

WESTINGHOUSE ELECTRIC CORPORATION

OVERVIEW

GEORGE WESTINGHOUSE

- THE MAN
- THE INVENTOR
- THE ENTREPRENEUR/BUSINESSMAN

WESTINGHOUSE - THE FIRST 100+ YEARS

GEORGE WESTINGHOUSE

THE MAN



BORN: OCT. 6, 1846 - CENTRAL BRIDGE, NY

DIED: MAR. 12, 1914 - ARLINGTON NATIONAL CEMETARY

ANCESTORS: GERMANY
FARMERS/MECHANICS

YOUTH: WORKED IN FATHER'S MACHINE SHOP
CIVIL WAR - AGES 16 TO 19
EDUCATION - 1-1/2 YEARS TOTAL

FIRST PATENT: AGE 19
ROTARY STEAM ENGINE

FIRST ENTERPRISE: AGE 22
WESTINGHOUSE AIR BRAKE COMPANY

APPEARANCE: PHYSICALLY STRONG
COMMANDING
DISTINGUISHED

GEORGE WESTINGHOUSE

THE MAN



CHARACTER: DILIGENT HIGH INTEGRITY
DISCIPLINED INSPIRATIONAL
ENERGETIC ENTHUSIASTIC
HARD DRIVER EAGER
SINCERE SENSITIVE

EMPLOYEE RELATIONS:

AIR BRAKE CO. DINNER
TURKEY
PENSION
COVERED WALKWAY
LUNCHROOM

EMPLOYEE CLUBS

WEALTH: A TOOL TO CARRY OUT IDEAS

SIMPLE MAN: TEMPERATE
HARD WORKING

HONESTY: "WE ARE HERE TO SERVE OUR
CUSTOMERS NOT TO SWINDLE THEM.
THAT'S THE ONLY WAY TO BUILD A
SOUND BUSINESS"

GEORGE WESTINGHOUSE

THE INVENTOR



PATENTS:

ONE EVERY 6 WEEKS FOR 48 YEARS (OVER ~~4000~~ ³⁵⁰)
VERSATILE
NOT FOR SALE - MADE IN OWN SHOP

TECHNOLOGIES:

AIR BRAKE:

STRAIGHT AIR
AUTOMATIC
QUICK ACTION
ELECTROPNEUMATIC
ACCESSORIES
FRICTION DRAFT GEAR
HYDRAULIC DRAFT GEAR

ELECTRICAL:

DISTRIBUTION
TRANSFORMERS
GENERATORS AND MOTORS
METERS
ARC LAMPS
ELECTRIC RAILWAYS AND LOCOMOTIVES
STEAM ENGINES
STEAM TURBINES
NATURAL GAS AND FUEL GAS
RAILWAY SIGNALLING AND INTERLOCKS

LAST PATENT:

NOV. 5, 1918 FOR AUTOMATIC
TRAIN CONTROL

GEORGE WESTINGHOUSE

THE ENTREPRENEUR/BUSINESSMAN

FIRST
ENTERPRISE: WESTINGHOUSE AIR BRAKE COMPANY - 1869

TOTAL OF 104
COMPANIES:

- TO MAKE EQUIPMENT CREATED BY PATENT IDEAS OR SPINOFFS
- WORLD WIDE
- MANY EVENTUAL MERGER

WESTINGHOUSE ELECTRIC COMPANY:

- CHARTER JAN. 8, 1886
- \$1,000,000 ASSETS
- 27 PATENTS
- 1890 BUILT 250 HP DC CURRENT GENERATOR BELT DRIVEN FOR RAILROAD APPLICATION
- 1894 DIRECT COUPLED WITH STEAM ENGINE - 1500KW
- 1898 ROTARY CONVERTER APPLICATION
BIRTH OF AC POWER PRODUCTION
(CONTROVERSY WITH EDISON)
300-400 KW UNITS 3600 RPM 480 VOLT HZ
WESTINGHOUSE AIR BRAKE COMPANY
- ASSETS TRANSFERRED TO WESTINGHOUSE ELECTRIC & MANUFACTURING CO. - 1889

WESTINGHOUSE MACHINE COMPANY:

- CHARTERED IN 1881
- STEAM ENGINE EMPHASIS
- 1895 LICENSE FROM SIR CHARLES PARSONS FOR STEAM TURBINE TECHNOLOGY
- HARTFORD ELECTRIC LIGHT CO. - 1900
1500 KW 1200 RPM T-G
- SINGLE "DOUBLE FLOW" DESIGN



GEORGE WESTINGHOUSE

THE ENTREPRENEUR/BUSINESSMAN



BUSINESS DETOUR:

- WESTINGHOUSE WAS HIS OWN BANKER
- 1907 "GREAT PANIC" LOANS CALLED IN
NO BANKS FOR BACK-UP
- RECEIVERSHIP STATUS FOR 3 COMPANIES
WESTINGHOUSE ELECTRIC COMPANY
WESTINGHOUSE MACHINE COMPANY
SECURITY INVESTMENT
- RECOVERY PLAN IN 14 MONTHS
ELECTRIC COMPANY RECOVERED
NEW BOARD - 1/2 SEATS CREDITORS
WESTINGHOUSE POWERS LIMITED
1911 RESIGNATION

FINAL MERGER:

- 1917 WESTINGHOUSE MACHINE COMPANY OFFICIALLY
MERGED WITH WESTINGHOUSE ELECTRIC
AND MANUFACTURING COMPANY

GEORGE WESTINGHOUSE LEGACY:

- ADVANCED STATE-OF-THE-ART IN
TRANSPORTATION THROUGH INVENTION
AND DEVELOPMENT OF THE AIR BRAKE
- ADVANCED MANUFACTURING POWER BY DEVELOPMENT
OF AC IN DISTRIBUTION AND APPLYING POWER
WITH ELECTRICITY.

WESTINGHOUSE ASSOCIATED COMPANIES

CHRONOLOGICALLY ARRANGED



WESTINGHOUSE ASSOCIATED COMPANIES

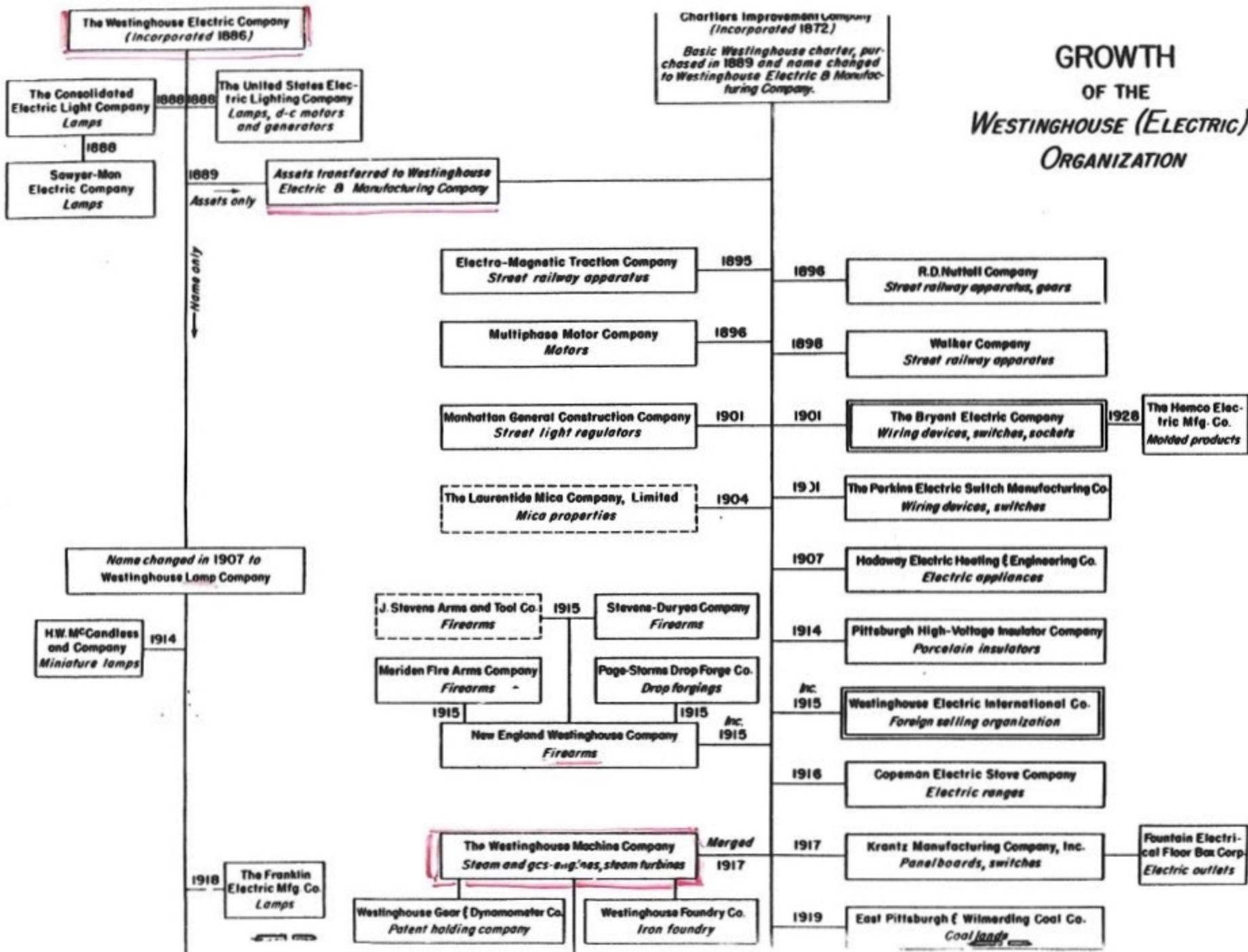
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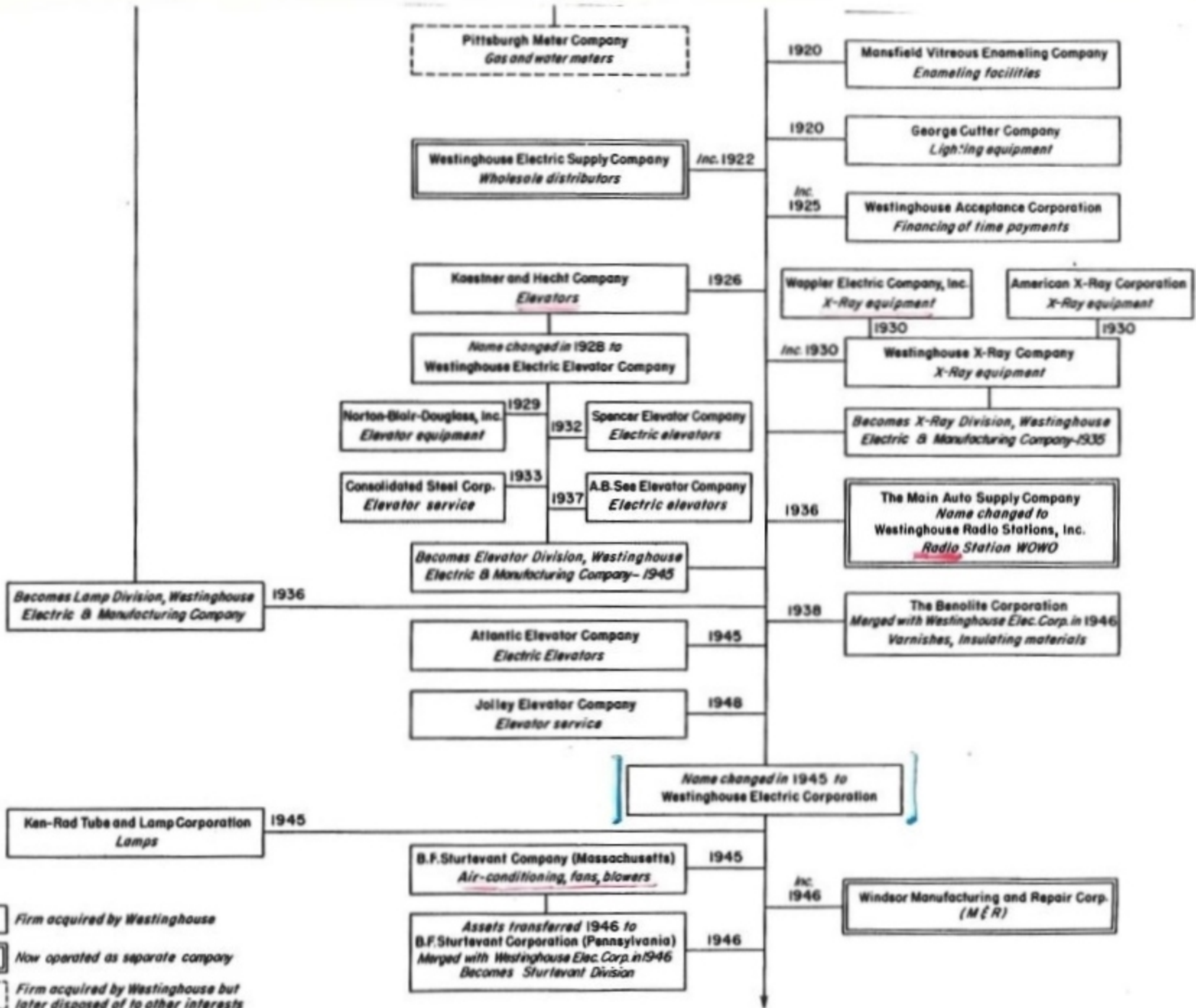
	1870	1880	1890	1900	1910	1920
CIE. INT. FR. LE CHAUFFAGE DES CHEMINS DE FER SYSTEME HEINTZ, LTD.						
WESTINGHOUSE METAL FILAMENT LAMP CO.						
SOCIÉTÉ ÉLECTRIQUE WESTINGHOUSE DE RUSSIE						
UNITED PUMP & POWER COMPANY						
NATIONAL BRAKE & ELECTRIC CO.						
WESTINGHOUSE COOPER HEWITT CO., LTD.						
WESTINGHOUSE METALLFADEN GLÜHLAMPENFABRIK GESELLSCHAFT						
MILWAUKEE LOCOMOTIVE MANUFACTURING CO.						
SOCIETÀ ITALIANA WESTINGHOUSE						
WESTINGHOUSE BRAKE CO. LTD. (AUSTRALASIA)						
MCKENZIE-HOLLAND & WESTINGHOUSE POWER SIGNAL CO., LTD.						
WESTINGHOUSE LAMP CO.						
BERGMANN ELECTRIC WERKE, A. G.						
SOCIÉTÉ ANONYME FR. L'EXPLOITATION DES PROCÉDÉS WESTINGHOUSE LEBLANC						
SOCIÉTÉ HONGROISE D'AUTO SYSTEME WESTINGHOUSE						
TRAFFORD REAL ESTATE CO.						
WESTINGHOUSE FRICTION DRAFT GEAR CO.						
PITTSBURGH HIGH VOLTAGE INSULATOR CO.						
WESTINGHOUSE AIR SPRING CO.						
COMPAGNIE DES LAMPES À FILAMENTS MÉTALLIQUES						
COMP. POUR LES APPLICATIONS DES RAYONS ULTRA-VIOLET (FRANCE)						
SOC. INT. POUR LES APPLICATIONS DES RAYONS ULTRA-VIOLET (BELGIUM)						
COPEMAN ELECTRIC STOVE CO.						
WESTINGHOUSE PACIFIC COAST BRAKE CO.						
ELECTRIC PROPERTIES CORPORATION						
WESTINGHOUSE NORSK ELEKTRISK AKTIENSKESKAP						
WESTINGHOUSE GEAR & DYNAMOMETER CO.						
LOCOMOTIVE STOKER CO.						
CANADIAN CONCRETE PRODUCTS CO., LTD.						
NATIONAL STEEL FOUNDRIES						
KRANTZ MANUFACTURING CO., INC.						
FOUNTAIN ELECTRICAL FLOOR BOX CORP.						
PAGE-STORM DROP FORGE CO.						
NEW ENGLAND WESTINGHOUSE CO.						
WESTINGHOUSE ELECTRIC EXPORT CO.						
J. STEVENS ARMS CO.						
MERIDEN FIRE ARMS CO.						
TURTLE CREEK & ALLEGHENY VALLEY R. R. CO.						
WESTINGHOUSE ELECTRIC PRODUCTS CO.						
SOUTH PHILADELPHIA CO.						
WESTINGHOUSE ELECTRIC INTERNATIONAL COMPANY						
INTERBOROUGH IMPROVEMENT CO.						
FRANKLIN ELECTRIC MANUFACTURING CO.						
EAST PITTSBURGH & WILMERDING COAL CO.						
WESTINGHOUSE AIR BRAKE HOME BUILDING CO.						
GEORGE CUTLER CO.						
NATIONAL UTILITIES CORPORATION						
WESTINGHOUSE UNION BATTERY CO.						
INTERNATIONAL RADIO TELEGRAPH COMPANY, THE						
MANFIELD VITREOUS ENAMELING COMPANY, THE						
WESTINGHOUSE BRAKE & SAXBY SIGNAL CO., LTD.						

THE DATE OF ORGANIZATION AND MEMBER OF COMPANIES INDICATED AS FOLLOWS:

Westinghouse Electric & Manufacturing Co.	W
Westinghouse Air Brake Co.	W
Westinghouse Lamp Co.	W
Westinghouse Electric International Co.	W
Westinghouse Machine Co.	W
Westinghouse Brake & Signal Co.	W
Independent Companies	

GROWTH OF THE WESTINGHOUSE (ELECTRIC) ORGANIZATION





- Firm acquired by Westinghouse
- Now operated as separate company
- Firm acquired by Westinghouse but later disposed of to other interests

WESTINGHOUSE ELECTRIC CORPORATION

THE FIRST 100 YEARS

MAJOR PRODUCT INTRODUCTION



1900-1910

STEAM TURBINE-GENERATOR
INDUCTION MOTOR
INDUCTION RELAY
ENGINE GENERATOR
SPEED REDUCING GEAR
SWITCHBOARD PANEL
AUTOMATIC SYNCHRONIZER
LIGHTNING ARRESTER

SYNCHRONOUS CONVERTER
ROTARY AIR PUMP
- TUNGSTEN LAMP
RADIAL FLOW CONDENSER
- HOUSEHOLD FAN
VOLTAGE REGULATOR



1910-1922

MARINE TURBINE
- ELECTRIC WELDING
- ELECTRIC LOCOMOTIVE
- FRACTIONAL HP MOTOR
STEAM AIR EJECTOR
- TOASTER
- SEWING MACHINE
TRACTOR TRANSMISSION
- ELECTRIC DRILL

- ELECTRIC OVEN
- KDKA RADIO
HELICAL GEARS
HYDRAULIC GOVERNOR
SYNCHRONOUS CONDENSER
AIRPORT RUNWAY LIGHT
DIESEL ELECTRIC DRIVE

1922-1940



- VACUUM CLEANER
- DEEP SEA DIVING LAMP
- METER
- LOUDSPEAKER
- SHORT WAVE RADIO
- COLOR LAMPS
- OIL WELL DRILL
- GEARMOTOR
- ELECTRIC STEEL
- FLAT IRON
- KOVAR MATERIAL
- WAFFLE IRON
- INERTIA SHOCK ABSORBER
- REFRIGERATOR SEAL
- DIRIGIBLE PROPULSION
- CAR PARKING MACHINE
- TACHOMETER
- AIR CONDITIONING
- HYDRAULIC ELEVATOR
- CUPALOY
- AIR BREAKER
- TRANSFORMERS
- MT. PALOMER TELESCOPE
- MOUNTING
- SOCKET INSTRUMENTS
- PERCOLATOR
- RADIO RECEIVING TUBES
- POWER SAW
- SIDE ENTRY BLADING
- ELEVATOR CONTROL
- TROLLEY COACH
- ANNEALING FURNACE
- TURBINE CONTROL VALVE
- ELECTRICAL JACK HAMMER
- PHOTOCELLS
- SILENT MOVIE CAMERA
- STROBAGLOW
- TRAFFIC LIGHT CONTROL
- AUTO DOOR OPENER
- MICARTA
- POWER FUSE
- MOVIE PROJECTOR
- SPOT WELDING
- LOOM MOTOR
- HYDRAULIC GOVERNOR
- AIRCRAFT CONTROL
- X-RAY TUBE
- SUPERVISORY CONTROL
- PIPE SAW
- WATER HEATER



IT CAN'T BE DONE
BUT HERE IT IS



1940-1953



- GAS TURBINE
- LINEAR COUPLERS
- JET ENGINE
- DIRECT DRIVE EXCITER
- SUNLAMP
- GEARED DRIVE LOCOMOTIVE
- REFRACTALLOY
- TORPEDOES
- PLANE LAUNCHER
- ANALOG COMPUTER
- HEATED WINDSHIELD
- RADIATION DETECTORS
- ELECTRIC STAIRWAY
- INSULFOAM
- SEARCH LIGHT
- SPECTATOR CONVEYOR
- FLUORESCENT LAMP
- LAUDROMAT
- SYNTHETIC RESIN
- URANIUM PHOTO FISSION
- RADIOGRAPHY

- DRY TYPE TRANSFORMER
- INSECTICIDE DISPENSER
- PRECIPITRON
- RADAR
- PRECISION CASTING
- FOSTERITE VARNISH
- LASHED TURBINE BLADES
- STRATOVISION
- PACKAGED STEAM TURB.-GEN.
- AUTOMATIC PILOT
- ELECTROPLATING
- SUNLAMP
- DISCALLOY
- THERMALASTIC
- BALL PARK LIGHTING
- MEAT TENDERIZER
- REFRIGERATOR
- DOUBLE BLEEDER STEAM TURBINE
- HIGHWAY LAMPS
- WINDOW AIR CONDITIONER
- XB-19 AC SYSTEM

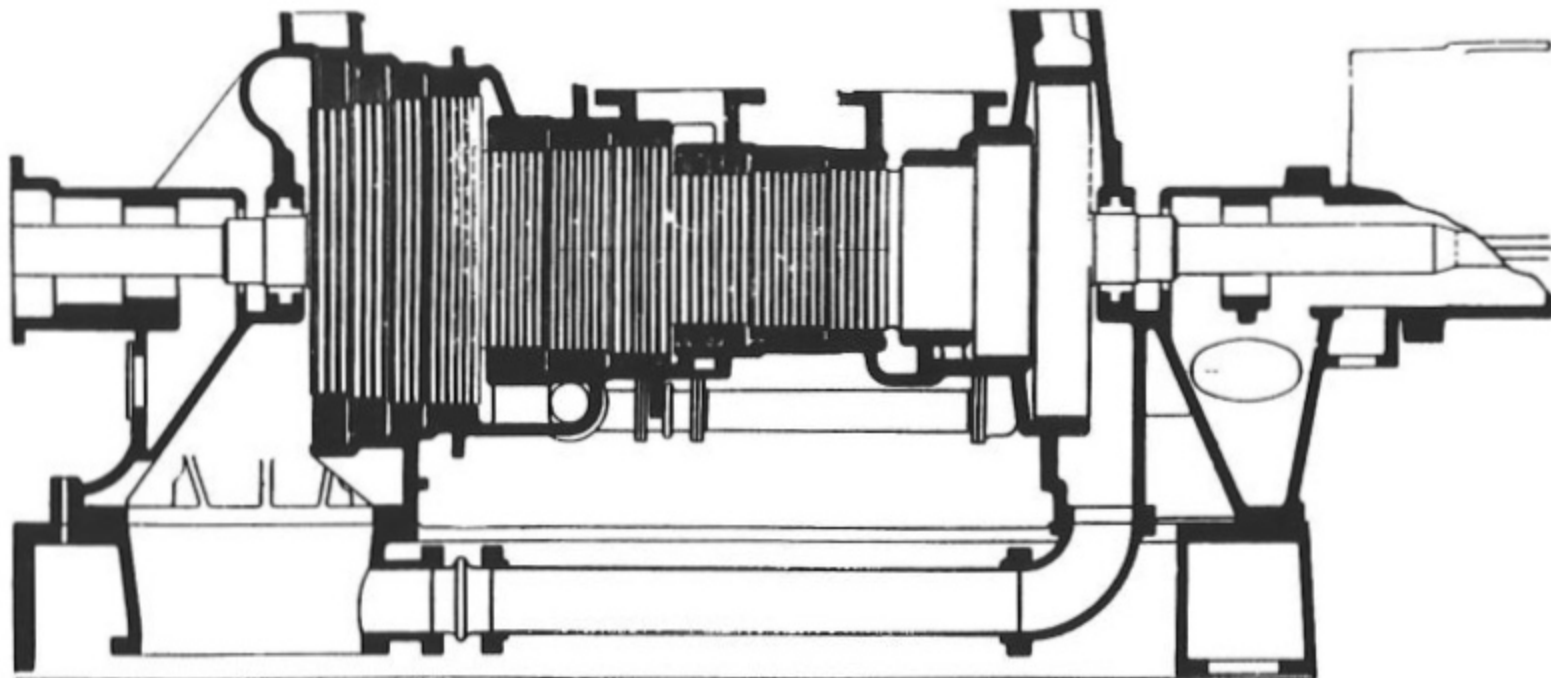


Westinghouse®

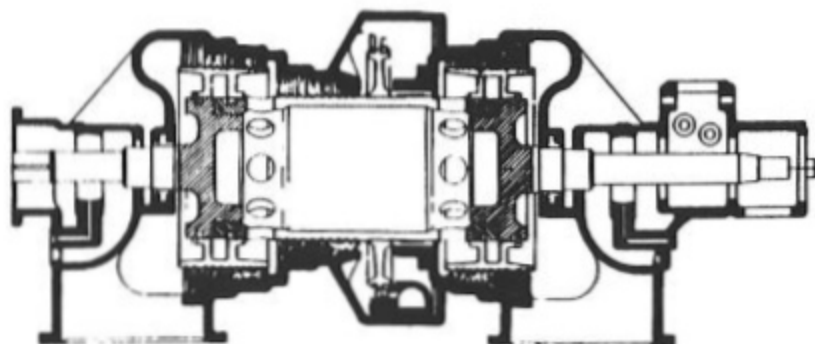
1953-1960

- NAUTILUS POWER PLANT
- NUCLEAR POWER PLANT
- SPACE REACTOR
- SUPERCONDUCTORS
- TRUCK REFRIGERATOR
- ELECTRON MICROSCOPE
- PEOPLE MOVER
- CORAL RIDGE
- ROBOTICS
- AIR TRAFFIC CONTROL

- MISSILE LAUNCHER
- AIRBORN RADAR
- MOON CAMERA
- 7-UP BUSINESS
- BREEDER REACTOR
- METRO SYSTEMS
- AWACS
- LIGHT WATER REACTOR
- LONGINES WATCHES



PARSONS SINGLE FLOW TURBINE



WESTINGHOUSE SINGLE DOUBLE FLOW TURBINE

**DRAWINGS TO SAME SCALE
TURBINES EQUAL CAPACITY**

Parsons single-flow and Westinghouse single-double-flow turbines. Comparative sizes; equal powers.