mass produced automobile in the world

# Influential Cars of the 20<sup>th</sup> Century

- 1901 **Daimler** produced the first **Mercedes** automobile
  - Ordered by **Emil Jellinek** (part owner of **Daimler**)
  - Named car after his daughter **Mercedes**
  - Advanced technical features for its time
  - Set standard for future automobiles
    - Steering wheel
    - Engine in front
    - Rear wheel drive
    - Multi (4) speed gearbox



- **Mercedes 35 HP Phaeton**
- 4-door phaeton body type
- Rear-wheel drive
- Inline-4 engine cylinders cast in pairs
- Displacement 361.5 cui
- Power 35 hp
- Wheelbase: 91.5 in
- Curb weight: 2645 lbs
- Top speed 45 mph+



# Influential Cars of the 20<sup>th</sup> Century

- **Henry Leland** , one of the most influential players in automotive history, founded both **Cadillac** and **Lincoln**
- His engineering prowess brought precision machining and parts interchangeability to automobiles (1903 Cadillac Dewar Trophy)
- He also brought us the first fully enclosed car
  - **Fisher Body** built the 1905 Osceola as rolling proof of concept
- For 1906, **Cadillac** offered the first fully-enclosed production car built as a made-to-order option
- The **Model H** coupe cost \$3000
  - The brass lamps were not included

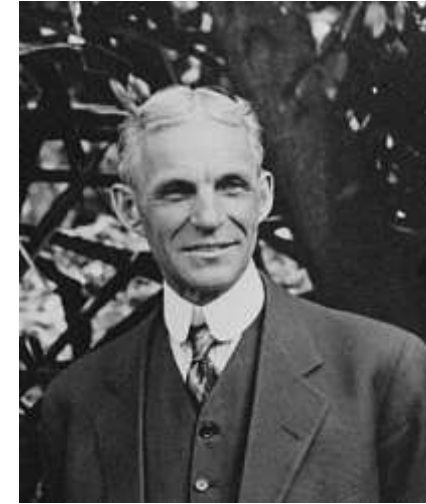


The closed body was so popular that **Cadillac** made it standard in 1910



# Influential Cars of the 20<sup>th</sup> Century

- **Henry Ford**-born 1863, raised on farm near Dearborn ,Michigan
- Mechanically inclined, handyman for areas farmers, hated farming
- Worked on all types of machinery as qualified mechanic
- Became engineer at **Detroit Edison Illuminating Company**
  - 1896 Built his “**Quadricycle**”
- By 1899 had built three cars-became chief engineer at **Detroit Automobile Company**-company failed within a year
- 1901 **Ford** organized **Ford Automobile Company**-failed in a year
  - **Ford** more interested in race cars



# Influential Cars of the 20<sup>th</sup> Century

- June 16, 1903 **Ford Motor Company** organized
- Company brought in talented machinists as well as financing
- First car was 1903 **Ford Model A** –a successful product
- In order to get publicity for new company in 1904 **Ford** drove the “999” racer to speed of 90 mph on frozen Lake St Clair



- **Ford** produced several models from 1903 to 1907
  - 1903 **Model A**-8 hp two cylinder 100.5 cu in engine runabout \$850
  - 1904 **Model B**-four cylinder touring car \$2000-too costly
    - Ford sells 1695 cars fourth in sales
  - 1904 **Model C**- two cylinder 10 hp open car \$950
  - 1906-08 **Model K**-six cylinder 40 hp (60 mph) \$2500
  - 1906 **Model N**-four cylinder 15 hp
    - Ford sells 8,729 cars first in sales
  - 1907 **Model R** and **S**- four cylinder 15 hp \$700
    - Ford sells 14,887 cars first in sales

# Influential Cars of the 20<sup>th</sup> Century



1903 Ford Model A



1904 Ford Model B



1903 **Cadillac** basically same as Ford Model A.

← **Leland's Cadillac** introduced after **Ford** had left **Henry Ford Company** which later became **Cadillac Motor Company**



# Influential Cars of the 20<sup>th</sup> Century



1904 C



1906 N



1907 R



1907 K



1909 F



1908 S

# Influential Cars of the 20<sup>th</sup> Century 1908-1927 Ford Model T

- Concept behind the **Model T** is as important as the car
- **Ford** wanted to build a car that the average wage earner could afford so it had to be made available at a reasonable price
- **Ford** : “I will build a motorcar for the great multitude”
- Not just for city dwellers
- U.S. had 38,600 miles of paved roads in 1904
  - 4.09 million miles of navigable roads in 2020
- The only way to achieve this was to design a light-weight car that could be put together rapidly from parts that were so standardized that any item could fit any car-interchangeable parts
- Mass production on an assembly line basis
- **Ford's** concept and its success revolutionized the automobile industry, as well as every other big industry, and changed the social structure of America



Woodward Avenue in Detroit  
between Six Mile and Seven Mile  
1908



Woodward Avenue  
at Eight Mile 1965



## Influential Cars of the 20<sup>th</sup> Century

- The **Ford Model T** retains a significant spot in automotive history
- It was one of the 1st mass-produced middle class-oriented inexpensive vehicles that improved mobility greatly for a large class of people
- It is one of the highest-selling automobiles in history
- **Henry Ford** moved to an assembly line production model with the introduction of the **Model T Ford**
- **Henry Ford** was the producer of the first real mass-produced passenger vehicle for the average person
- The **Model T** is the car that's credited with "putting the world on wheels"



1908 Ford Model T

## Influential Cars of the 20<sup>Th</sup> Century 1908-1927 Ford Model T

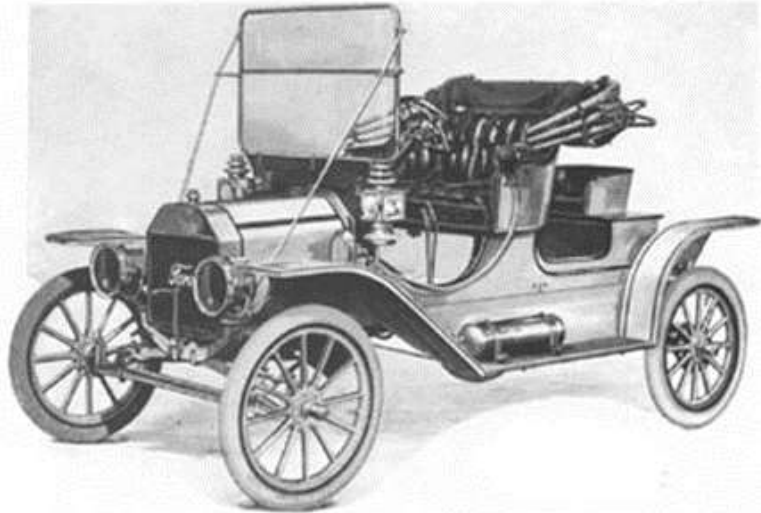
- Up until this time the automobile had been a status symbol and cars were painstakingly built by hand for the wealthy
- At the time it was a revolutionary business model to lower a product's cost and the company's profit margin in exchange for increased sales volume
- By the end of 1913 **Ford's** application of the **moving assembly line** had improved the speed of chassis assembly from 12 hours and eight minutes to one hour and 33 minutes
- In 1914 **Ford** produced 308,162 cars, which was more than all 299 other U.S. auto manufacturers combined
- By the time the last **Model T** was built in 1927, the company was producing an automobile every 24 seconds

- The first production **Model T Ford** was assembled at the Piquette Avenue Plant in Detroit on October 1, 1908



- Over the next 19 years relatively few fundamental changes were made to the basic design
- By 1926 the design was so antiquated that the **Model T** could not compete with more modern offerings from competitors like Chevrolet

## Influential Cars of the 20<sup>th</sup> Century 1908-1927 Ford Model T

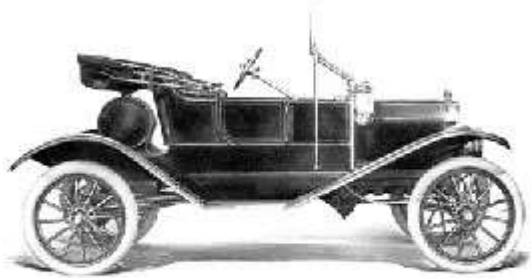


Model T Roadster. 4 cylinder, 20 h.p.  
A touring car for three.  
\$825.00 f.o.b. Detroit (~\$22,073 in 2021)



Model T Town Car. 4 cylinder, 20 h.p.  
5 passenger.  
\$1000.00 f.o.b. Detroit (~\$26,755 in 2021)

# Influential Cars of the 20<sup>th</sup> Century 1908-1927 Ford Model T Models for 1911



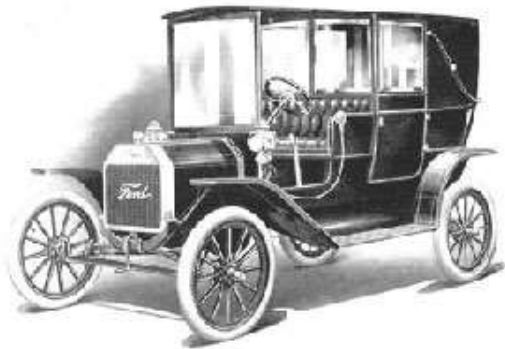
Ford Model T Torpedo Runabout  
Fully equipped, \$725. Unequipped, \$645



Ford Model T Open Runabout  
Fully equipped, \$680. Unequipped,  
\$600



Ford Model T Roadster  
Fully equipped, \$680. Unequipped,  
\$600



Ford Model T Town Car  
\$1200 with equipment of 3 oil lamps,  
horn, and tools only



Ford Model T Coupe  
\$1050 with equipment of 3 oil lamps,  
horn, and tools only



Ford Model T Touring Car  
Fully Equipped, \$780. Unequipped, \$700

## Influential Cars of the 20<sup>Th</sup> Century 1908-1927 Ford Model T

### Model T Engine

Configuration	Inline-4
Displacement	177 cu in (2.9 L)
Cylinder bore	3 3/4 in
Piston stroke	4 in
Block material	Cast iron, monoblock design
Head material	Cast iron, detachable
Valvetrain	Side valve (flathead)
Ignition	Ford designed magneto
Fuel supply	Gravity feed
Carburetor	Side draft
	Choke and throttle controls on steering column
Cooling system	Thermo siphon
Compression ratio	3.98:1
Horsepower	20

### Model T Construction

Various body types	
Length	134 in
Width	65.8 in
Wheelbase	100.5 in
Weight	1200 -1543 lbs
Body	Steel and wood
Mechanical parts	Steel/Vanadium steel
Top speed	45 mph



# Influential Cars of the 20<sup>th</sup> Century 1908-1927 Ford Model T

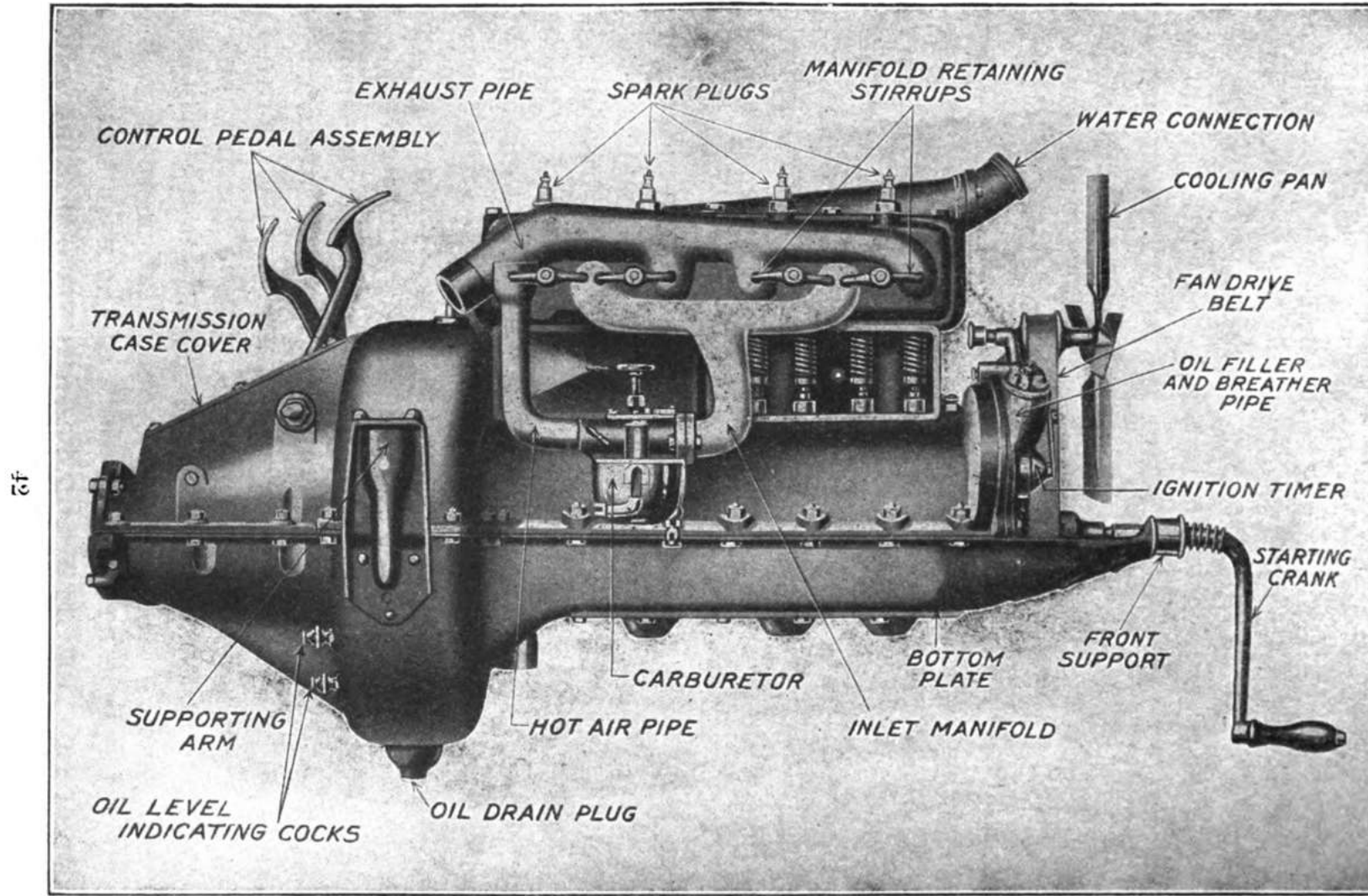
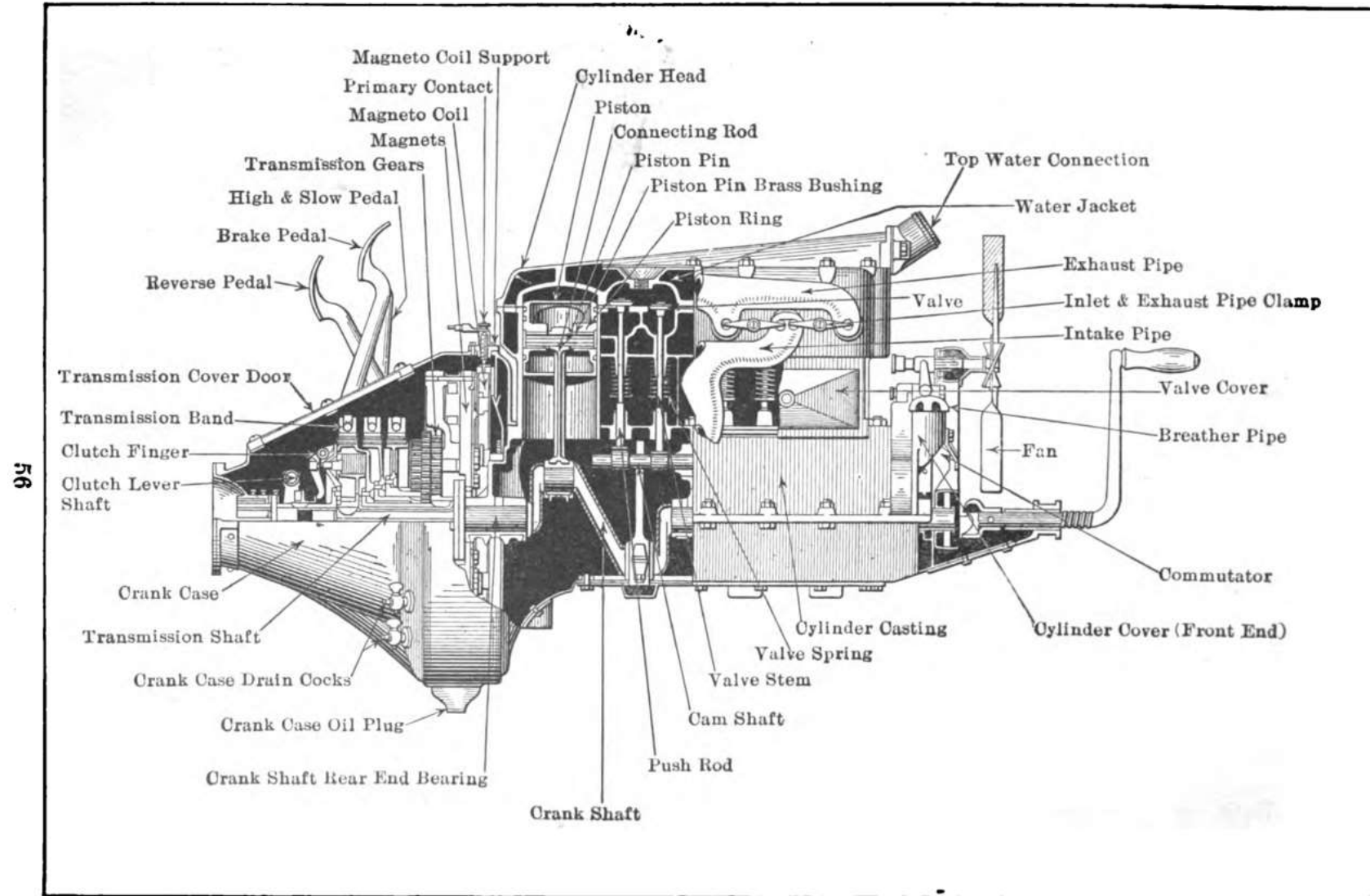


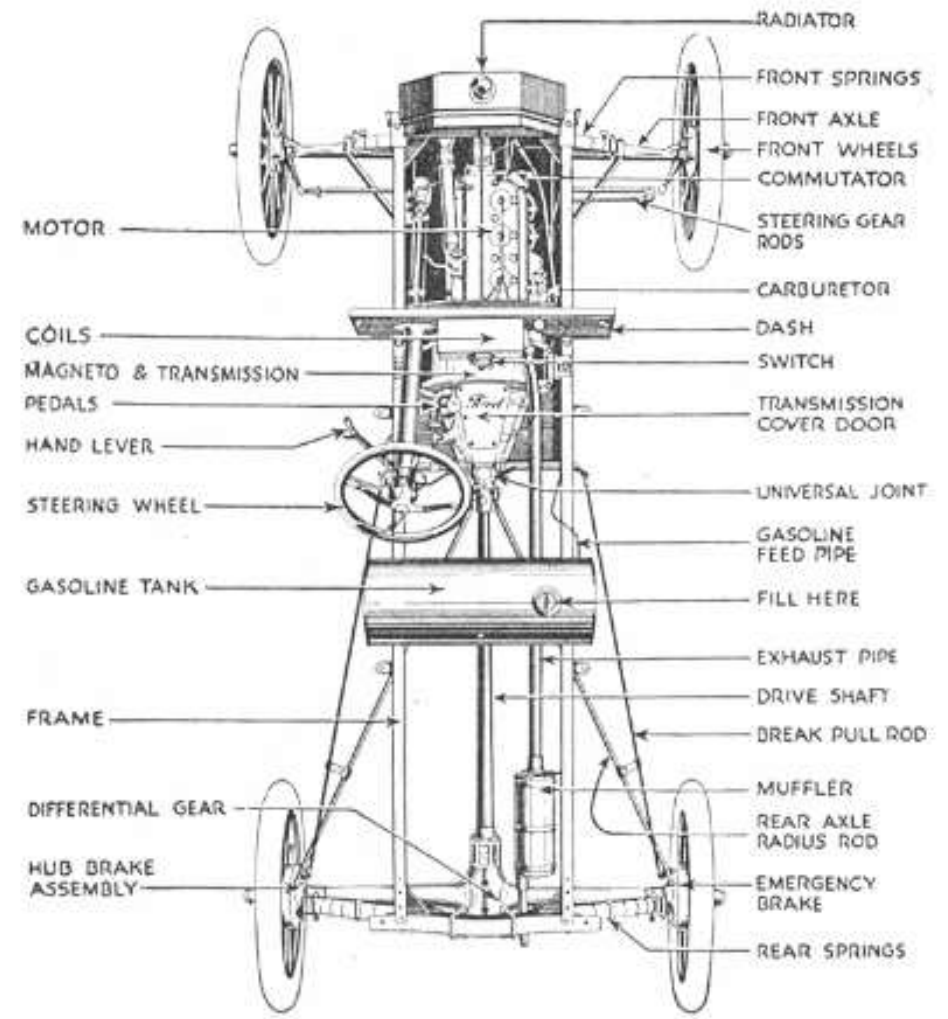
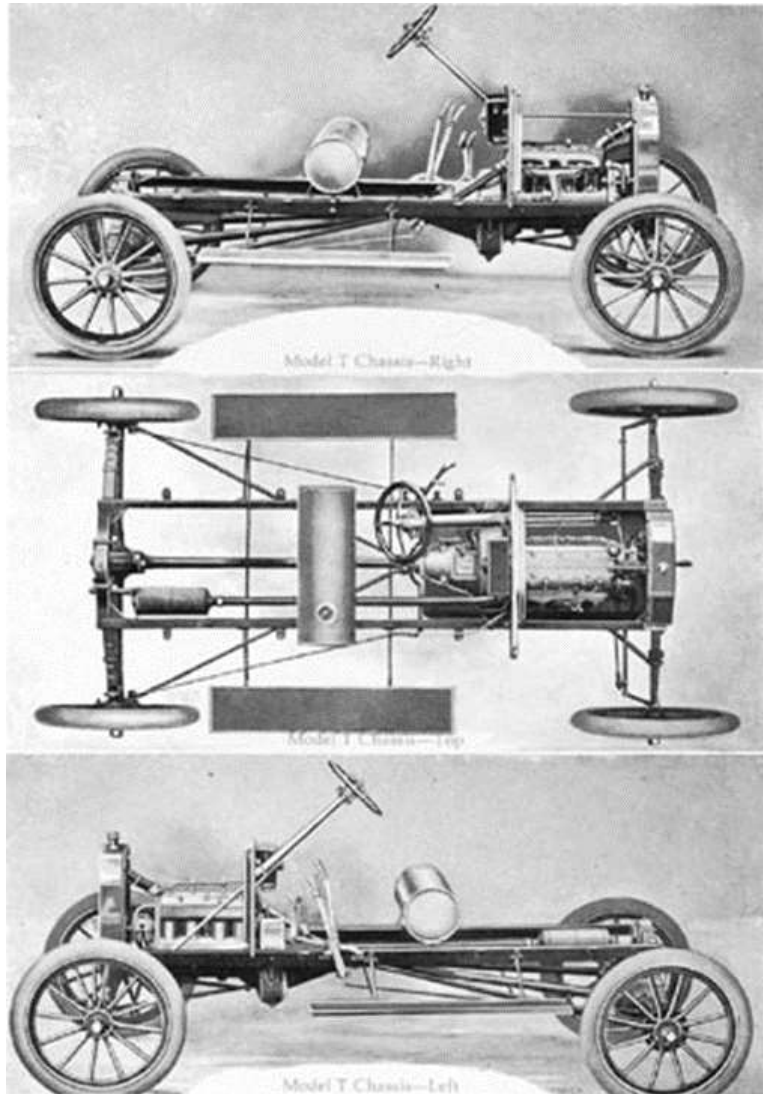
Fig. 8.—Valve Side of the Ford Model T Unit Power Plant Showing Manifolds, Carburetor and Interior of One of the Valve Spring Chambers.

# Influential Cars of the 20<sup>th</sup> Century 1908-1927 Ford Model T



**Fig. 11.—Part Sectional View of the Ford Four Cylinder Unit Power Plant Showing Important Parts of the Power Generating and Transmission System.**

# Influential Cars of the 20<sup>Th</sup> Century 1908-1927 Ford Model T



The Ford Chassis—top view, which is identical in all Model T's

## Influential Cars of the 20<sup>th</sup> Century 1908-1927 Ford Model T



### **Ford Model T “Depot Hack”**

- Custom body on bare chassis
- Carry passengers and baggage from train station to hotels
- Forerunner of Station Wagon
- Other manufacturers also built similar vehicles

## Influential Cars of the 20<sup>th</sup> Century 1908-1927 Ford Model T

- **Wheels:** artillery wood type with long hubs
- **Tires:** pneumatic; front 30×3 inches, rear 30 x 3-1/2 inches
- Larger tires than ordinarily used for weight of the car, last longer and greater comfort
- **Springs:** Front and rear, semi-elliptical transverse, all Vanadium steel
- **Weight:** 1200 pounds
- **Cooling system:** thermo-siphon and fan
- **Brakes:** two sets: (a) Service band brake operates on the transmission and is controlled by a foot pedal; (b) Emergency brake is controlled by hand lever at side of car acting on the drums of rear wheels
- Carburetor: float feed automatic with dash adjustment.
- **Engine:** 20 horsepower, 4 cylinder in line L-head side valve with detachable cylinder head and 3 bearing crankshaft
- Cylinders cast in one block with water jackets
- **Bore and Stroke:** 3 ¾ by 4 inches with a displacement of 177 cu in (2896 cc)
- **Ignition:** Ford magneto generator, low tension, direct connected to engine drive
- **Transmission:** Ford spur planetary, bathed in oil, – all gears from heat treated Vanadium steel, silent and easy in action
- **Lubrication:** combination splash and gravity system
- **Clutch:** multiple steel discs, operating in oil. All forward speeds are controlled by foot pedal. Reverse by hand lever. Spark and throttle under steering wheel.



## Influential Cars of the 20<sup>Th</sup> Century 1908-1927 Ford Model T

- **Crank and cam shafts:** non-welded, drop-forged, heat-treated FORD Vanadium steel
- **Standard equipment:** the Touring Car, Torpedo Runabout, Open Runabout and Roadster include at the fully equipped prices, a top, automatic brass windshield, speedometer, two gas lamps and generator, three oil lamps, tubular horn and a kit of tools
- The Town Car and Coupe equipment include three oil lamps, tubular horn and tools only
- **Fuel tank:** 10 gallons. Cylindrical gasoline tank mounted directly on frame
- **Dimensions:** wheel base 100 in., tread 56 in
- **Control:** three foot pedals. By pressing the first pedal “C” the slow speed is applied; by releasing, it is in the high speed. The center pedal “R” is for reversing the car. The third pedal “B” is the brake
- The FORD Model T can be entirely manipulated either by use of the pedals or by the controlling lever at the side of the ca
- The carburetor lever and throttle just under the steering wheel will regulate the speed of the car from a walk to 40 miles an hour, without shifting a lever or applying the foot pedals.

## Influential Cars of the 20<sup>th</sup> Century

- 1915 **Packard** offers a V-12, “Twin Six”



- The **Packard** “Twin Six” V-12 was America’s first 12 cylinder engine
- First engine with aluminum pistons

# Influential Cars of the 20<sup>Th</sup> Century -- Why the Model T Was an Influential Car

- **Price:** The Model T was priced in the same ballpark as its closest contemporary, the horse
- By continually driving down the price of his cars, using optimization techniques like the application of the moving assembly line in 1913, Ford made more cars than anyone else in his day
- When he instituted the 5 dollar a day wage for his workers he was not only an instant folk hero but he gave every worker the financial means to buy his cars
- **Perpetual Integration:** The Ford Model T was easy to modify and whole industries of after market modifications were introduced to transform them into race cars, utility vehicles, sawmills and farm tractors
- **Reliability:** Easier to get out of the barn and get going than hooking up the team to the wagon
- The planetary transmission with a flywheel magneto and Ford's use of vanadium steel for strength made the car reliable and easy to operate
- When it did need repair, the revolutionary separate head and block design pioneered by Ford and the simplicity of the overall design made maintenance simpler, faster and ultimately more affordable
- A few simple tools can keep a Ford Model T running for years
- **Configuration:** The rugged structure and high ground clearance made the Model T suitable for operation on rural roads

# Influential Cars of the 20<sup>th</sup> Century -- Why the Model T Was an Influential Car

- It put middle class America on wheels - ushering in the era of the automobile
- Automobiles were now utilitarian, not just playthings for the well to do
- Especially for rural Americans
- It help connect the farm to the city
- It introduced the moving assembly line manufacturing methods to industry
- It opened the market for other manufacturers to offer lower priced automobiles
  - Chevrolet, Dodge, Plymouth, etc
- It forced others to offer low priced automobiles with more features to compete with the Model T
  - And they did
- It served to increase public pressure for more and better roads
- It changed the face of life in America



# Influential Cars of the 20<sup>Th</sup> Century 1908-1927 Ford Model T

- **Ford Motor Company** had 31 assembly plants in the U.S outside Detroit
- European plants in
  - UK
  - France
  - Finland
  - Spain
  - Ireland (tractors)
  - Germany (trucks)
- May 26, 1927, the **Model T** last day of production
- 15 million + **Model Ts** were manufactured
- The basic **Model T** was little changed from 1908 thru 1927



- In 1932/1933 the company was forced to shut down all but seven of their 31 assembly plants outside Detroit
  - The Great Depression
  - Competition
- Only nine of the closed plants reopened when the economy improved



# Influential Cars of the 20<sup>Th</sup> Century 1912 Cadillac

- 1912 **Cadillac** introduces electric self starter as standard along with a generator /battery lighting system
  - Developed by **Charles F. Kettering** at Dayton Engineering Laboratories (DELCO)
- Crank starting engines was difficult and could be dangerous
- The electric starter eliminated the need to mechanically crank engines to start them
- This made it possible for women to safely operate cars without having a man start it
- Further democratizing the automobile in America and the world



1912 Model 30

- Four cylinder, L-head, inline
- Individual cast iron cylinders
- Copper water jacket
- 283.6 cu in displacement
- Five main bearings
- 40 hp ~ 60 mph top speed
- 3 speed transmission
- Two wheel mechanical brake



## Influential Cars of the 20<sup>Th</sup> Century– Chevrolet 490

- 1915, **Chevrolet** released the **490** to challenge **Ford's** hold on the market.
- The **490** adopted a three-speed gear transmission for easy operation
- The Model T, required particular driving skills to operate its two speed planetary gear transmission
- The 490 had an overhead valve (OHV) engine
- Braking was by external contracting brakes on the rear wheels
- It represented a marked improvement in serviceability and maintenance
- The **490** quickly stole the market share from the **Model T** and even came to threaten its position as the best selling car in America



1918 Chevrolet “490”  
Sale price \$490  
(~\$13,110 in 2021)

- The **Chevrolet 490** was the first serious threat to the market dominance of the **Ford Model T**