

Ingenious Machines Assure Accuracy In Turning Out The Important Parts

This is the fifth of a series of
articles on "How the Modern Au-
tomobile Is Made."
BY ISRAEL KLEIN,
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The greatest exactitude demanded
in the construction of the au-
tomobile is in the production of the
moving parts.

Machines are employed and
tools used that cut to the exact
measurement, leaving no room for
human error. The machines range
from the heavy, cumbersome drill-
ing and milling operators to such
fine and precise lathes and grind-
ing instruments that diamonds
have to be used as cutting sur-
faces.

Only the setting of the machin-
ery is left to man. The rest of the
operation needs only his super-
vision and the work of replacing
pieces as they are completed.

Mechanical Hands

The aluminum crankcase and
the gray iron cylinder block, com-
ing from the foundry, meet in a bat-
tery of giant milling and drilling
machines in their first course
through the factory. Each is hand-
led as a workman would handle a
toy at a lathe.

They are cut down to size. The
holes are bored out smooth and
ground smoother. They are twist-
ed and turned by powerful me-
chanical hands as they go through
these operations.

Finally they are set into a drill-
ing machine where as many drills
as there are holes to be made in
each part cut out these holes with-
in a few seconds.

In grinding and boring, ma-
chines work in baths of lard oil

and water, and in some cases of
pure oil, to cool the surfaces of
the tools and of the metal that is
being cut.

The used oil runs into a tank
underground, is cleaned of impuri-
ties and brought back for further
use.

The finer operations in the au-
tomobile plant are in the manu-
facture of the parts that go into
the crankcase and cylinder block
assembly—the crankshaft, the cam-
shaft, the pistons, piston rods,
wrist pins and valves.

From Forge to Lathe
The crankshaft, camshaft and
piston or connecting rods are drop
forgings of tough steel, forged
roughly under heat into their pec-
uliar shapes by an electric or a
steam drop hammer.

The other parts are casting or
cuttings of steel or a hard alloy
of steel and chromium, or of nickel
and gray iron, to give them tough-
ness and rigidity in use.

The forged piece is first cut
roughly down to size. Then the
precision machines take hold.

A bushing or bearing of babbitt
metal is forced under great heat
into the brass bearing surfaces of
the connecting rod, for instance.
After it is trimmed down it is tak-
en to a machine that has a dia-
mond for a cutting tool. This dia-
mond cuts down the inner surface
of the bearing so finely that no
variation from the true can be de-
tected.

Diamond for Fine Work

This is one of the many opera-
tions in which diamonds are used
for their extreme hardness to
cut the finest and smoothest of
surfaces obtainable. Crankcase

bearings are cut similarly by a
group of diamonds set in a core
of copper and fuse metal to hold
them firmly in place. These are
mostly black, rough diamonds of
the kind not useful for jewelry,
but highly efficient in precision
work.

Where extremely fine grinding
has to be done on bearings, pis-
tons and other important engine
parts, a diamond is used to cut the
edge of the fine grinding wheel
smooth and true.

The great need for such accuracy
in cutting or grinding down a part
to exact dimensions may be point-
ed out in the case of the piston
pin bushings in the upper end of
the connecting rods. Here the en-
gine undergoes such severe strain
that every moving part has to be
exact and close fitting to make it
durable and workable.

So finely ground are these parts
that their glassy surfaces can't
show the marking of a lead pen-
cil. So close to exactitude are
their measurements that any varia-
tion can be detected only through
an instrument that multiplies this
slight variation ten-fold.

Crankshaft Cut at Once

An ingenious machine called a
contour lathe is so made that six
tools move in and out with the
revolving surfaces of the revolving
crankshaft, cutting down these sur-
faces or "cheeks" to their exact
dimensions. Here, three distinct
shapes of "cheeks," all set at dif-
ferent angles, are cut down in one
operation.

Accurate as this and similar
lathes are in the construction of
the crankshaft, they must be
checked up by another ingenious
machine that transforms vibration
of the shaft into a visible light
wave. This is the crankshaft bal-
ancing machine.

Crankshafts have to be balanced
to avoid vibration when in opera-
tion. One is turned vertically be-
tween two supports on their ma-
chine that converts their degree of
vibration into electrical pulsations.
These, in turn, are converted into
a light wave that fluctuates on a
scale, amplifying the vibrations
120 times.

The skilled operator can tell by
the positions and degrees of fluc-
tuations where the crankshaft is
off balance. He corrects this by
drilling a hole out of one or more
of the counterweights on the shaft.
He tests it again, drills some more,
and continues his tests until the
light runs straight down the center
of the scale without fluctuating.

Next week: The chassis is taken
through the rest of its manufac-
ture.

MANY AUTO MODELS

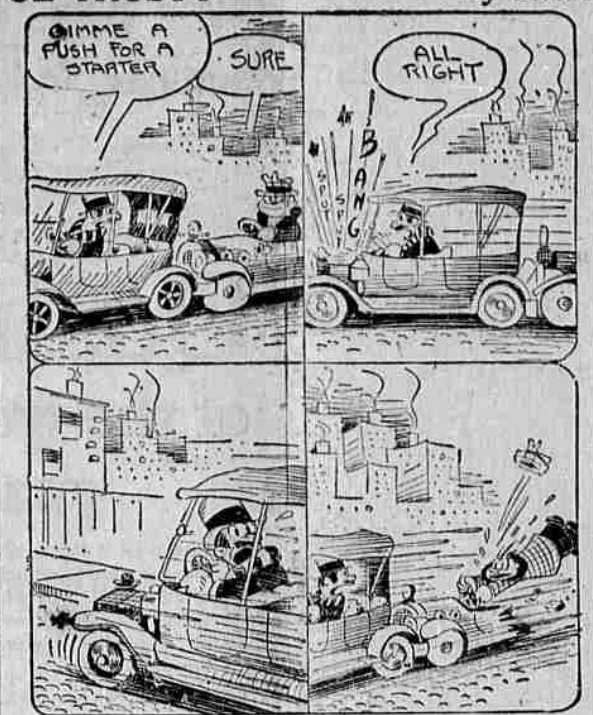
There are more than 625 indi-
vidual types of automobiles, both
open and closed, on the United
States market. They are the pro-
duct of 48 manufacturers and they
range in price from less than \$500
up to \$5000. This does not in-
clude custom-built cars.

WELL ON WAY TO UNI- FORM CODE

By NEA Service.
WASHINGTON, April 20.—
North Carolina and North Da-
kota have started the ball
rolling along the lines of a
uniform traffic code for the
United States.
Both states have passed
laws that set down principles
established at national traf-
fic conferences.
They concern registration
of titles to cars, weight su-
pervision of trucks, and re-
strictions as to lights, tires,
brakes, horns, mirrors and
mufflers and new rules on
driving.

OL' TRUSTY

By Swan



SAFETY AUTO HORNS

An appeal for a definite system
of warning signals for automobile
horns and an exhaust horn as aux-
iliary safety equipment for all cars
has been issued by the Auto-
mobile Equipment Association. Offi-
cials believe that such horns will

provide greater safety for the ped-
estrians and greater protection for
the automobile driver.

Fifty cents a month by carrier—
four dollars a year by mail is the
subscription price of the Roseburg
News-Review, Newsday daily in
Southern Oregon

BRIDGE JOINS FAST BEACH SPEEDWAYS

By NEA Service.

ST. AUGUSTINE, Fla., April 20.—
The three fastest beach speed-
ways in the world have been joined
by the new million-dollar bridge
spanning Matanzas bay between
here and Anastasia Island.

The new connected route ex-
tends from Atlantic beach oppo-
site Jacksonville to Inlet terrace,
18 miles south of Daytona beach,
a distance of almost 135 miles.
Cars now may race at top speed
nearly all the way on beach sands
smooth and hard as a billiard
table and averaging 500 feet wide
at low tide.

The 40 miles from Atlantic beach
opposite Jacksonville to Vilano
beach, opposite St. Augustine can
be made in as many minutes. The
mainland is reached by the Vilano
bridge and then the Matanzas
bridge offers entrance to Anastasia
Island, one of the speediest
stretchers in the world.

The beach highway is wide
enough to admit 43 cars abreast
and is a straight line for 18 miles
to Matanzas inlet. A bridge joins
the route to Flagler beach and
Ormond-Daytona beach, where high
speed records have been made.

How's She Hittin'

BY ISRAEL KLEIN
Science Editor, NEA Service

The car has to be cranked for
starting. The lights burn out mys-
teriously. The ammeter doesn't
seem to be working.

Something's gone awry, ob-
viously. In the ignition system.
But the battery registers full
charge. The engine works smooth-
ly once it's started. So there's

MISLEADING SIGNS

It is a commendable part of the new federal highway code
that no signs that would mislead the motorist be set up, at least
along these approved roads.

That forces a great many garage and refreshment stand
owners to take down their glaring "STOP" signs, and put up
others that would advertise their business and not direct traffic.

This rule should help increase the business of such places
by the addition of prospective customers who otherwise would
resent being misled, enough to pass by these stands no matter
how hungry they might be or how seriously they might need help.

The real purpose of this rule is to avoid the repetition of
Aesop's "Wolf, Wolf" anecdote. Motorists passing up two or
three "Stop" signs that meant only an advertisement, might dis-
regard the next that really meant Stop for the sake of safety.

Petroleum the law might soon find a way to force the elimin-
ation of the large landscape blinders, especially at curves of the
roads.

nothing wrong with the distributor, with oil or grease as to be render-
nor the generator. ed useless.

The fault must lie somewhere be- These must be cleaned and re-
tween the generator and battery. lightened.

In fact, it does. A sure sign is In the case of the battery termi-
the rapid extinction of good head- nal, if corroded, a weak solution
light or other bulbs. of baking soda will dissolve the
greenish substance.

This shows a closed circuit be- The terminal should be discon-
tween the generator and the lights, nected and both the wire and bat-
but one that takes all the juice tery connections washed and scrap-
from this part of the system, in- ed clean.

Ordinarily the generator supplies A cracked or broken battery
power to the battery, while the terminal may be discovered by
engine is running, keeping the jerking it back and forth. It must
source of the ignition system fully be tight. If loose, the battery needs
charged. But when the battery re- repair.

fuses to budge, and the lights seem to take all the generator's juice by burning out so quickly, there is a
sure sign of a broken circuit be- tween the generator and battery.

That needn't be a loose wire in this part of the system. It may be a broken terminal on the battery, or one so covered with corrosion that it can't work.

The battery terminal of the gen- erator, also, may be so covered

TOURISTS TURN NORTHWARD ON HISTORIC, PICTURESQUE TRAILS

By NEA Service

LAKE CITY, Fla., April 20.—
With the first exodus from the sun-
baked shores of Florida comes the
opening of the national touring
season.

Motorists are gradually finding
their way back north, as the snow
recedes from the ground and the
trees come into bloom. In a few
weeks they will have settled them-
selves for the northern season, on-
ly to start soon after on tours
across the continent.

For the present, one way is open
for the tourists from the south,
so that they may continue to en-
joy the beauties of nature in its
sublime season. That route leads
up from this city, the gateway of
Florida, or from New Orleans, on
through Atlanta and along the Ap-
palachian range of mountains as
far as Quebec.

Few routes surpass this in vari-
ety of scenery and in historic
grandeur. Here are mountain
roads and level stretches, both
kinds revealing immense expanse
of landscape.

Through Historic Country

Nearly every epoch in American
history is recalled as the motorist
passes places that lived in the
history of the United States and were
dominant even before the time of
the constitution. The recollections
seem to grow in age as the tour
stretches farther north, ending in
Quebec, perhaps the oldest and
quaintest part of the continent in
view of the route.

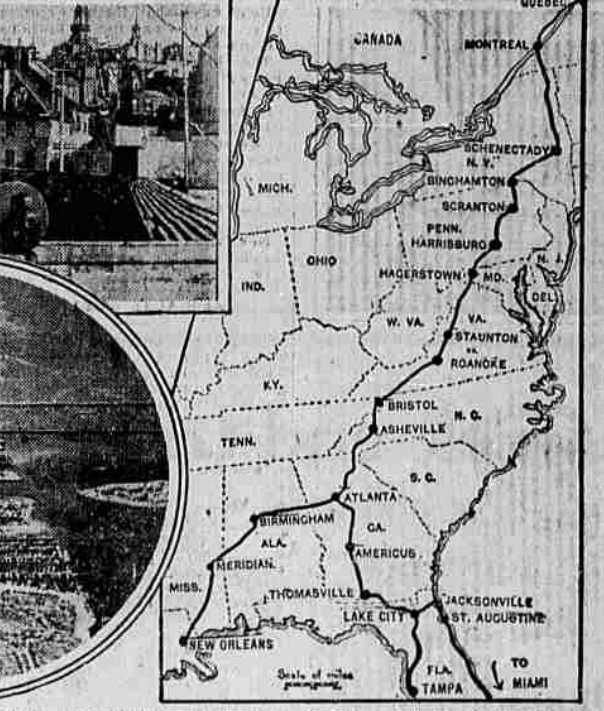
Yet there is a strong contrast
to this historic background, in the
modern nature of the roads. For of
the 2100 miles traversed from Lake
City to Quebec, or from New Or-
leans to the Canadian border, 85
per cent is fully improved, a great
part of it by concrete pavement.
Hardly a stretch can be called un-
improved to the extent of being im-
passable.

The route from Florida leaves



From Miami (lower view) to Quebec (in upper photo), motorists are treated to perhaps the most beau-
tiful and historic scenery in the country, along the trail laid out on the map at the right. Many travelers
are taking this course on their northward trek from the ebbing winter vacation in Florida.

Lake City, goes up to Madison and
first along the Jackson Highway
to Meridian, Miss., then northeast
through Tuscaloosa and Birming-
ham, and east along the Banhead
highway to Atlanta.



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tiful and historic scenery in the country, along the trail laid out on the map at the right. Many travelers
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At Atlanta these two routes con-
verge and all go northward to
Asheville, N. C., in the midst of a
national park area, by way of
Gainesville, Bryson City and
Wayneville. Here he enters an

attractive resort district, surround-
ed by mountainous peaks, some of
the highest in the east.

He goes on from Asheville
through Johnson City, Tenn., Bris-
tol, Roanoke and Staunton, Virginia,
into another entrancing landscape,
one carrying historic recollections
of colonial days with the beauties
of nature.

Here the ride of General Sheri-
dan is reversed, this time by auto,
on through Winchester, Va., and
then up into Harpersburg, Md. The
famous battlefield at Gettysburg
is passed as the motorist travels
along through to Harrisburg, Pa.,
and proceeds to Sunbury and
Salem.

From the Pennsylvania border,
the motorist turns northeast and
enters another epochal area in the
history of this country, that of "El-
denburg and Saratoga, with their
memories of the French and Indian
and the Revolutionary wars.

Past the Adirondacks

He enters this district after
passing Binghamton, N. Y., and
reaching Schenectady, a short dis-
tance from Albany on the Hudson.
Here he reaches the picturesque
Mohawk valley and drives past the
historic lakes George and Cham-
plain, with their wealth of resorts,
to the Canadian border at Mont-
real.

A short run along the St. Law-
rence river, and the end of the
journey finds the tourist in quaint
and historic Quebec.

The entire route is one of pleas-
ant memories and awe-inspiring
sights. At this time of the year, it
is especially inviting, for spring
seems to unfold itself as the mo-
torist advances northward.

A score of transcontinental high-
ways cross this route, enabling
residents of practically the entire
United States to enjoy the Ap-
palachian trail on their way home.

AIR ACES ARE TUNING UP FOR THE NEW YORK-TO-PARIS FLIGHT



WOOSTER

Lieutenant Commander Noel Davis and Lieutenant Stanton W.
Wooster, U. S. N., are promising contenders for the \$25,000 Orteig
prize for the first New York-to-Paris hop. This is the giant Key-
stone biplane, "The American Legion," recently successfully tested
at Bristol, Pa., in which they will shortly hop off across the ocean
from Long Island while—



BYRD

Commander Richard Evelyn Byrd, of North Pole flight fame, with Floyd Bennett, in their specially
built "America"; Charles Lindbergh, former Air Mail pilot, in a single-engine Ryan monoplane, and
Charles Nungesser and Rene Fonck, the French aces, also take wings on the 3600-mile adventure. Byrd
disclaims hope to win the prize, saying that his is a long-contemplated scientific undertaking, but should
he get there first he would be eligible for the gold. Fonck, whose attempt last year ended in disaster,
is again to fly a Sikorsky monoplane. Other aspirants for the prize are—



ACOSTA

Bert Acosta, pioneer pilot, and Clarence Chamberlain, who planned
to test the capabilities of their big Wright-Bellanca monoplane,
while endeavoring at the same time to establish a new endurance
record, by a long sustained flight over New York. An accurate
idea of whether the ship could make the long oceanic hop was
looked for from this flight.



CHAMBERLAIN

This is the 3600-mile rainbow at
whose foot lies the \$25,000 Orteig
prize for the first New York-
Paris or Paris-to-New York flight.
Names notable in the annals of
the air are included in this spring
roster of contenders for the
award.