# Rockford Model T Ford Club Newsletter

# February 2022

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**MEMBERS WORKING FOR YOU:**

| | |
|---|---|
| *President* | *Open* |
| *Vice President* | *Open* |
| *Secretary* | *Deb Werner* |
| *Treasurer* | *Duane Bunton* |
| *President Emeritus* | *Wayne Henson* |
| *Directors* | *Bill Werner* |
| | *Kurt Duesterhoeft* |
| | *Dave Lantz* |
| *Newsletter Editor* | *Kurt Duesterhoeft* |
| *Little Hershey* | |
| *Swap Meet* | *Dave Lantz* |
| *Sunshine Persons* | *Duane & Cathy Bunton* |

**PURPOSE OF THE CLUB**

*The purpose of this chapter is to promote the interests of the public in the preservation and restoration of antique autos, particularly the Model T Fords, their accessories, lore, and literature.*

**AT A GLANCE – CALENDAR OF UPCOMING CLUB EVENTS**

| Date | | | Time | Event | Location |
|---|---|---|---|---|---|
| ------- | Feb | | ------- | No meeting | ------------ |
| Wed | Mar | 2 | 7 p.m. | Monthly Meeting | Duane and Cathy Bunton's home<br>13298 Promontory Trail<br>Roscoe, IL 61073 |

**OTHER LOCAL SHOWS AND EVENTS**

| Date | | Event | Location |
|---|---|---|---|
| Feb | 12 – 21 | *Chicago Auto Show | McCormick Place, Chicago |
| Feb | 25 – 27 | *World of Wheels | State Fair Park, Milwaukee |

*click on the above links for more information on these events

There is no meeting scheduled for February, as we take a break for the winter. We'll resume our regular monthly meetings starting in March.

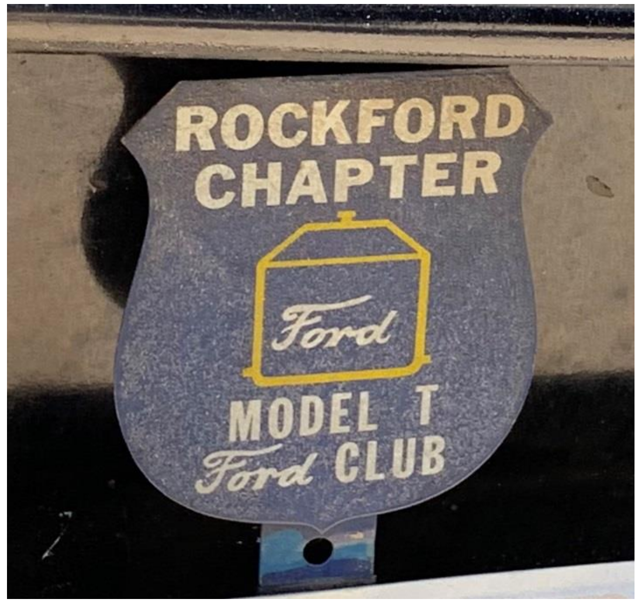
## Those celebrating this month:

**Birthdays**

| | |
|---|---|
| Vi Zavagli | 2/2 |
| Becky Wong | 2/12 |
| John Wong | 2/14 |
| Dean Wanfalt | 2/24 |

## The Marketplace

Dave Lantz is looking for a license plate bracket like this one he spotted on Scott and Sheryl Stiers' Touring. If you have one to sell, or know someone who might, let Dave know. You can contact him at 815/979-4544 or daveblantz@gmail.com.




Winter is a great time to take inventory and sort through all those parts. Got something you don't need anymore? Advertise it in the newsletter! Contact Kurt at 815/874-5102 or you can email him at kduest64@frontier.com.

## Tech Talk – Taking the Mystery out of the Model T Magneto

by Kurt Duesterhoeft

The Model T magneto may seem like a mysterious beast, but it is actually a fairly simple AC electric machine. The word "magneto" contains the word "magnet" and that's no coincidence. Magnets are the key to the magneto's operation. Like so many other things on the Model T, once you really dig into the magneto, you can better appreciate its elegant simplicity.

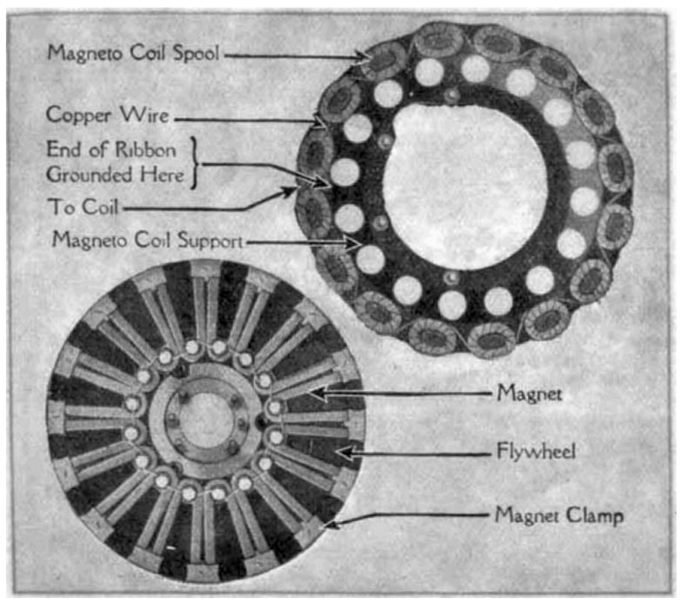



*Figure 1. Magneto components*

The magneto produces electrical power for the ignition coils and, on some early cars, also powered the lights and horn. In later years, when cars were equipped with a battery, the lights and horn were no longer powered by the magneto, but by the battery. The reason for this change will become more obvious.

The magneto consists of two parts as shown in Figure 1; first a set of stationary coils of wire that are mounted inside the hogshead and secondly a set of permanent magnets that spin on the crankshaft.

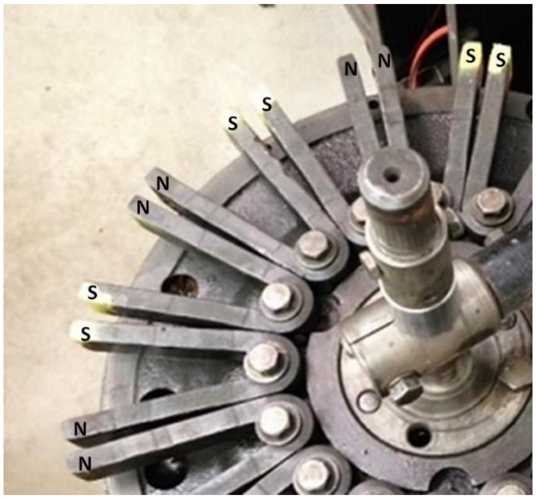


*Figure 2. Magnet alignment on the flywheel*

Each of the magnets is V-shaped at just the right angle (about 18 degrees) so sixteen of them fit on the flywheel in a radial pattern. Each magnet has a north pole and a south pole, of course. You'll recall that opposite poles attract and like poles repel. Figure 2 shows the magnets mounted on the flywheel (with the clamps removed). The poles have been labeled (N)orth and (S)outh. The magnets are aligned on the engine flywheel in a North/North – South/South configuration. This is a key point. By arranging them this way, the magnetic fields of adjacent magnets "combine" to produce a magnetic field with twice the strength of a single magnet. So two adjacent north poles combine magnetically to make a single, stronger north pole and two adjacent south poles create a single, stronger south pole. With the magnets arranged this way, there appears to be only eight north poles and eight south poles even though there are actually sixteen of each. But each of these "apparent" poles has twice the magnetic strength of an individual magnet. Simple, but elegant!

So how does the magneto produce electricity? As the flywheel spins, the stationary coils sense the changing magnetic flux from the spinning magnets. As the flywheel turns, the coils will sense a transition from north to south and then south to north. This forms one AC electrical cycle and happens eight times for every revolution of the crankshaft. So the magneto produces eight electrical cycles per revolution. Engine speed is measured in rpm (revolutions per minute) while AC frequency is measured in cycles per second (Hz). Knowing there are 60 seconds per minute and 8 electrical cycles per revolution we can find the ratio between frequency and rpm.

$$Frequency\ (Hz) = \frac{8 * Engine\ speed\ (rpm)}{60} = \frac{Engine\ Speed\ (rpm)}{7.5}$$

There is a simple ratio of 7.5 between frequency and rpm. For example, at 750 rpm, the magneto will put out a frequency of 100 Hz. At 1500 rpm, 200 Hz. This fixed ratio makes it possible to determine engine rpm by measuring frequency, or vice versa.

Voltage is induced in the magneto coils by the changing flux of the passing magnets. The amplitude of the voltage is determined by two things; the amount of magnetic flux (i.e., how strong the magnets are) and how quickly the magnets pass by the coils (engine speed). The faster the engine spins or the stronger the magnets are, the higher the voltage will be. Weak magnets will produce low voltage and an engine at idle will also produce lower voltage than one that is revved up. This is where the N/N – S/S alignment of the magnets is really key. Because this alignment produces more magnetic flux at the "combined" poles, it also produces higher voltage than a N/S – N/S configuration would. The voltage of the magneto is proportional to engine speed. If the engine speed is doubled, the magneto output voltage will also roughly double. For example, an engine operating at 1500 rpm will produce about three times as much voltage from the magneto as that same engine operating at 500 rpm. A good magneto should produce about 8 volts at idle (around 425 rpm) and about 28 volts at 1500 rpm.

The fact that the voltage can vary so much with engine speed is problematic for lightbulbs in particular. The higher the voltage, the brighter an incandescent bulb will burn, but the quicker it will burn out. A bulb for magneto headlights had to be designed for high voltage when the engine was revved up, but that made it very dim at idle. Operating the lights from a battery fixed this issue by providing a consistent 6 volts, no matter what the engine speed.

But the ignition coils are a little different story. They can operate over a very wide range of voltage, from a low of about 3 volts to over 30 volts on the high end. The higher the voltage provided to the ignition coils, the hotter the spark produced by the spark plugs. This is a good thing and explains why the Model T continued to have a magneto for the ignition coils even after cars were equipped with batteries. This is also why the engine runs better when switching the ignition from battery to magneto, once the engine is running. The coils produce hotter spark at the plugs when operating from the magneto because the voltage of the magneto is higher than the battery voltage. Operating the coils from the battery is still useful when starting the car, however, because the engine is turning over so slowly that the magneto may not produce enough voltage to operate the coils and fire the spark plugs.

We can measure the voltage of the magneto from the contact post on the hogshead to ground. These measurements were taken with the car running on battery as the coils will distort the measurements if the car is running on magneto. While the voltage amplitude can be measured using a simple AC voltmeter, to really see what's going on requires an oscilloscope. Figures 3 and 4 show the voltage of a good magneto operating at two engine speeds; 600 rpm and 1200 rpm, respectively. Two things are readily noticeable. The waveform has gotten taller and also skinnier at 1200 rpm than it was at 600 rpm. As expected, the amplitude (voltage) of the waveform has roughly doubled (from 13.5 to 25.6 volts) and there are twice as many electrical cycles for the same period of time (80 Hz vs. 160 Hz).

| **Parameter** | **Figure 3** | **Figure 4** |
|---|---|---|
| Engine speed | 600 rpm | 1200 rpm |
| Magneto Frequency | 80 Hz | 160 Hz |
| RMS Voltage (Vrms) | 13.5 V | 25.6 V |
| Peak to Peak Voltage (VPP) | 53.9 V | 101 V |

By taking this closer look at the magneto, we can see how a clever arrangement of the magnets creates the voltage needed to run the coils. We can also see why magneto headlights were short-lived. But the magneto itself endured for the entire production cycle of the Model T and, in fact, is still in common use today in many small engine applications.

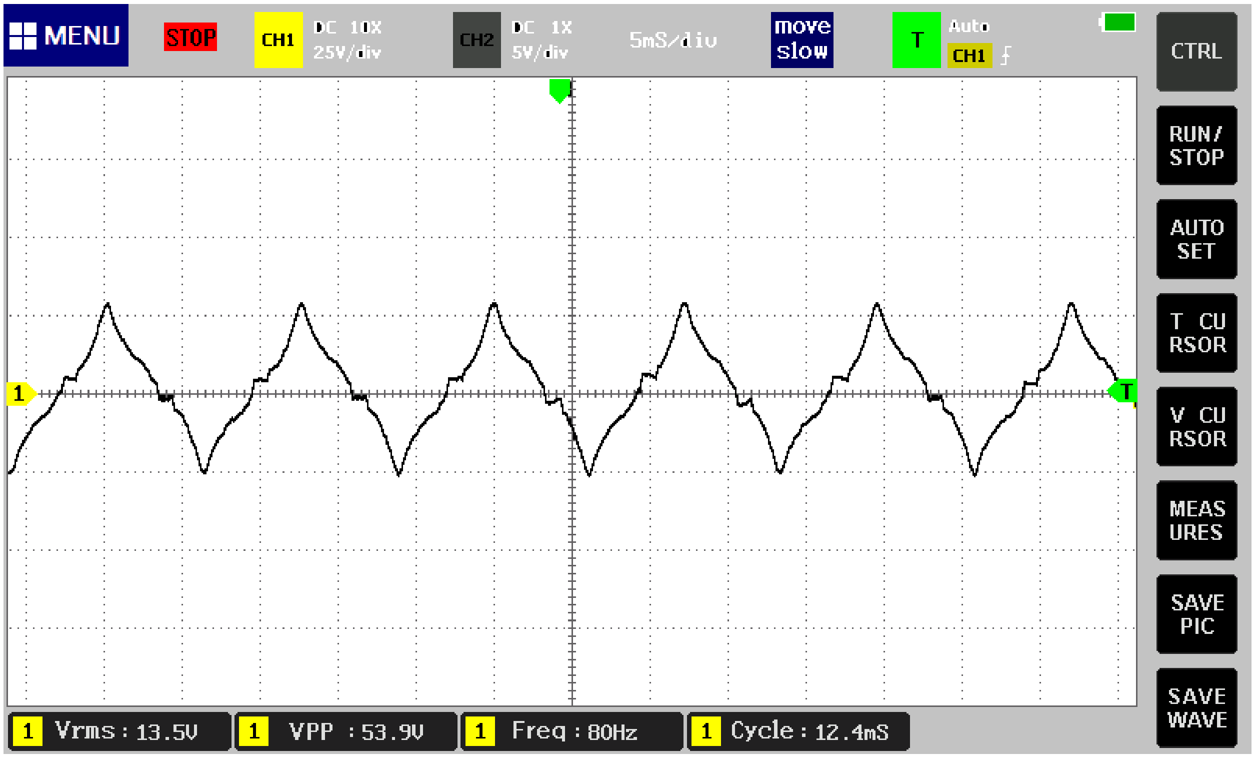



*Figure 3. Magneto voltage at 600 rpm*

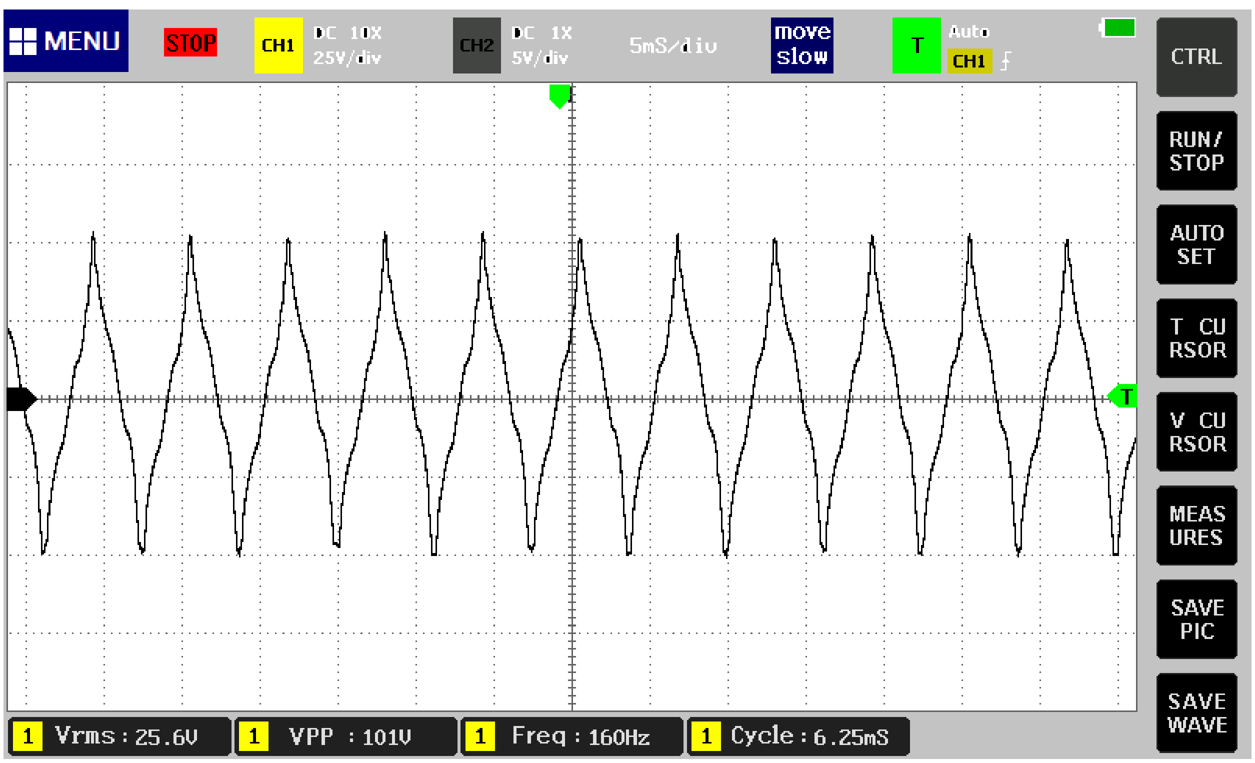
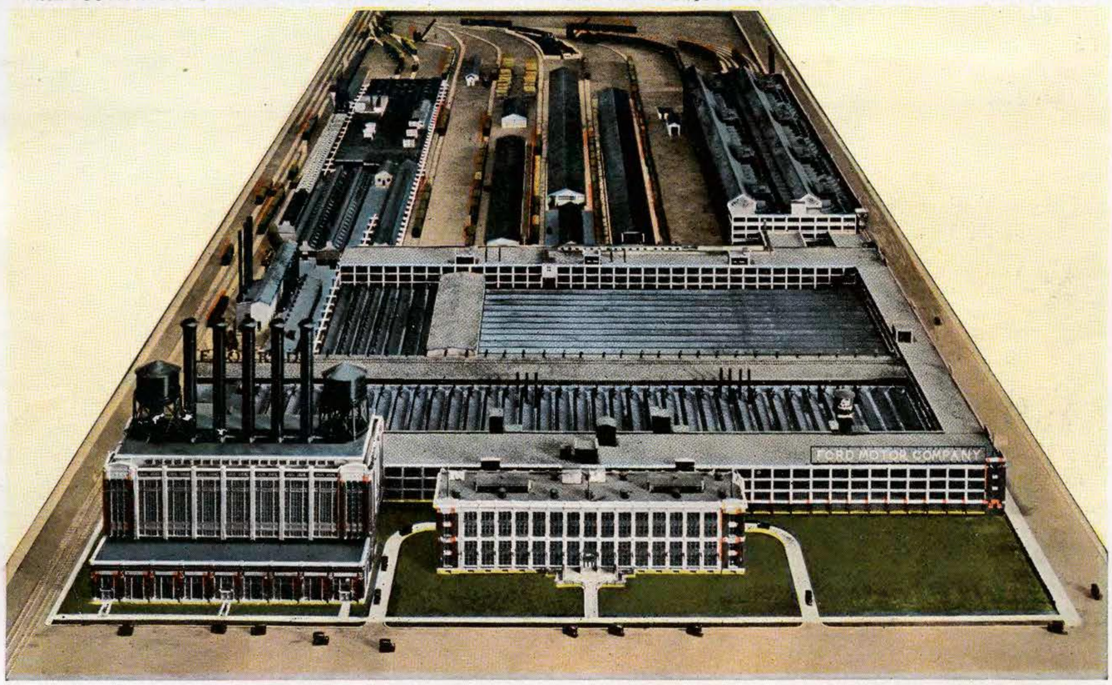



*Figure 4. Magneto voltage at 1200 rpm*

*The following pictures were taken from a set of 1917 souvenir postcards of the Ford factory.*

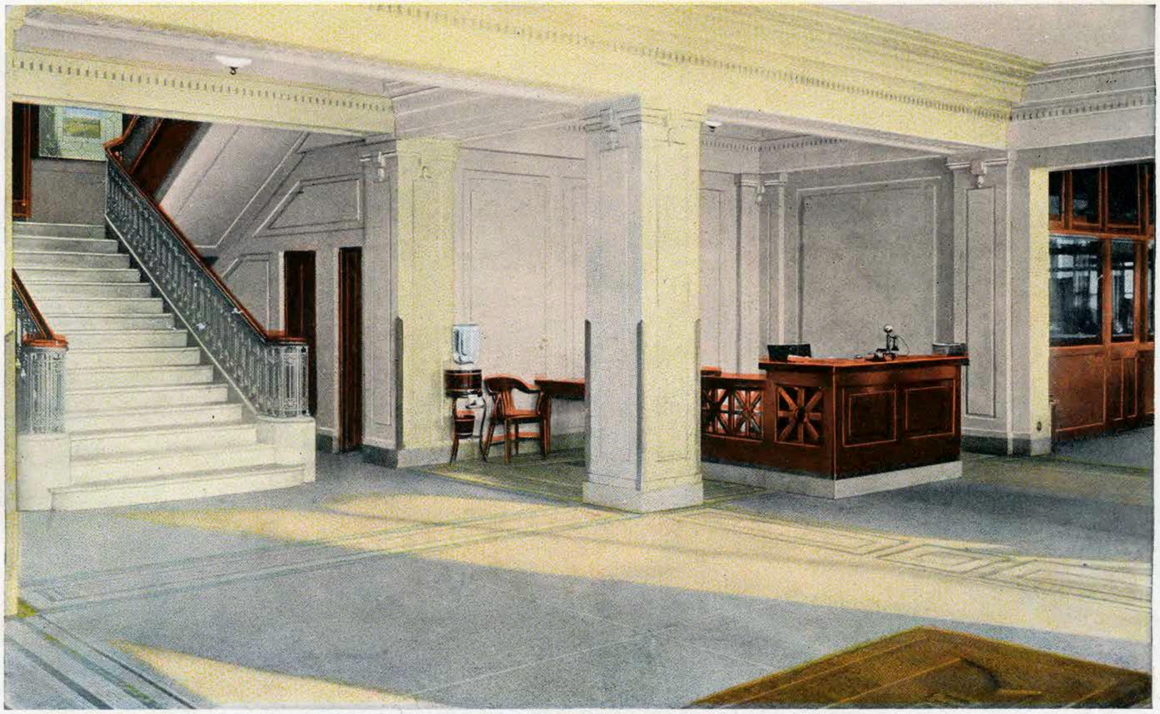
AREA 56 ACRES. 75 ACRES FLOOR SPACE UNDER ROOF. MORE THAN 700,000 FORD CARS COME FROM THIS FACTORY



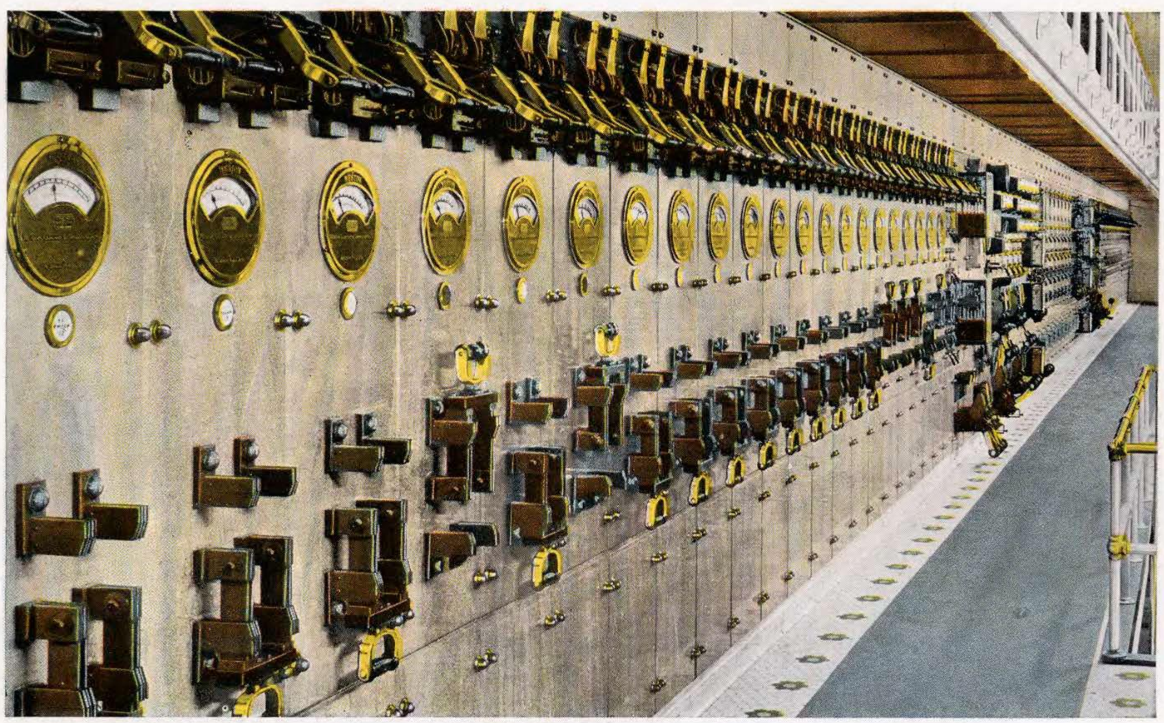

EACH YEAR. AVERAGE NUMBER OF EMPLOYEES 42,000 FORD MOTOR COMPANY. ADDITIONS NOW UNDER WAY WILL DOUBLE THE CAPACITY OF THE PLANT.

1000 ASSEMBLED FORD CHASSIS, ONCE A RECORD OUTPUT.

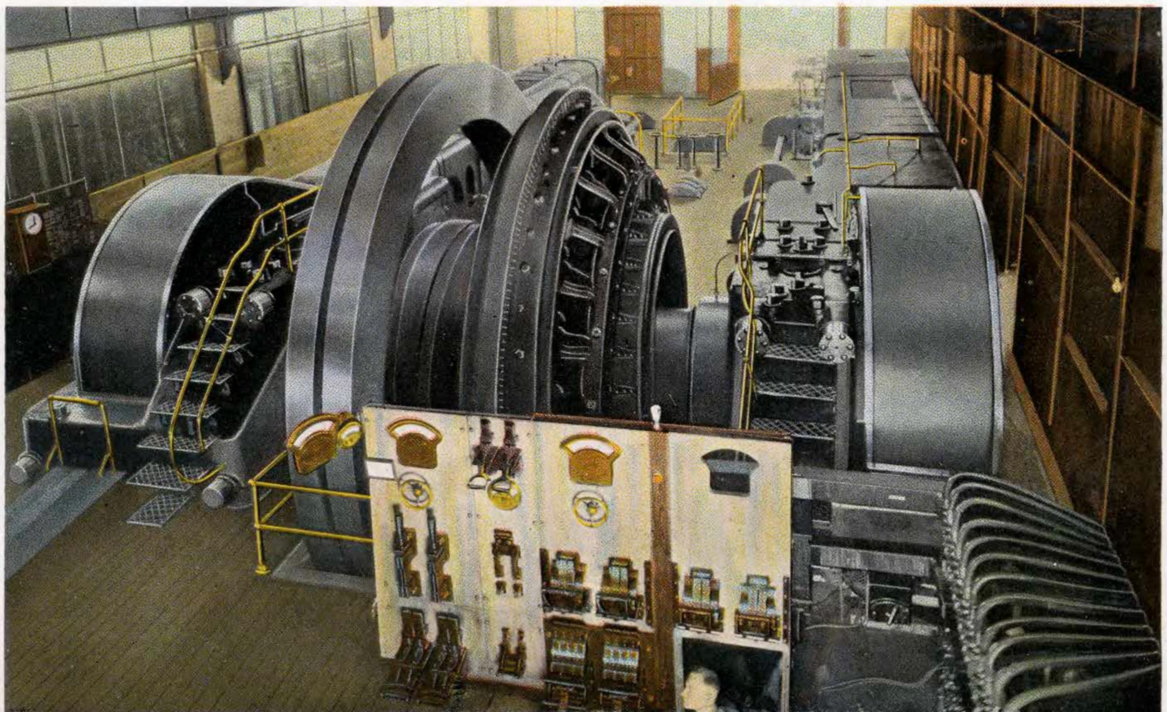
IN 1916, FORD PRODUCTION MOUNTED AS HIGH AS 2768 CARS IN A SINGLE DAY.



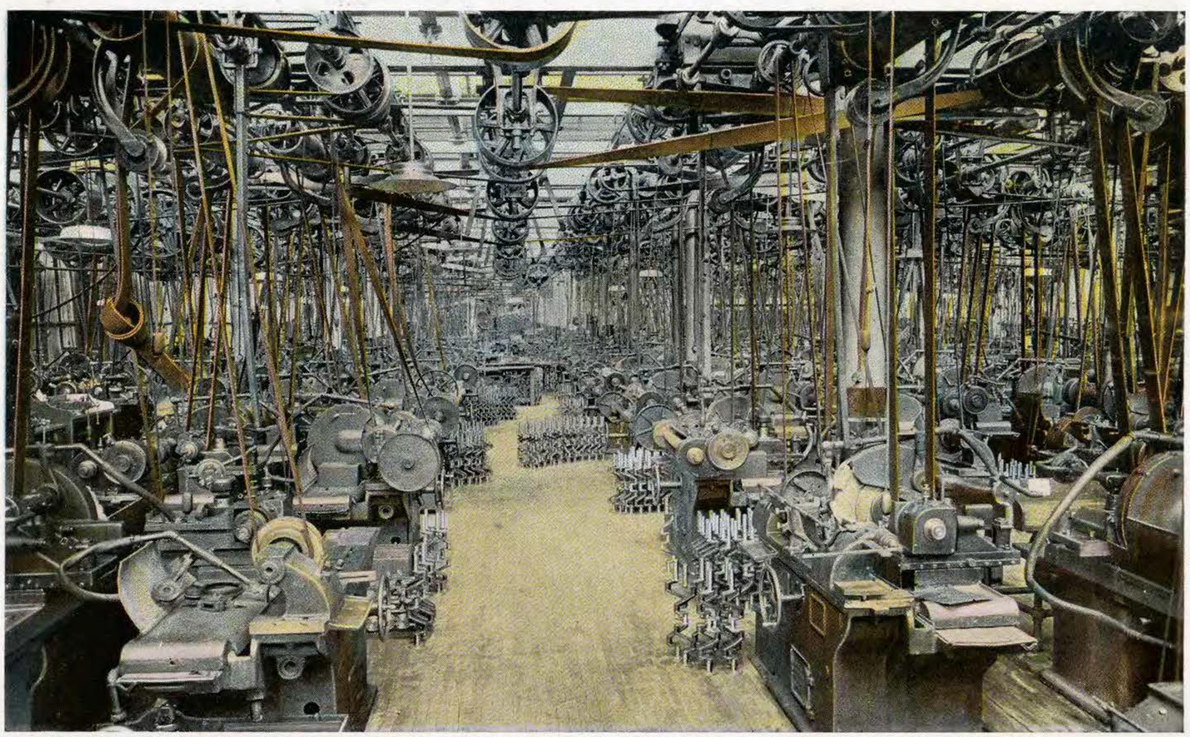
LOBBY OF ADMINISTRATION BUILDING SHOWING INFORMATION DESK AT THE RIGHT.



THE LARGEST DIRECT CURRENT CONTROL BOARD IN THE WORLD IN THE FORD POWER HOUSE.



A 6,000 HORSE POWER GAS-STEAM ENGINE. THERE ARE SEVEN OF THESE AT FORD'S.



CRANKSHAFT GRINDING DEPARTMENT. 50 MILES OF BELTING ARE USED TO DRIVE FORD MACHINERY.