

# SCIENTIFIC AMERICAN

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## THE OTIS ELEVATORS AT THE COLUMBIAN EXPOSITION.

The display of elevators at the World's Columbian Exposition is very large and includes practically every type of elevator that is used. Probably a dozen different manufacturers make exhibits. The largest and most noticeable display is made by Otis Brothers & Company, of New York, who not only have a large and fine exhibit in the Transportation building, but also have many elevators in actual use throughout the Exposition. Three elevators are conspicuous features in the space occupied by the exhibit of this company, and these are in constant use, carrying passengers to the gallery and return. In the central tower of the Transportation building eight hydraulic passenger elevators have been installed. These were designed primarily to carry people to the roof promenade and restaurant, but after the burning of the cold storage plant the Exposition management closed the roof to the public, and since then only two elevators have been used, and these simply to carry people to the gallery. In the Administration building there are eight Otis electric passenger elevator engines. In the Manufactures and Liberal Arts building there are four electric elevators which carry people to the roof promenade, while in the Casino building there are two hydraulic passenger elevators, one hydraulic freight elevator, and two hydraulic direct-acting dumb elevators.

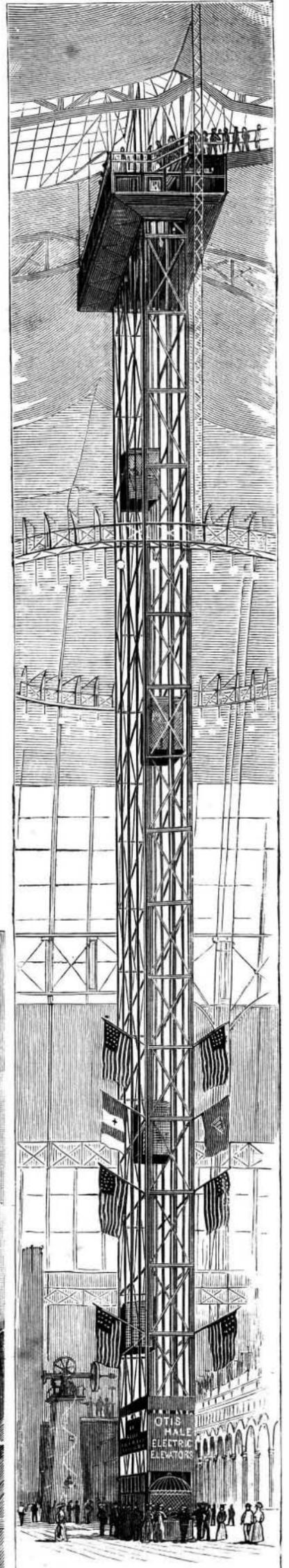
No elevators at the Exposition have attracted so much attention as those in the Manufactures and Liberal Arts building. These have the highest rise of any electric elevators in the world—a distance of 185 feet. The distance, however, seems much in excess of this because the tower in which they run is in the center of the north end of the main aisle of the building, and is open on all sides, as may be seen by examining the illustration on this page.

These elevators are operated by electricity, and represent the latest achievements in the manufacture and operation of elevators, both from a commercial point of view and from considerations of safety. There are four cars in this shaft, but they are run in pairs, so that in reality there are only two plants, which are attached to opposite sides of the drum, and which have no independent counterbalances, as the cars balance each other. Each car has a carrying capacity of fourteen people, and there is an attendant in each car, although the operating is done in one car for each set; that is, the wheel-operating device in one car controls not only the operation of that car, but also the one which counterbalances it. The cars are run at stated intervals and are started at a signal, at which the doors at the top and bottom are closed. The electric motor which operates each machine is of 15 horse power capacity and derives its current from the 500 volt Exposition power circuit. The speed of the elevators is 200 feet per

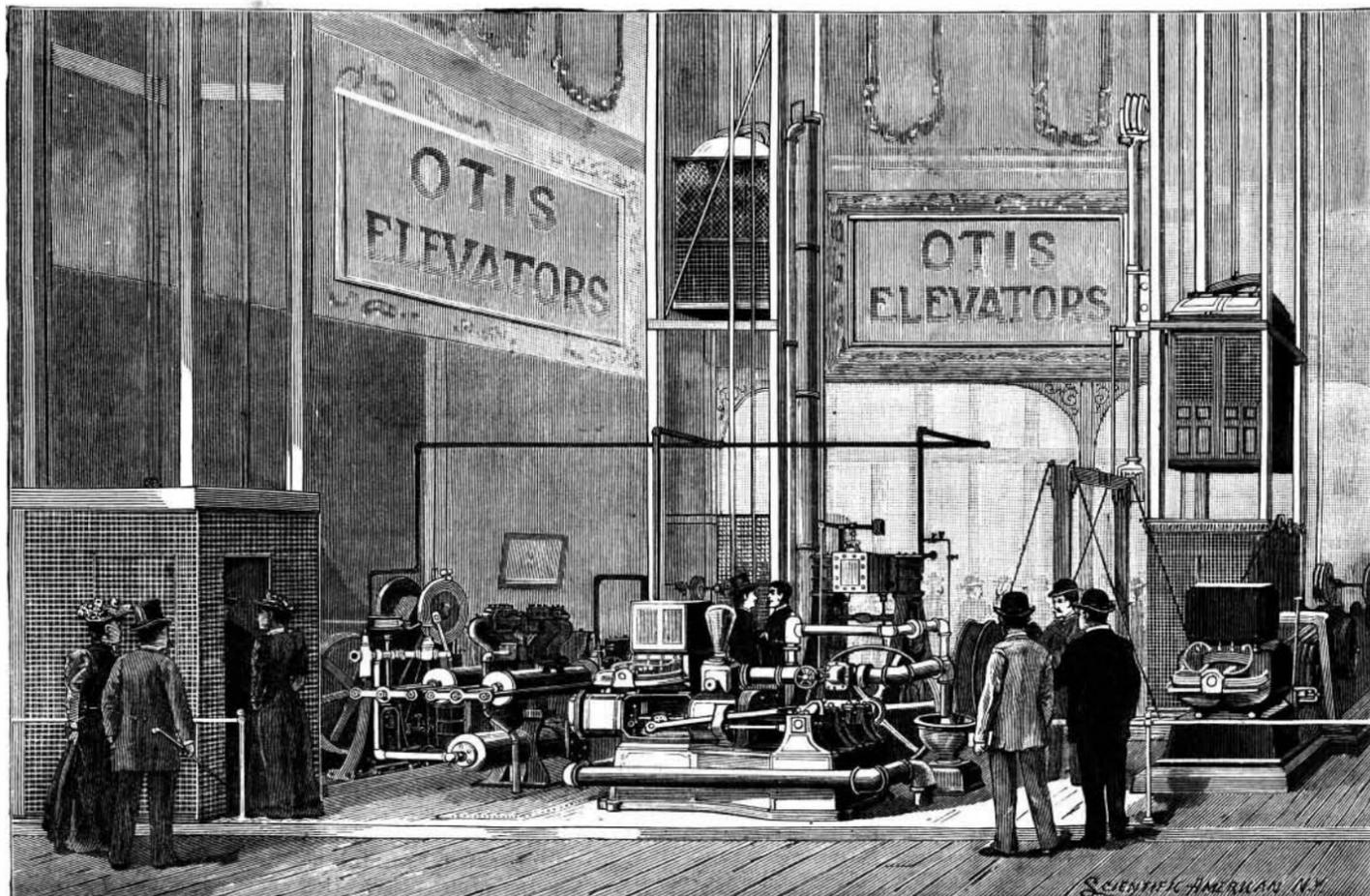
minute. The machinery is installed in the basement of the building, immediately under the elevator shaft. The armature shaft of the motor is coupled direct to a worm shaft by insulating coupling. This shaft engages two gear wheels, which in turn engage each other. The worm shaft is double, being both right hand and left hand, so that there is no end thrust, this being taken up between the two wheels. The electric controlling device is a solenoid coil, which is in the main armature circuit, and which acts on a core rigidly attached to the rheostat brush, thus automatically controlling the amount of resistance in the armature circuit. The motor is of the Eickemeyer type. The armature makes 800 revolutions per minute and the speed is readily reduced by means of the worm shaft. The motor is compound wound and so arranged that when the operator throws on the current it uses both the shunt and series fields; but when the load is started the series field is automatically cut out, leaving the shunt field to control the speed. The brake device is of the iron strap pattern, faced with leather, applied automatically.

A great many electric elevators constructed on this same general plan, except so far as the counterbalance is concerned, have been installed by the Otis Company. The general plan for counterbalancing is that the weight of the car is almost counterbalanced by a weight attached directly to the car, while one-half the maximum load is counterbalanced by another weight attached to the opposite drum from the main hoisting cable; the result being that the motor is not called upon to work except to one-half of the rated capacity of the elevator. These elevators are provided with an automatic stop at the bottom, also at the top of travel. The application of electricity to elevator use has been very successful, as is shown by the efficiency of these elevators at the Exposition, and it has been in use long enough and has been tested thoroughly enough to prove its special advantages. It has advantages over steam on account of its economy under general conditions, smoothness of operation, and freedom from dust, noise and heat. Neither does it require the attention of an engineer or other skilled attendant. As compared to hydraulic elevators, the electric elevator does not occupy as much space, is cheaper in first cost, and in ordinary use is probably cheaper of operation, as it calls for only as much energy as is required to manage the load, while the hydraulic elevator uses so much water regardless of the weight of the load, and works to its fullest efficiency only when every load is a maximum one.

There are conditions, however, to which steam and hydraulic elevators are especially suited, and the latest achievements in the construction of these elevators can be seen in the exhibit of the Otis Company. The elevators in the tower of



THE GREAT OTIS ELEVATORS IN THE LIBERAL ARTS BUILDING.



THE WORLD'S COLUMBIAN EXPOSITION—EXHIBIT OF OTIS BROTHERS & COMPANY'S ELEVATORS.

the Transportation building have two compound Worthington pumps, which pump water into 20,000 gallon pressure tanks.

Steam elevators are used largely in factories and elsewhere where steam is to be had readily. The latest improvement in the construction of steam elevators, and which is shown in this exhibit, is the compound.

This company has installed several elevators which are of more than passing interest, as they show what a degree of perfection has been attained in this direction. The elevators in the Eiffel tower at Paris are of this company's make.

Cooking by Gas.

Briefly enumerated, its advantages are: It is always available at a fixed price; avoiding the necessity for the troublesome and tedious distribution of wood and coal, and saving the rent of a cellar and loss of money from market fluctuations.

Storage of fuel in the immediate neighborhood of the kitchen fire being unnecessary, the use of gas diminishes the risk of fire in a house.

The full heating power is developed from the moment of lighting a gas fire; thereby saving the time and labor spent on fire lighting, which in the case of liquid fuel is accompanied by danger, and accomplishing the work in the shortest possible time.

Increase or decrease of gas consumption according to the requirements of the moment; taking the place of the inevitable stirring of the fire, or removal of vessels from it.

The consumption can be controlled by the meter, so as not to exceed a certain limit ascertained to suffice for requirements.

It can be used with advantage in small as well as large apparatus; the consumption being exactly proportioned to the work to be done.

Scorching of food during cooking is completely provided against, since each burner can be turned down at any time, and the heat regulated to a nicety.

The radiant heat from a gas fire can be taken advantage of in winter for warming the kitchen, but in summer nearly wholly suppressed.

The retention of the full flavor of food is promoted by gas cooking, through the complete control of the application of heat.

No smoke is evolved from a gas fire, and damage to property, cost of cleaning, and all the inconveniences associated with the smoke nuisance, are avoided.

PERHAPS the meanest of all swindlers are those who prey on poor inventors. They look over the Gazette, issued by the Patent Office, every week, and get the names of those to whom patents have been newly granted.

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HOW TO BECOME AN ELECTRICAL ENGINEER.

The SCIENTIFIC AMERICAN from time to time is asked by its correspondents for information on the subject of technical education. At the present time especially the question is asked with reference to electricity and electrical engineering.

Sir William Thomson has stated that an educated mechanical engineer requires but a few months study to make of him an electrical engineer. It is fair to assume that the average young man contemplating electricity as a profession, if doing so with any justification whatever, from the force of circumstances must be a mechanic.

The electrical station of the present day is based for its successful operation largely on economy in the generation and utilization of steam. The finest examples of the steam engineering in this country are supplied by them. The general engineering knowledge must not, therefore, stop with simple mechanics. The student must make up his mind to acquire the fullest possible knowledge of steam engineering and practice.

Reported Open Water Near the North Pole.

A vessel recently returned to San Francisco from carrying supplies to the whaling fleet in the Arctic Ocean, north of Alaska, reports that one whaler found open water at the mouth of the Mackenzie River, and had followed it in a northerly direction until he reached a point a little above eighty-four degrees, or farther north than the Greely expedition reached.

Four years out of five the ice packs in so heavily between Point Barrow and the mouth of the Mackenzie that it is impossible for vessels to penetrate it, but more frequently there is an open sea off into the northeast from Point Barrow. This direction, however, is regarded as a death trap by the whalers, and is religiously avoided. It is such a trap as De Long deliberately went into after being cautioned in the strongest terms by whaling masters not to be enticed into it.

Scientific Training.

Professor Von Helmholtz, in a recent address to the students of Columbia College in this city, said that the recognized method of scientific work now was collection of knowledge, retention of that knowledge and its communication to mankind.

Careful observation makes the artist and makes the brilliant scientist. Trace the connection between events and the laws that govern that connection until doing so becomes intuitional. Train the mind so that the strongest impressions will be made by the most important events until this also becomes intuitional.