
ADVENTURES in Electricity
NUMBER FIVE
A VAST NETWORK OF STEEL TRACKS STRETCHES ACROSS THE LENGTH AND BREADTH OF AMERICA - LIKE THE ARTERIES OF A GREAT BODY, THESE TRACKS CARRY THE PULSING LIFEBLOOD OF A GREAT NATION... ITS HUNDREDS OF THOUSANDS OF PEOPLE, ITS MILLIONS OF TONS OF VALUABLE FREIGHT!
THE DEVELOPMENT OF RAILROAD POWER HAS KEPT PACE WITH HISTORY AS MEN WORKED WITH VISION AND COURAGE... AND FINALLY, WITH THE MAGIC OF ELECTRICITY... TO CREATE A REVOLUTION ON THE RAILS!
GE
ADVENTURE SERIES
Prepared for
GENERAL ELECTRIC COMPANY
By GENERAL COMICS, Inc
ELECTRICITY IN RAILROADING

ON HAND FOR THE BIG SHOW ARE JOHNNY POWERS AND HIS OLDER BROTHER, ED.....

GOLLY, ED, **LOOK!** REAL LIVE ACTORS, RIGHT OUT OF HISTORY!

RAILROADS **MADE** AMERICAN HISTORY, JOHNNY...

WHAT DO YOU MEAN, ED?

WELL, THE STORY OF RAILROADS STARTED ONLY 25 YEARS AFTER OUR COUNTRY DECLARED ITS INDEPENDENCE. IT ALL BEGAN...

IN 1801... ABOUT THE TIME OUR NAVY SHOWED THE PIRATES OF TRIPOLI THAT WE WOULD SPEND "MILLIONS FOR DEFENSE, BUT NOT ONE CENT FOR TRIBUTE!"...

..A MAN NAMED LEIPER SHOWED THAT WHEELS ROLL MORE EASILY ON A **TRACK!**

ON THOSE RAILS, THAT HORSE CAN PULL THREE TIMES THE LOAD.


BUT ABOUT 1830, WHEN ANDREW JACKSON WAS PRESIDENT AND THE WHITE HOUSE WAS JUST COMPLETED...
...RAILROADING REALLY GOT UNDER WAY WHEN ONE OF THE FIRST STEAM ENGINES... A COAL BURNER...RACED A HORSEDRAWN CAR.
GIVE UP, MAN! YOU CAN'T BEAT AN IRON HORSE!
USSOS
AND IN 1865, THE YEAR PRESIDENT LINCOLN WAS ASSASSINATED...
...THE FIRST REGULAR SERVICE BEGAN WITH EARLY COAL BURNING, STEAM ENGINES... THEY HELPED OPEN UP THE WEST!
THOMAS A. EDISON
HEY... THOMAS EDISON! WHAT'S NEXT--- ELECTRICITY?
RIGHT, JOHNNY. EDISON INVENTED THE ELECTRIC LIGHT IN 1879... AND THEN HAD A REVOLUTIONARY IDEA ABOUT RAILROAD POWER...
R1411
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AND IN 1880, SOON AFTER GENERAL CUSTER'S FAMOUS LAST STAND AT THE BATTLE OF THE LITTLE HORN...
... AT MENLO PARK, WITH EDISON AT THE THROTTLE, THE FIRST ELECTRIC TRAIN "SPEEDED" ITS WAY TO RAILROAD FAME!
OH DEAR! 20 MILES PER HOUR! MUST MR. EDISON GO SO FAST?
WHERE'S THE POWER COMING FROM?
SAY, WHERE DID THE POWER COME FROM, ED?
THE SAME SOURCE THAT ELECTRIC LOCOMOTIVES USE TODAY... A DYNAMO OR GENERATOR IN A POWERHOUSE FAR AWAY. HERE, I'LL SHOW YOU...
ELECTRICITY WAS GENERATED IN THE POWER-HOUSE AND CARRIED RIGHT THROUGH ONE OF THE STEEL TRACKS...
THE ELECTRIC CURRENT WAS "PICKED UP" BY ONE OF THE STEEL WHEELS AND CARRIED INTO THE MOTOR...
THIS MOTOR CHANGED THE ELECTRIC POWER INTO MECHANICAL POWER...TURNING A SHAFT THAT TURNED THE WHEELS.
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EIGHT YEARS AFTER EDISON'S ELECTRIC "RIDE",-IN 1888---THE YEAR BEFORE THE TERRIBLE JOHNSTOWN FLOOD...
...A COMPANY, WHICH LATER BECAME PART OF GENERAL ELECTRIC, BROUGHT ELECTRIC POWER OUT ON CITY STREETS.
DON'T BE AFRAID, DEAR! WE'LL BE AMONG THE FIRST TO RIDE THIS NEW INVENTION!
OH, ROBERT ...YOU'RE SO BRAVE!
THEN THINGS HAPPENED FAST, JOHNNY... AND ELECTRICITY JUMPED FROM CITY STREET-CAR TRACKS TO RAILROAD TRACKS BETWEEN CITIES. IT WAS PART OF THE B&O LINE BETWEEN WASHINGTON AND NEW YORK...
RAILROAD EXECUTIVES GATHERED TO DISCUSS A PROBLEM..."
WHY COULDN'T WE SAVE BOTH TIME AND MONEY, GENTLEMEN, BY ROUTING OUR PASSENGER TRAINS THROUGH THE SAME SHORTCUT WE USE FOR FREIGHTS?
WHY? BECAUSE PASSENGERS COULDN'T STAND THE SMOKE AND STEAM AND GASSES IN THAT MILE-LONG TUNNEL... THAT'S WHY! IT'S ALMOST TOO MUCH FOR THE FREIGHT TRAIN CREWS NOW!
"BUT PROGRESS DEMANDED AN ANSWER AND SOON..."
IT SEEMS IMPOSSIBLE... BUT COULD YOU GENERAL ELECTRIC PEOPLE BUILD AN ELECTRIC LOCOMOTIVE POWERFUL ENOUGH TO HAUL 40 OR 50 LOADED CARS UPHILL THROUGH OUR TUNNEL?
THAT'S A TOUGH ONE, SIR...WE'LL DO OUR BEST!
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FINALLY, IN 1895, JUST 3 YEARS BEFORE THE SPANISH-AMERICAN WAR...
...CAME AN IMPORTANT DAY IN RAILROAD HISTORY! G.E. DELIVERED ITS FIRST ELECTRIC LOCOMOTIVE...BUT THE DIVISION SUPERINTENDENT WASN'T SATISFIED!
I'M STILL NOT CONVINCED THAT THESE NEWFANGLED ELECTRICS HAVE A PULL LIKE A GOOD OL' STEAM-HOGGER!
SUPPOSE YOU RIDE THIS ELECTRIC AND TEST IT YOURSELF!
BUT, SIR, THIS ENGINE HAS A LOT OF POWER-IT SHOULD BE APPLIED GRADUALLY!
I'M TESTING THIS ENGINE, AREN'T I? FULL SPEED AHEAD!
LOOK...IT PULLED THE END RIGHT OUT OF THAT BOX-CAR!
WOW! THAT ELECTRIC ENGINE SURE HAS PLENTY OF PULL!
CRA-ACK!
I GUESS THAT SHOWED THE SUPER, HUH?
THOSE EARLY B&O ELECTRICS SHOWED A LOT OF FOLKS... AND GAVE SOME IDEAS TO SOME OTHERS...
NEXT SHOWING 2 P.M.
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"AT THAT TIME, NEW YORK WAS BIG, BUSTLING, STILL GROWING...AND RIGHT IN THE MIDDLE OF MANHATTAN WAS A ROARING INFERNO THAT BELCHED STEAM, SPARKS AND SOOT--GRAND CENTRAL TERMINAL WITH ITS ACRES OF TRACKS AND RAILROAD YARDS!"
(SNIFF) WHO WOULD WANT TO LIVE NEAR A DREADFUL PLACE LIKE THIS?
NOBODY WOULD, MA'AM, IF THEY COULD AFFORD TO LIVE ANYPLACE ELSE!
THOSE SPARKS START FIRES ALMOST EVERY DAY! SOMETHING SHOULD BE DONE ABOUT THAT "PIT"!
"HERE AGAIN, ELECTRIC LOCOMOTIVES CAME TO THE RESCUE! NOW THOSE UGLY TRACKS AND YARDS COULD BE COVERED UP... THAT SMOKY PIT CHANGED INTO FORTY ACRES OF THE MOST VALUABLE REAL ESTATE IN THE WORLD!"
BUT IF THAT'S GRAND CENTRAL, WHERE ARE ALL THE TRAINS?
YOU'RE STANDING ON THEM, MA'AM!
THIS IS THE FINEST SECTION OF MANHATTAN! I WAS LUCKY TO FIND OFFICE SPACE HERE!
PARK AVE
I'LL BET THAT MADE THE OTHER RAILROAD LINES SIT UP AND TAKE NOTICE!
RIGHT! FOR EXAMPLE, TAKE THE LONG ISLAND RAILROAD, PART OF THE PENNSYLVANIA SYSTEM...
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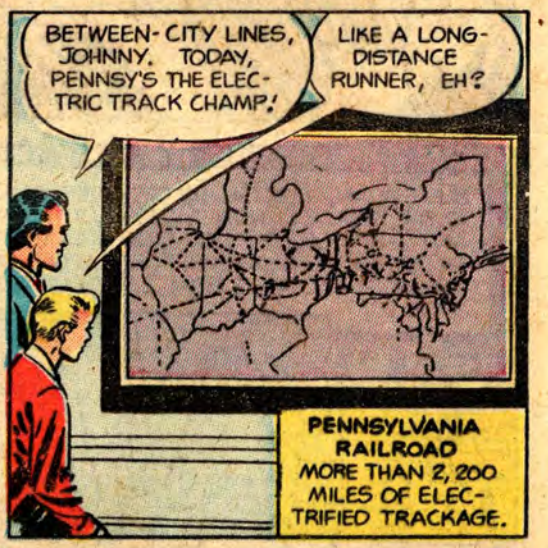
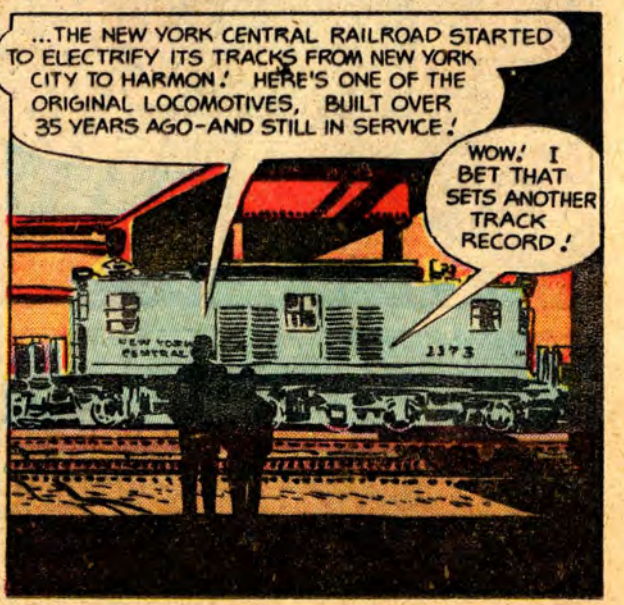
...IN 1905, JUST BEFORE THE DISASTROUS SAN FRANCISCO EARTHQUAKE...


...THE LONG ISLAND RAILROAD, STARTED TO ELECTRIFY ITS "LONG-LINE" TRACK!
"LONG-LINE"? WHAT'S THAT?


BETWEEN-CITY LINES, JOHNNY. TODAY, PENNSY'S THE ELECTRIC TRACK CHAMP!
LIKE A LONG-DISTANCE RUNNER, EH?
PENNSYLVANIA RAILROAD MORE THAN 2,200 MILES OF ELECTRIFIED TRACKAGE.


YES, AND SOON ALL OVER AMERICA, ELECTRICITY BEGAN "WORKING ON THE RAILROAD"! IN 1909, WHEN BLERIOT FLEW THE FIRST PLANE ACROSS THE ENGLISH CHANNEL...


...THE NEW YORK CENTRAL RAILROAD STARTED TO ELECTRIFY ITS TRACKS FROM NEW YORK CITY TO HARMON! HERE'S ONE OF THE ORIGINAL LOCOMOTIVES, BUILT OVER 35 YEARS AGO-AND STILL IN SERVICE!
WOW! I BET THAT SETS ANOTHER TRACK RECORD!
NEW YORK CENTRAL
2373


AND THERE WERE PLENTY MORE RECORDS, TOO. IN 1915, DURING WORLD WAR I...
"...ELECTRICITY WENT TO WORK FOR THE MILWAUKEE ROAD ON THE LONG, TOUGH HAUL OVER THE CASCADE MOUNTAINS...AND PROVED ITS POWER IN A FAMOUS TUG-OF WAR..."
HEY! THAT SINGLE ELECTRIC IS PULLIN' BOTH OUR ENGINES BACK!
JOHNNY, HERE'S THE LARGEST SINGLE-CAB ELECTRIC LOCOMOTIVE IN IN THE WORLD...BUILT BY G.E. FOR THE DIFFICULT CASCADE TUNNEL SECTION OF THE GREAT NORTHERN RAILWAY.
AND THIS IS THE "VIRGINIAN" ONE OF THE MOST POWERFUL MOTOR-GENERATOR TYPE ELECTRICS ON THE ROAD TODAY!
BOY! IT'S A LONG WAY FROM EDISON'S FIRST ELECTRIC ENGINE!
THE SIGN SAYS "DIESEL-ELECTRIC" ...WHAT'S THAT?
JOHNNY, YOU NEED SOME QUICK LEARNING. LET'S TAKE A LOOK AT THE 3 BASIC TYPES OF LOCOMOTIVES...
AMERICA'S MOST POWERFUL DIESEL-ELECTRIC LOCOMOTIVES
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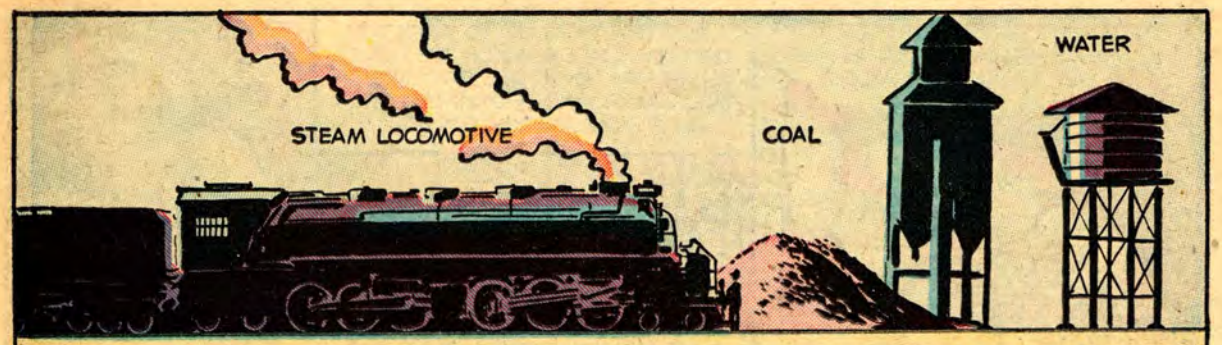
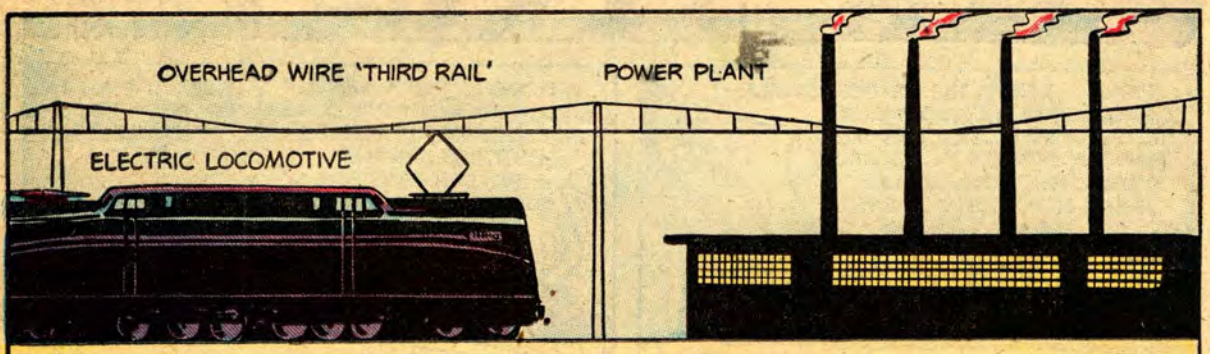
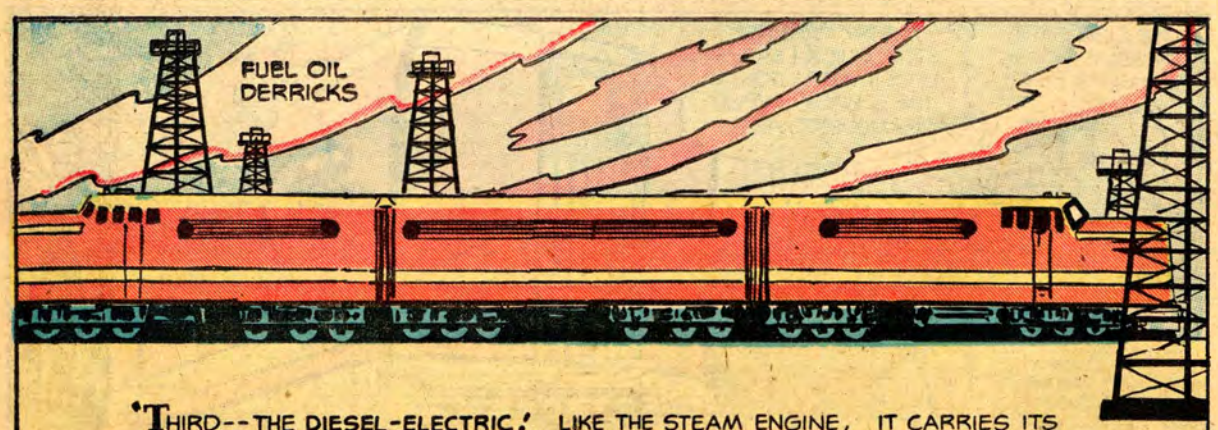


"FIRST--THE **STEAM** LOCOMOTIVE! IT CARRIES ITS OWN FUEL BUT HAS TO STOP AND REFUEL OFTEN...NEEDS FREQUENT SERVICING. IT'S THE CHEAPEST LOCOMOTIVE TO BUY...BUT THE MOST EXPENSIVE TO MAINTAIN AND OPERATE!"

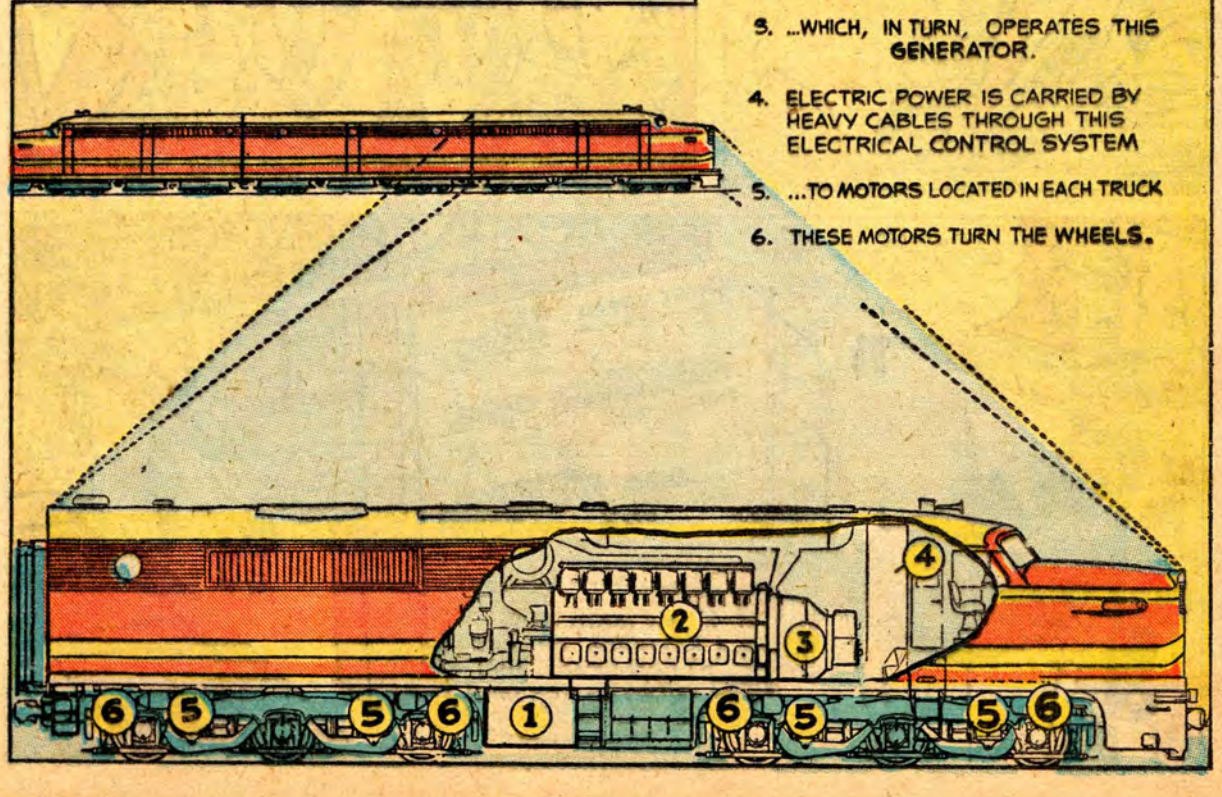


"SECOND--THE **ELECTRIC** LOCOMOTIVE! ITS POWER IS GENERATED MILES AWAY AT A STATIONARY POWER PLANT...ELIMINATING FUEL STOPS. ELECTRIFIED TRACK IS FAIRLY EXPENSIVE TO BUILD, BUT IT CAN'T BE BEAT WHERE TRAFFIC IS HEAVY BETWEEN CITIES AND THROUGH RESIDENTIAL DISTRICTS!"



"THIRD--THE **DIESEL-ELECTRIC!** LIKE THE STEAM ENGINE, IT CARRIES ITS OWN FUEL, BUT IT TRAVELS MUCH FARTHER WITHOUT REFUELING. SINCE IT DOESN'T HAVE TO 'GET UP STEAM', IT'S ALWAYS **READY TO GO**...AND, BEST OF ALL, LIKE ALL ELECTRICS, THE DIESEL-ELECTRIC RUNS A LONG TIME WITHOUT OVERHAULING. IT'S CLEAN, QUIET...FAST AND POWERFUL!

1. FUEL OIL CARRIED IN TANKS HERE...
2. ...IS USED TO RUN THIS DIESEL ENGINE...
3. ...WHICH, IN TURN, OPERATES THIS GENERATOR.
4. ELECTRIC POWER IS CARRIED BY HEAVY CABLES THROUGH THIS ELECTRICAL CONTROL SYSTEM
5. ...TO MOTORS LOCATED IN EACH TRUCK
6. THESE MOTORS TURN THE WHEELS.




GOLLY, THERE'S POWER IN 4... 8 ...24 WHEELS!
CHECK...THAT'S WHY THIS BIG BABY IS TOPS IN SMOOTH, EVEN, EFFICIENT POWER.
BUT WHY NOT HAVE THE POWER RUNNING STRAIGHT FROM THE DIESEL TO THE WHEELS?
A GOOD QUESTION...WITH A GOOD ANSWER! ELECTRICITY GIVES MORE EXACT CONTROL AND SMOOTHER SPEED CHANGES!
THAT MEANS LESS WHEEL SLIPPAGE, LESS WEAR ON CARS AND COUPLINGS, LESS POUNDING ON THE TRACK AND ROADBED, HEAVIER LOADS AND MORE COMFORT.
WOW... IT LOOKS AS THOUGH STEAM-ENGINES ARE THROUGH!
NOT YET! REMEMBER... ALL ENGINES ARE BUILT FOR LONG SERVICE! 'STEAMERS' WILL BE AROUND FOR QUITE A WHILE!
THIS TELLS THE STORY- DIESEL-ELECTRICS ARE THE PREFERRED ENGINE TODAY!
BOUGHT
STEAM
DIESEL-ELECTRIC
1929
89%
11%
1947
8½%
91½%
MY MATH ISN'T TOO GOOD, BUT EVEN I CAN FIGURE THAT OUT AS BETTER THAN 10 TO 1!
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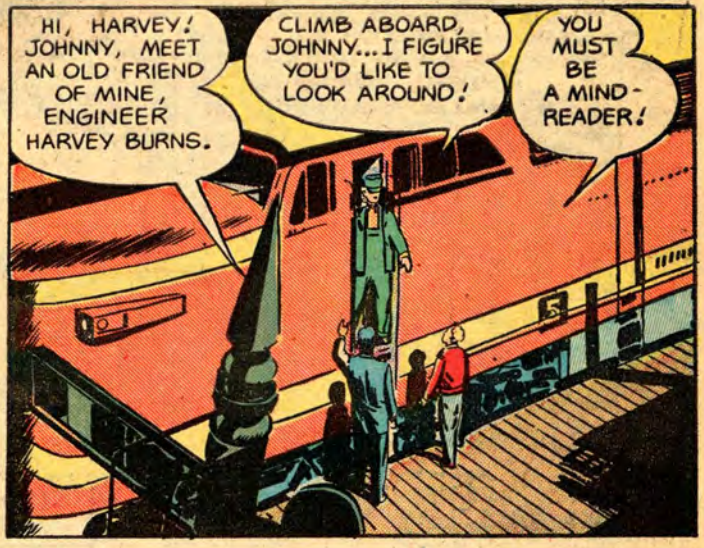
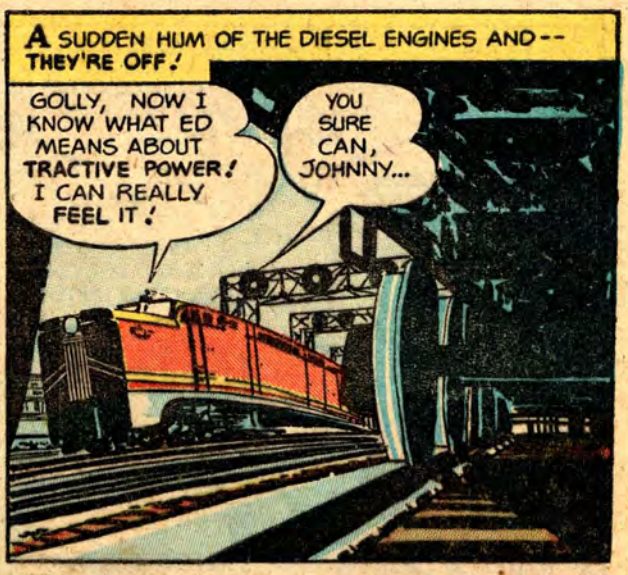
ONE OF THE GREAT THINGS ABOUT DIESEL-ELECTRICS, JOHNNY, IS THEIR **FLEXIBILITY.** FOR EXAMPLE, THIS BIG, 6,000 HORSE-POWER LOCOMOTIVE HAS **THREE** SEPARATE UNITS OF 2,000 HP EACH...
I GET IT! IF YOU NEEDED ONLY 4,000 HP, YOU'D USE ONLY **TWO** UNITS!


YES, JOHNNY, YOU CAN USE ONE, TWO, THREE, OR MORE UNITS TO GET JUST THE POWER YOU NEED.


HI, HARVEY! JOHNNY, MEET AN OLD FRIEND OF MINE, ENGINEER HARVEY BURNS.
CLIMB ABOARD, JOHNNY... I FIGURE YOU'D LIKE TO LOOK AROUND!
YOU MUST BE A MIND-READER!


GOLLY, THIS IS THE MOST WONDERFUL ENGINE IN THE WORLD!
WE THINK SO... SO FAR, AT LEAST. BUT WE'RE AT WORK NOW ON EVEN NEWER DESIGNS... GAS TURBINES AND OTHERS.


SAY... THIS IS THE LAST DAY OF THE EXPOSITION AND I'M TAKING THIS ENGINE BACK INTO SERVICE! HOW'D YOU LIKE TO COME ALONG FOR THE RIDE?
OH BOY!
THERE'S YOUR ANSWER!


A SUDDEN HUM OF THE DIESEL ENGINES AND -- THEY'RE OFF!
GOLLY, NOW I KNOW WHAT ED MEANS ABOUT TRACTIVE POWER! I CAN REALLY FEEL IT!
YOU SURE CAN, JOHNNY...


"AFTER ALL, THIS IS THE FIRST ENGINE THAT COULD PULL A 1182-TON PASSENGER TRAIN 'OVER THE HUMP' ON THE RATON MOUNTAIN ROUTE OF THE SANTA FE---"


Y'KNOW, THE WAY YOU SIT THERE IN THIS CLEAN STREAMLINER, IT'S LIKE BEING AN AIRPLANE PILOT!
YEP, BUT IT WASN'T LIKE THIS IN THE OLD DAYS...


"IT WAS A HOT, SMOKY, DIRTY JOB!... AND SPARKS WERE A REAL WORRY!"
OW! ANOTHER HOLE BURNED IN THIS SHIRT ...AND ANOTHER HOLE BURNED IN ME!

"AND THE FOLKS WHO LIVED ALONG THE LINE HAD THEIR TROUBLES WITH SMOKE AND CINDERS, TOO..."

YEP, THINGS ARE PLENTY DIFFERENT NOW!

THANKS TO OUR DIESEL-ELECTRIC!

WELL, YOU'VE CONVINCED ME THAT ELECTRICITY IS DOING A JOB "WORKING ON THE RAILROAD!"

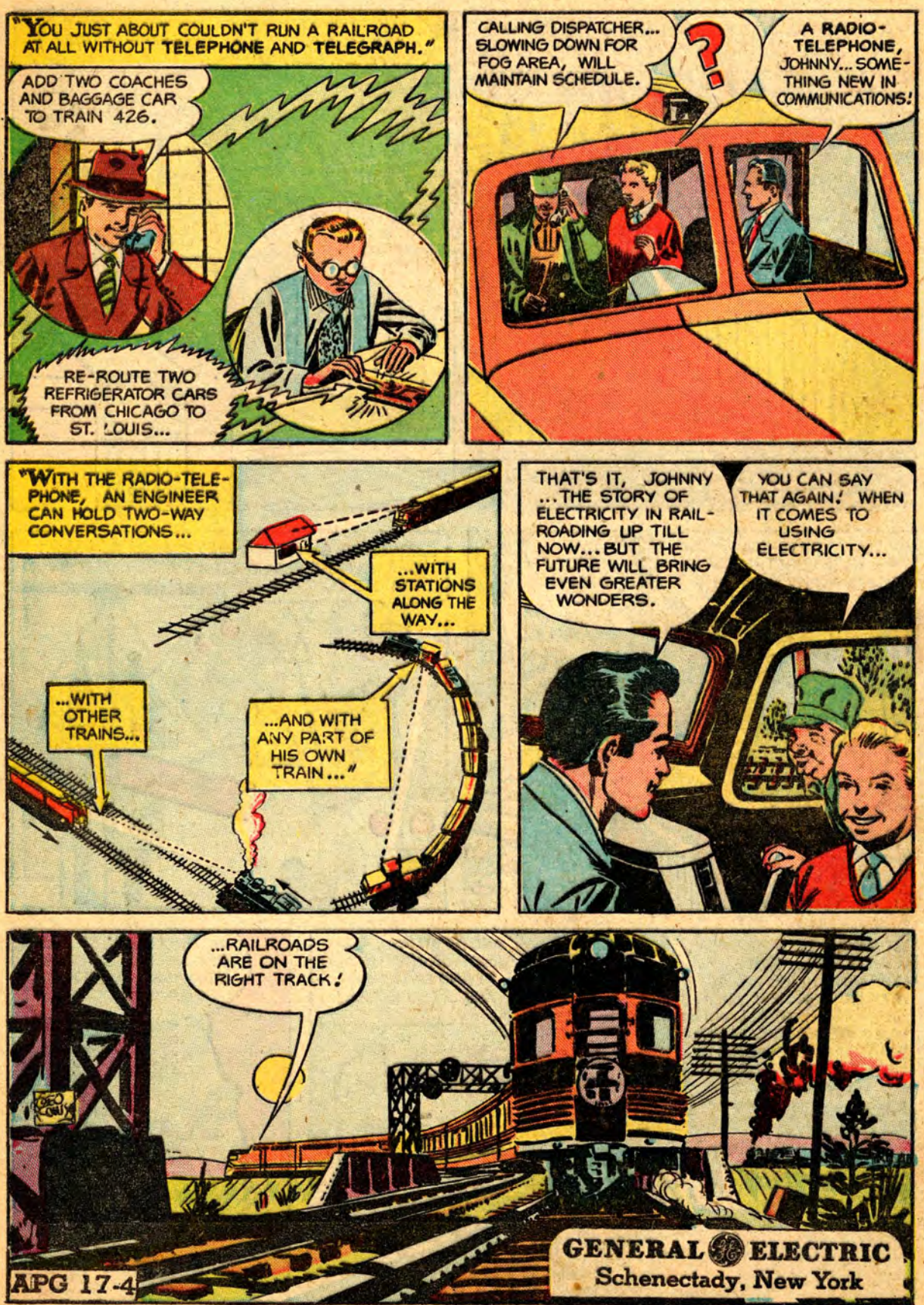
I'VE HARDLY BEGUN, JOHNNY. FOR EXAMPLE...

"CONSIDER **SWITCHES AND SIGNALS.** MOST OF THEM ARE ELECTRICALLY-OPERATED BY REMOTE CONTROL..."

"IT WOULD BE IMPOSSIBLE, OF COURSE, FOR A BIG TERMINAL LIKE GRAND CENTRAL IN NEW YORK TO OPERATE AT ALL WITHOUT REMOTE-CONTROL OF TRAIN MOVEMENTS BY ELECTRIC SIGNALS AND SWITCHES..."

ANOTHER DAY... AND ANOTHER 400 TRAINS IN AND OUT SAFE AND ON SCHEDULE!

AND THAT'S JUST THE BEGINNING, JOHNNY! NOW TAKE ELECTRIC COMMUNICATIONS...


"YOU JUST ABOUT COULDN'T RUN A RAILROAD AT ALL WITHOUT TELEPHONE AND TELEGRAPH."
ADD TWO COACHES AND BAGGAGE CAR TO TRAIN 426.
RE-ROUTE TWO REFRIGERATOR CARS FROM CHICAGO TO ST. LOUIS...
CALLING DISPATCHER... SLOWING DOWN FOR FOG AREA, WILL MAINTAIN SCHEDULE.
?
A RADIO-TELEPHONE, JOHNNY... SOMETHING NEW IN COMMUNICATIONS!
"WITH THE RADIO-TELEPHONE, AN ENGINEER CAN HOLD TWO-WAY CONVERSATIONS...
...WITH STATIONS ALONG THE WAY...
...WITH OTHER TRAINS...
...AND WITH ANY PART OF HIS OWN TRAIN..."
THAT'S IT, JOHNNY ...THE STORY OF ELECTRICITY IN RAILROADING UP TILL NOW... BUT THE FUTURE WILL BRING EVEN GREATER WONDERS.
YOU CAN SAY THAT AGAIN! WHEN IT COMES TO USING ELECTRICITY...
...RAILROADS ARE ON THE RIGHT TRACK!
APG 17-4
GENERAL ELECTRIC
Schenectady, New York