

44

From George E. Simons,
General Electric Co.,
A Century of Progress,
Chicago, Ill.

General Electric's Exhibit
In A Century of Progress

Spectacular discoveries and developments of its famous research laboratory are shown and explained in the "House of Magic", the feature of the General Electric Company's exhibit at A Century of Progress Exposition. The company has concentrated nearly all of its displays in 9,000 square feet of space on the main floor of the great circular hall of the Electrical Building.

In the little auditorium which is completely air conditioned 200 people can be accommodated for each series of lectures and demonstrations, comprising one of an all-day series of performances which illustrate the striking advances in the electrical art that have been made during the last few years. The lighting system alone, utilizing a combination of the newest types of equipment, provides an interesting demonstration in addition to furnishing adequate lighting.

For rapid changes of costume, there is a girl in the "House of Magic" who would make green with envy the quick-change artists of the vaudeville stage. She isn't a real girl; she's a picture, done in three kinds of fluorescent paint. Under the ordinary lights, she appears as a charming young thing in a flimsy summer formal gown. At the snap of a switch, the house lights change and she is left apparently clad only in a striking one-piece bathing suit. With another change of lights, the girl disappears to leave only the bathing suit. This is just one of the demonstrations.

Probably one of the most interesting demonstrations is of the electrical fever machine, a development which came as a side issue when engineers were engaged in the building of short wave radio transmitter equipment. It was found that electrical waves coming from this radio tube created an artificial temperature or fever in persons nearby. The result was that several fever machines have been built and are now being used in hospitals with most satisfactory results in combating diseases where a fever is necessary, such as paresis. To show how an artificial

fever is produced by it corn is popped in a container placed between two glass containers, each filled with ice water.

Phototubes, more popularly known as "electric eyes", show off their ability to distinguish color by sorting black and white balls rolling down a chute. Another one prevents the lecturer from lighting a candle with a match. Still others detect the presence of cigarette smoke and turn on a fan, count the invisible flickers in an ordinary lamp, and help to pick up music that is being transmitted through the air on nothing more substantial than a beam of light. A novelty that attracts small boys particularly is the voice-controlled toy electric train, which may be made to go forward, stop, or back up with no more effort than speaking orders into a microphone or telephone mouthpiece.

The cathode ray oscillograph gives the audience a chance to see what sound looks like in the form of light vibrations, and almost weird demonstrations of the effects of ultra-violet are shown with objects coated with fluorescent paint. The fever machine, Geiger counter, dental X-ray, stroboscope, and many other ingenious devices are put through their paces; while a Thyatron organ, no bigger than a toy piano but capable of sound volume equal to great pipe organs, furnishes a musical interlude. A wave of the scientist-magician's wand opens the exits at the close of the performance.

Outside the "House of Magic" and under a balcony that supports massive pillars covered with mural paintings depicting the development of the electrical industry are displays of General Electric products and processes, many of them in operation, that dramatically portray the part played by electricity in the home, in commerce, and in industry. The whole exhibit was obviously designed to make many applications of electricity understandable to men, women, and children alike, and, in addition to providing an explanatory picture of common uses of electricity, to suggest new and better uses for the future. Blazing forth from an electric sign more than 150 feet long, on the facade of the balcony, are quotations from Steinmetz and Edison who predicted the progress of electricity many years ago.

Air-Conditioning

In a setting built to represent the basement and first floor of a house, two types of air conditioning installations are shown. In one section, the furnace and central air conditioning unit for all-year use are in operation to demonstrate how air is heated, washed, humidified, and distributed in winter; and cooled, conditioned, and distributed in the summer. In another section, air conditioning equipment for a single room is shown in operation.

Kitchen Institute

Displays of electric ranges and refrigerators are placed on either side of a section identified as the G-E Kitchen Institute exhibit, consisting of two model kitchens, each equipped with electric range, refrigerator, dishwasher, clock and other small home appliances.

A talking kitchen that talks about itself to women instead of being talked about by them, is the first of the models reached by the visitor who leaves the "House of Magic." The talking is done by a mechanical device which also turns on spotlights, one at a time, to emphasize the items of equipment being explained. Having heard the story of the talking kitchen, the visitor may move on to the second model in which electrical and plumbing connections have been made, and may examine at close range the conveniences provided by electricity in the modern kitchen. Between the kitchens in the Institute's planning room, where an experienced designer is in attendance to assist with the planning of new or remodeled electric kitchens.

General Electric has also installed complete electric kitchens using the most advanced types of equipment in the Keck Glass House and the Rostone House in the Model Housing Group, and also in the exhibits sponsored by the Great Atlantic & Pacific Tea Company, and the Paper Foundation.

More equipment for electrical housekeeping is shown in the model laundry designed in accordance with scientifically proved ideas in home planning by members of the staff of McCall's Magazine. Representing a bright, airy room, about 15 feet square, the laundry is equipped with every modern convenience--electric washer, flatplate ironer, ventilating fan, electric clock, iron, work tables, sorting bins, and other accessories. From start to finish, it was planned and constructed progressively so that the family washing can be done with a minimum of effort in the shortest possible time. Demonstrations are given every day.

Transportation

The part played by electricity in modern transportation is shown in the apparatus section of the exhibit. Models are used to tell the story of electric ship propulsion. One is a reproduction of the S.S. "California," and the other is a framework model showing the generating equipment, propulsion motors, and auxiliaries necessary to operation. Electric transportation on land is represented by a working model of a giant bi-polar electric locomotive built by G-E.

Power

Reproduced in miniature is the 20,000 kilowatt mercury vapor turbine station built at the Schenectady Works of the company, and for people who want to see what makes the wheels go round, there is a cut-away turbine which shows what happens from the time steam is introduced into the machine until it is exhausted. To show how a nest of gears will cut down speed from 1800 revolutions per minute to as low as 13 revolutions without loss of power, there is a new machine called the gear-motor. A section of the enclosing case is cut away.

Industrial Equipment

For use in hospitals, hotels, apartment buildings, and office buildings where mechanical noises are undesirable, there is a new motor designed especially for quiet operation, and there is still another motor being operated in a tank with water splashing over it. The tiny motors which operate home appliances, office machines, and other small devices, an electric welder, portable farm motor, electrically operated valves, pilot devices for magnetic control, and the explosion-proof motor for gasoline pumps are also on display.

A recent development known as a Thyatron reactor control panel which operates the changing colored lights in the exhibit is displayed with the apparatus. The various little devices used in house-wiring and other construction projects are displayed in a special compartment.

Lighting

A large space at the east end of the exhibit is occupied jointly by the Incandescent Lamp Department of the company and the General Electric Vapor Lamp Company. In the Vapor Lamp section, a striking feature is the floating opal ceiling of ever-changing colors, illuminated by gaseous conductor tubes in which various types of gases are used to produce the complete range of delicate pastel shades that appear and disappear over the entire surface.

The most efficient practical light source yet developed, the sodium lamp which produces three or four times as much light as the ordinary light source, is demonstrated. Mercury vapor lamps, some of which radiate healthful ultra-violet rays, are lighted to show the type of illumination used in automobile factories, machine shops, textile mills, and other establishments where high visibility is of prime importance.

More than 300 different types of Mazda lamps, representative of the 8,893 different lamps made by General Electric, are on display in the Incandescent Lamp Division. Among them are the largest and the smallest incandescent lamps in the world.

A working display of many of the instruments and machines used in the inspection and manufacture of Mazda lamps has been set up for demonstration by an attendant, while unusual uses of artificial light are shown in pictures, illuminated transparencies, and models.

To show almost ideal lighting of large buildings, there is a group of models lighted in accordance with the most advanced standards of practice. The central figure in the group is a 10 foot model of a 50-story office building built to a 1/64 scale.

Almost the entire exhibit is a display of advanced lighting practice, there being approximately 2200 lamps consuming about 216 kilowatts in the space occupied by the company's main display. Outdoors advanced lighting practice is demonstrated on a most extensive scale, the entire outdoor lighting plan of the Exposition being planned and executed under the direction of W. D'Arcy Ryan, for years director of General Electric's Illuminating Engineering Laboratory. A staff of General Electric and Westinghouse engineers have combined their talents under the supervision of Mr. Ryan to produce what is probably the most unusual display of outdoor artificial illumination ever attempted.

At least 3,000 kilowatts of light equipment-- incandescent lamps, arc searchlights, and gaseous tubes-- has been installed by the Exposition, and exhibitors who have erected special buildings as well as the scores of concessionaires have added to the outdoor lighting scene. More than 15,000 incandescent lamps, ranging in size from 10 to 3,000 watts, 24 36-inch arc searchlights, and thousands of feet of neon and mercury vapor tubes are employed. There are a thousand 1000-watt floodlighting projectors, 2,200 200-watt projectors, 17 3 k.w.-incandescent searchlights, and 500 special mushroom type lighting fixtures, about four feet high, which have been developed for path and garden lighting.

Combination street-and floodlighting standards in 25 distinct designs are installed in various parts of the grounds to provide general illumination and supplementary lighting for some of the buildings.

Three electric fountains have been installed in the south lagoon, just off the east shore and north of the Twenty-Third Street bridge. With 507 water jets, sprays, and nozzles in each, eight distinct water displays can be produced by each fountain. A 75-second period is required for each water effect, and a complete cycle that includes the many combinations takes ten minutes. Eighty feet is the maximum height to which water is spouted, and the total water consumption of the fountains is 3600 gallons per minute.

In the center fountain, 70 under-water floodlighting projectors equipped with red, green, blue, and amber lenses, provide harmonious gradations of color, including soft pastel shades. Each of the two outer fountains employs 36 floodlights with clear lenses.

A Thyatron reactor control panel provides the endless series of changing light and water effects in the center fountain, while the white ghost fountain on either side duplicates the water changes under clear, white light.

Exterior illumination of the Electrical Building is accomplished by a combination of incandescent searchlights, and electric fountain of unique design, and mercury vapor tubes presenting the appearance of a waterfall over the curved surfaces at the rear of the semi-circular court. Above the waterfall effect is an aurora created by the 17-3 kilowatt incandescent searchlights, each having a light output of approximately 21,000,000 candlepower, mounted on the roof. These searchlights are adjusted so that the beams intersect above the fountain to form a brilliant silver fan in the sky.

In the center of the court is the electric fountain, a tower of water and light. Above the large basin, four rings of water jets are illuminated in different colors by a total of 140 floodlighting projectors. From the center rise supports for an inverted cone of polished metal, 85 feet in the air, that reflects the sparkling colors of the water.

Probably the most outstanding effect, certainly the brightest, is produced by the scintillator, consisting of a battery of 24-arc searchlights having a total light output of 1,440,000,000 candlepower. Mounted on swivel and trunion bases, these 36-inch projectors may be turned at any angle, to shoot variegated patterns of colored light into the sky. The scintillator is located on the shore of Lake Michigan just south of the Travel & Transport Building. With a railroad track nearby, two locomotives can be brought into service to generate and shoot clouds of steam high into the air. A strikingly beautiful effect is obtained by training the brilliant colored light on clouds of steam and clouds of smoke exploded high above the ground by smoke bombs.

Brilliantly colored fans and plumes of light are thrown hundreds of feet into the sky, and a fiery battle of serpents is symbolized in a special display. In their initial position, the searchlights form an intensely bright aurora over the entire area.

New developments in gaseous tube lighting provide an unusual effect in the first court of the General Exhibits group. Hot cathode neon and mercury vapor tubes are set alternately in the fin of a louvered pylon, having a diamond-shaped cross section and standing 38 feet high. The under side of each fin is indirectly illuminated by the gaseous tubes, 48 of each being used in the display. Controlled by a Thyatron panel, colors on the pylon almost imperceptibly change from greenish yellow through the intermediate shades to neon red. With the changes in light in this display, colors on the walls of nearby buildings are apparently changed.

Beautiful spots of soft light and color throughout the grounds are produced by the illumination of trees, shrubs, gardens and paths. Tree boxes around the trunks conceal flood-lighting projectors, clear light from which is directed on the foliage to emphasize the natural beauty of trees and plants against a background of brilliantly colored buildings.

For paths and gardens in particular, a special mushroomlike reflector has been developed, 500 of which are used throughout the grounds. With translucent tops that allow only a little light to glow upward, and standing less than 4 feet above the grounds, these fixtures direct the greater part of the light in a wide circle on the ground.

Arcturus

General Electric's contribution to a successful beginning of 150 nights of activity is found in the occasion on which man, for the first time in history reaches out into the void beyond our solar system to capture a beam of light from the star Arcturus to provide the energy by which A Century of Progress launches its spectacular lighting display on the night of May 27.

Arcturus was singled out from the heavenly galaxy as the building star of the Fair due to its historical significance in the march of events in Chicago's progress. Light that left the star 40 years ago, at the time the World's Columbian Exposition opened, has been traveling through space, 186,000 miles a second, and will reach Chicago at the very time A Century of Progress opens its gates to the world.

Foremost scientists and engineers working with four astronomical observatories in various sections of the United States have made possible this amazing demonstration of mankind's triumph over space and time. Months of research, the construction and adjustment of delicately sensitive instruments have gone into the working out of plans.

Technicians and engineers of the General Electric Company and Westinghouse Electric and Manufacturing Company have been cooperating for months in completing arrangements.

Dr. Edwin B. Frost, then director of Yerkes Observatory at Williams Bay, Wisconsin, one of the greatest of living astronomers, conceived the idea that it would be entirely possible to capture the rays of Arcturus for the unique Fair opening.

Acting upon his suggestion, sponsors of A Century of Progress called together a distinguished group of scientists and astronomers who were best equipped to carry the idea to fruition. Otto Struve, now director of Yerkes Observatory; Harlow Shapley, director of Harvard Observatory, Cambridge, Mass; Robert Baker,

director of University of Illinois Observatory at Urbana; and Frank C. Jordan, director of the University of Pittsburgh Observatory at Allegheny, Pa., were enlisted to enact this dramatic event.

General Electric was responsible for the installation of photoelectric tubes, amplifiers, and other necessary equipment at Harvard and Yerkes, while Westinghouse provided the apparatus at Allegheny and Urbana. Western Union agreed to furnish the lines to carry the electrical impulses from all four observatories to Chicago. Both NBC and CBS broadcast the program over nation-wide chains.

The technical plan for the star pick-up was outlined by engineers, several weeks ago, as follows:

At each of the four observatories, the observer will point his telescope to Arcturus, beginning shortly before 9:15 Eastern Standard Time, the night of May 27, 1933, and will keep the star "on bearing" until the necessary signal has been completed to the Exposition's station.

In each observatory, a photo-electric tube and amplification equipment will be provided to operate a relay closing circuit in the telegraph line. A radio broadcast receiver, tuned in to the Exposition opening program, will notify the operator when to allow his telescope to project the star's light on the electric eye, the impulse of which will close his local circuits to the wire. In Chicago, each connecting telegraph line will terminate in a relay which will close two contacts. When a relay closes, one of its contacts will operate a visual, and an audible signal.

The second contacts of these relays from the observatory circuits will be connected in a series so that the closing of the contact at the last observatory will complete the circuit, which will operate a master switch starting the night celebration of the World's Fair and causing the various buildings to be flooded in light. A motor generator equipment will be so arranged that its crescendo note will be audible over the loud-speaker system on the grounds and can be broadcast over the radio waves. It will be so arranged that when the motor generator is at top speed, the powerful searchlight located on the tower of the Hall of Science will be illuminated.

The searchlight will, in turn, throw its beams on the various World's Fair buildings, selecting them one by one, and as the light rays strike photo-electrically arranged "traps" on the buildings, they will become flames of colorful brilliance.

X-Rays

In one of the few exhibits sponsored by the General Electric group outside the Electrical Building, the General Electric

X-Ray Corporation gives visitors a better insight to the fascinating subject of X-ray. A group of selected radiographs is shown to represent the application of X-ray in medicine, dentistry, science, and industry.

Various types of equipment are shown, among them a group of the famous Coolidge X-ray tubes ranging in size from those of low power used in diagnostic work to those which are operated at several hundred thousand volts in the treatment of disease.

