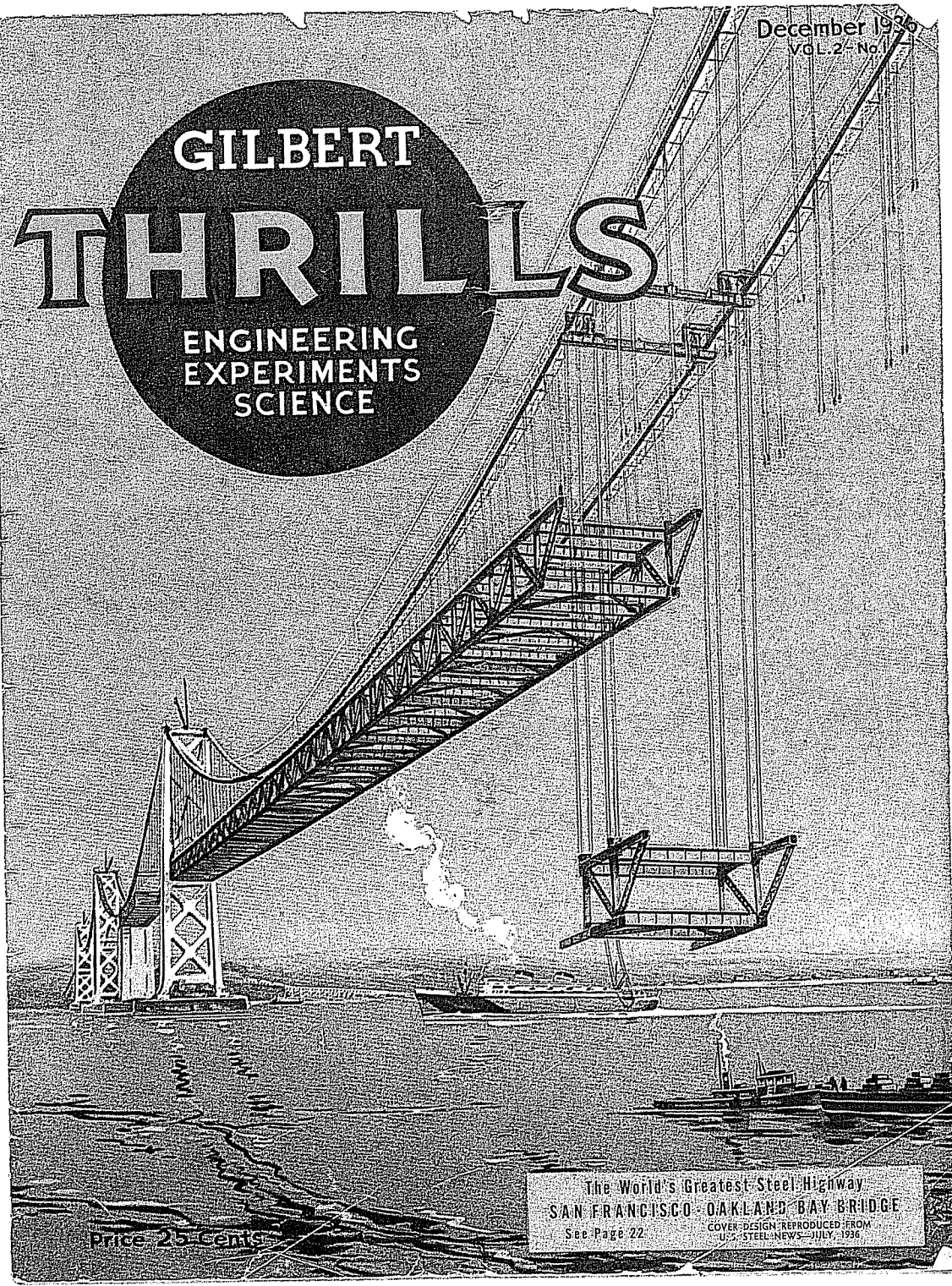


December 1936
VOL. 2 - No. 1

GILBERT THRILLS

ENGINEERING
EXPERIMENTS
SCIENCE

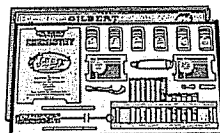


Price 25 Cents

The World's Greatest Steel Highway
SAN FRANCISCO - OAKLAND BAY BRIDGE
See Page 22
COVER DESIGN REPRODUCED FROM
U.S. STEEL NEWS - JULY, 1936

NEW GILBERT CHEMISTRY SETS

Newly designed in Gilbert's chemical laboratory in collaboration with one of America's outstanding chemical research laboratories under the direction of Treat B. Johnson, Yale University, Ph.B., Ph.D., a recognized authority on chemistry. With the new Gilbert chemistry sets you can accomplish new chemical experiments never before offered in toy sets. UP TO DATE! New chemicals, new equipment, new apparatus such as beakers, thermometer, flasks, scales (in some sets). New Basswood laboratory type cabinets. New desk type laboratory outfits.



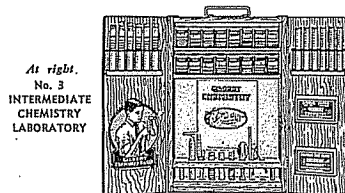
**New BASSWOOD
LABORATORY TYPE CABINETS**
At left
No. 1 CHEMISTRY
The Dandy
Beginner's Set



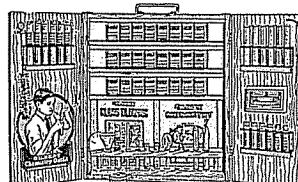
At right
No. 2
JUNIOR CHEMISTRY
LABORATORY

23 pieces of chemicals and apparatus including test-tube rack. Large manual of instructions shows how to do 151 experiments.

Here is the set that will enthrall the beginner and permit him to perform many simple and amazing experiments. Make fire ink, see how silver tarnishes, dye cotton cloth, fireproofing, etc. 151 experiments all explained in a big instruction book—will give the young chemist hours of fun he never dreamed of. Includes 25 pieces of chemicals and apparatus and 18" of metal shelf room and test-tube rack. Packed in Basswood laboratory cabinet.



At right.
No. 3
INTERMEDIATE
CHEMISTRY
LABORATORY

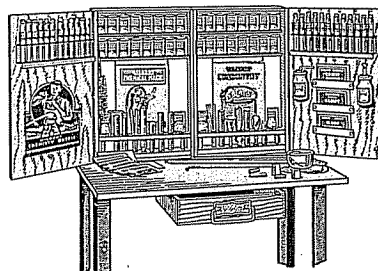


At left
No. 6
SENIOR
CHEMISTRY
LABORATORY

With this great outfit for the amateur chemist you can clean silverware electrically, make ammonia, bleach and dye all sorts of things, etc. These are only a few of the 345 experiments that you can do with the 44 pieces of chemicals and apparatus all described in big manual. Has three feet of metal shelf room and test-tube racks. Packed in two-door Basswood laboratory cabinet.

Imagine making colored fire! Testing foods for their elements! Making real cement! Making sparklers, soda water! Tanning leather! All are easily done with this combination Chemistry and Glass Blowing Outfit. 67 pieces of Chemicals and Apparatus including chemistry manual and glass blowing manual. Packed in two-door Basswood laboratory cabinet with five feet of metal shelf room and test-tube racks. More than 400 exciting chemical feats.

Illustrated and described below—NEW—up-to-date—COMPLETE DESK TYPE LABORATORY OUTFITS

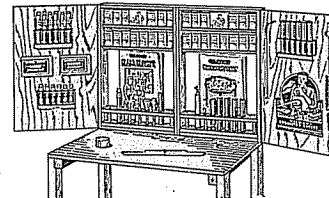


*Above—No. 14 INVENTOR'S DESK TYPE
CHEMISTRY LABORATORY*

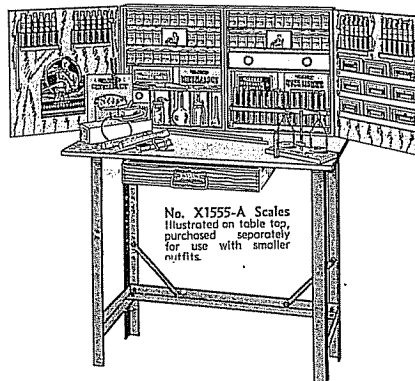
Rows and rows of chemicals at your fingertips. With this laboratory you can delve into the wizardry of chemical magic. 117 chemicals and pieces of apparatus with three big books describing over 600 experiments in chemistry, glass blowing and chemical magic. Laboratory is mounted on a table with steel legs. Easy to sit down to. Finished in Basswood with hardwood veneer table-top. 7 1/2 ft. of test-tube racks and shelf room. Stands 40 3/4" high, 39" wide, table-top 14 1/2" deep.

*At right—No. 25 MASTER SCIENTIST'S
DESK TYPE CHEMISTRY LABORATORY*

This unrivaled desk type laboratory is the finest set made for the student or young scientist. Over 200 pieces of chemicals, apparatus and equipment including five big manuals covering Chemistry, Chemical Magic, Mineralogy, Hydraulic and Pneumatic Engineering and Glass Blowing. Also scales, beaker, flask, alcohol lamp, gas generator, thermometer, etc. Contains over 9 ft. of shelf room and test-tube racks. Drawers. Made of Basswood, hardwood veneer table-top with steel legs. Convenient to sit at and perform over a thousand experiments. Many of these experiments never before offered in experimental chemistry, dry-ice experiments, artificial refrigeration, ethyl gas, lacquers, paints and water colors, testing of foods, electro-chemistry, electro-plating, electrotyping, etching, electrolysis and many others too numerous to mention. Stands 40 1/2" high, 51" wide, table-top 14 1/2" deep.



Above No. 8 EXPERIMENTER'S DESK TYPE LABORATORY
80 pieces of chemicals and apparatus and equipment with over five feet of metal and wood shelf room and test-tube racks. Convenient to sit at and perform nearly 500 fascinating experiments. Glass Blowing and Chemistry manuals. 39" x 37 1/2" x 14 1/2".



No. X1555-A Scales
Illustrated on table top,
purchased separately
for use with smaller
outfits.

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All the popular Gilbert Outfits, both cabinets and desk type laboratories, are shown on this page. Examine them closely. See them at your nearest local toy store.

**\$100.00
ANNUAL
AWARD
and 10 awards
of \$10.00 each**

"To the boy doing what, in my opinion is, the most important chemical research in 1937, I will make a cash award of \$100.00. To the ten boys doing the next most important chemical research work I will award \$10.00 each. Applicants for these awards must not be over 17 years of age, and must send me a full description of their experiments by June 1st, 1937."

A. C. Gilbert

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A. C. GILBERT
Managing Editor
E. B. CARR

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VOL. 2.

DECEMBER 1936

No. 1



Wonderful Advance, Improvement and Added Educational Value in Toys from Beginning of Century

I am assuming that hardly any of you boys have ever given much thought to the wonderful advancement in construction and added educational value of the toys of today over those of only a few short years ago.

You have probably heard Mother and Dad say many times "We never had such wonderful toys when we were kids," and let it go at that, but nevertheless, it's true, and a great change has taken place since their time.

Times, conditions, the world's rapid advancement, and man's ability to master, through his skill, obstacles that once seemed to be unsurmountable barriers, all have a part in this great forward movement.

Youth of today lives in an atmosphere of speed, invention, and push, and he sees performed right before his very eyes, achievements that are actually miracles, and he revels in the opportunities that give him, through the modern toy, a chance to create, experiment, and advance for himself. All of this is reflected in the toys of today—of course, little tots still have their dolls, rubber rattles,

Merry Christmas

To my many thousands of boy friends, again let me wish you all a very Merry Christmas.

Wherever you are, and whatever your surroundings, my sincere thoughts are for your health and happiness, and that you may each have your share of the things that bring contentment, which means so much in the lives of youth.

These greetings may reach many of you well in advance of the holiday season, but the spirit of Christmas is already in the minds of both young and old, and my thoughts are for your happiness, and that you may all celebrate this day with equal delight and enjoyment.

A.C. Gilbert

pull toys, bells, whistles, alphabet blocks, animals, tin trumpets, drums, Noah's Arks, etc., but for the boy of advanced age, his play hours are devoted to toys that are decidedly different. His outlook on life is in keeping with all that he sees around him, and he wants to be a part of it. He desires toys that will bring realism into miniature construction, that will permit him to delve into the mysteries of chemistry, that will reveal exciting discoveries in electrical experiments, that will permit him to explore for hidden mysteries of nature through the searching eye of the microscope, and to enjoy hundreds of thrills with other scientific toys. All this appeals to his intellect, for they are toys with which he can "do things" and get just the kind of fun he wants.

In presenting the different Gilbert Toys that are illustrated on the colored pages, you'll find a variety of scientific outfits that have all been invented by Mr. Gilbert for the express purpose of giving you fun, thrills, and excitement, and to be of greatest educational value.

Mr. Gilbert believes that every boy is interested in things that will make him think for himself, and that boys want to know about all the wonders and principles of mechanics, engineering, electricity, chemistry, etc., and every Gilbert Toy is built to fill this need.

You'll soon be taking your regular jaunts along the gaily decorated thoroughfares, where shop windows will be jam full of toys and other Christmas gifts, but your visit to Toyland we know will hold you spellbound, for there in all its brilliancy and vivid colorings, will be a veritable fairyland with toys of every description and kind.

You'll find the complete Gilbert line for your personal inspection—big action models of Erector, with motors humming, turning giant fly wheels on power plants, operating elevators, ferris wheels, walking beam engines, etc. You'll see the most complete Chemistry laboratories ever made for a boy—electrically operated Kaster Kit molding outfits will be on display and demonstrated, Opto Kits, Electrical Sets, Tool Chests, Glass Blowing and Mineralogy outfits, also Magic and Puzzle Sets. Just look for the big sign that reads "Gilbert Hall of Science." We are sure you'll be thrilled by these startling exhibits and that in these groupings you'll find just the Gilbert Toy you want to take home with you.

GILBERT THRILLS

20th Century Marvels of Transportation

Crossing the Atlantic with Speed and Luxury

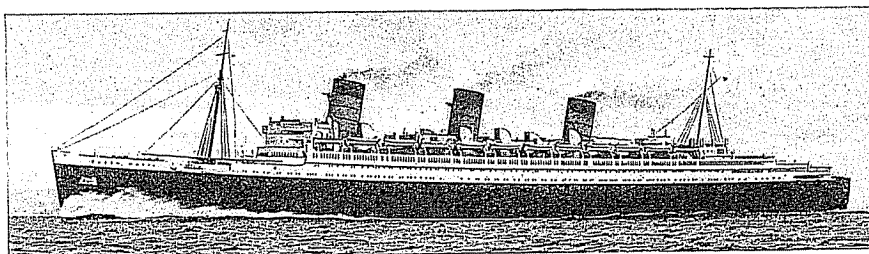
In the entire history of ocean transport the North Atlantic has been the marine speedway of the world. Nations have been in constant rivalry in their never ending race for supremacy and even before the advent of steam, newspapers were advertising the merits of the American Black Ball Line, whose fast sailing clippers claimed the Blue Riband by making the passage from New York to Liverpool in 22 days.

When, in 1835, it was first proposed to institute a regular steamship service between England and the United States, ridicule was poured on the scheme, but practical engineers were determined to make this proposal a reality and when the Great Western was built in 1837 she was equipped with the largest marine engines which had been built up to that time, their output being 750 h.p.

On her maiden voyage in April 1838 she made the passage from Bristol to New York in 15 days, or seven days less than the best average by sailing ships.

sets of Parsons turbines with an output of 200,000 h.p. and each of the 257,000 blades for the complete set of turbines were fitted and tested by hand. Steam is supplied to the propelling turbines from 24 Yarrow Water Tube boilers and these have a working pressure of 400 lbs. per square inch and a steam temperature of 700 degrees F. At full pressure the 24 boilers use about 4,000,000 gallons of fresh water a day.

Like all modern liners of great speed the Queen Mary burns oil fuel only. This fuel is contained in bunkers at each side of the boiler rooms, their total capacity being 6,300 tons and so carefully has the air and overflow pipe system been planned, that no oil vapor with its distinctive and unpleasant odor escape. It requires eight hours for refilling these bunkers. She is driven by four giant propellers—two on each side. Each was cast from 50 tons of manganese bronze and when machined and finished weighed 35 tons. The propellers themselves are the largest ever constructed.



"THE QUEEN MARY," England's Masterpiece in Ship Construction

Reprint Courtesy Cunard-White Star Line

This marked the beginning of keenest rivalry and nearly a century of record making has elapsed since that time, during which England, America, Germany, Italy and France have held supremacy at varying intervals. Singularly enough, the world witnessed in 1936 initial trans-Atlantic crossings of two of its greatest, speediest and most luxurious ships—The Queen Mary—Britain's masterpiece and the Zeppelin Hindenburg—Germany's latest marvel of the air. Never, with the exception of the great French liner Normandie, have such sumptuous passenger transports been placed at the disposal of the ocean traveler and these three wonder vessels stand supreme in their spheres.

Power—Speed—Safety—Convenience—Comfort—all combine to justify the claim that these palaces of sea and air are brilliant engineering and construction triumphs.

We wonder in amazement at man's ability to create such mammoth structures, we marvel at the complexity of it all, yet facts are truths and engineering skill has done itself proud in this era of modern accomplishments. Failing on her maiden voyage to wrest the speed record from the giant French liner Normandie, the Queen Mary did, however, on July 27th, make the fastest crossing ever recorded for a steamer between Europe and New York and on August 24th she completed a record crossing in four days, 7 hours and 12 minutes to win the Blue Ribbon to become the fastest vessel on the high seas.

The Queen Mary's gross tonnage is 80,773—her length overall 1,019½ feet and her breadth 118 feet. She is the second vessel ever built to exceed 1000 feet in length and these figures will give one a relative idea of her huge bulk. Her height from keel to top superstructure is 135 feet, from keel to crown of forward funnel 180 feet and from keel to masthead 234 feet. She is equipped with four

So high is the speed at which the turbine revolves that if it were coupled direct to the propellers, a great deal of the latter thrust would be wasted by cavitation and the propeller itself would of necessity be too small for the work. Consequently the power of the turbine is transmitted to the propeller shaft through gearing, the effect being to reduce the speed at which the shaft rotates. By this device it becomes possible to use a propeller large enough to utilize the full effect of all the power developed.

Needless to say the ratio of turbine to propeller speed had to be worked out to a fraction by calculation and experiment.

The gear wheel on the turbine meshes with a larger wheel attached to the propeller shaft and the toothing is helical and cut to a thousandth of an inch, a process that required nearly three months to complete, while the gear cases are fitted to a limit of 1½ thousandths of an inch.

The four propeller shafts are of hollow steel, two feet in diameter and fitted to thrust blocks or bearings at the gear case end. At regular intervals along their length they are supported by journals or semi-circular rests, between which and the revolving shaft an oil film is interposed.

The control of this great ship is normally effected by means of a marvelous mechanical device, the gyro-pilot automatic steering gear, often referred to as the "Iron Mike." A full explanation of the mechanism of this remarkable instrument is too technical to be given here, but it is based on the well known principle that a gyroscope, once set to spin in a given plane, will continue to spin in spite of every counter influence that may be applied.

In the case of the gyro-pilot, the mechanism is adjusted to conform to a certain course plotted on the chart and as by a system of power amplification the gyro directly controls the ship's rudder. Naturally the ship's head will follow that course for as long as the

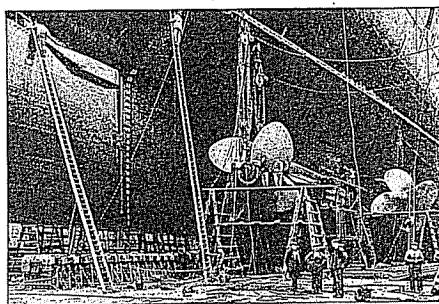
GILBERT THRILLS

5

original gyro adjustment remains unaltered. Strong currents, heavy waves, or a beam sea all tend to cause deviation or "yawing" and the human helmsman must be particularly skilled at his job if he is able to keep a moderately straight course under any of these conditions.

On the other hand, the gyro-pilot does it automatically and infallibly. Should the ships head swing to starboard, the gyro compass in the "Iron Mike" instantly transmits the movement to a motor controlling the steering wheel, so that this wheel moves the rudder in the direction required to bring the ship back to her original direction. Then the moment she begins to straighten out, the same influence brings the rudder back to amidship position.

However widely the ship may "yaw" to port or starboard, the gyro-pilot invariably corrects these wayward movements and steadies her on her proper course. Although the "Iron Mike" is of comparative recent origin, it is already firmly established as one of the most valuable aids to navigation.



Reprint Courtesy of Cunard-White Star Line

Four Giant Propellers weighing 35 tons each drives at tremendous speed this 80,000 ton ship. At extreme left is her 140 ton rudder

In addition to the gyro-pilot the ordinary type of steering gear is provided, but in the Queen Mary duplicate wheels are used. These actuate the hydraulic rams which control the 140 ton rudder, and should the gear mechanism of one wheel break down, the other can be brought into play with scarcely a moment's pause.

Structurally the Queen Mary is as powerful as a battleship and it may be asserted without fear of contradiction, that no vessel in the world is as well equipped to face and withstand the hazards of the sea.

Every possible safety device has been used in her construction and not until a model had been evolved which proved capable of remaining afloat after whole sections of the hull had been torn away was the watertight sub-division of the real ship finally approved.

Her colossal strength is masked by the symmetry of the completed ship and those who voyage in her see little evidence of the massive beams, girders and steel plates which constitute the hull proper.

From the keel up to a point far above the waterline she is double-hulled, literally "a ship within a ship" and between the inner and outer bottom is an intervening space of nearly six feet, divided into a great number of water tight compartments. Then on either side of this double bottom, rise the twin steel walls of the hull to a height of nearly 40 feet. Here too, the intervening space is a honeycomb of water tight compartments. Altogether the ship has 158 of these and the backbone of this elaborate system of sub-division is formed by 18 water tight bulkheads of phenomenal strength.

Extensive use of special high elastic limit steel in hull construction has gained strength without excessive weight and huge plates varying from 8 to 30 feet in length were riveted in place by over 10,000,000 rivets, many of them weighing as much as 5 lbs. each. If these were placed end to end they would cover a distance of 275 miles.

Beside the many water tight bulkheads there are fireproof partitions and screens throughout the ship. The object of course is to localize any outbreak and confine it to a very limited space. An elaborate system of fire mains, hoses and self acting extinguishers renders any widespread outbreak all but impossible.

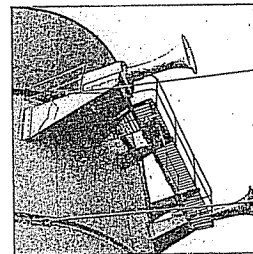
In every enclosed space on board there is an instrument which automatically gives warning to the bridge if the temperature rises above a certain figure, and so sensitive are these instruments that the striking of a match in one of the smaller compartments below deck would, it is claimed, be instantly recorded by them.

There are also indicators which register the presence of smoke in any part of the ship and these give instant warning not only to the bridge, but to the various fire stations, so that counter measures may be promptly executed.

The Queen Mary is the first liner in the world to carry only motor driven lifeboats. These crafts, 24 in all, are of massive steel construction and each can comfortably seat 145 people. This is in excess of 240 over the combined accommodations required for passenger and crew of 3,240 people. Every boat can be released and lowered to the water by one man in the space of seconds. They are all propelled by Diesel engines and have exceptional maneuvering powers, which would enable them, when fully loaded, to leave the ship's side and get out of danger without delay. Furthermore, each boat has standard equipment including water, milk and biscuits for passengers, also distress flares, lamp, oil and matches in water-proof boxes. Truly the Queen Mary deserves to be known as the "safety first ship." To see this massive giant steam into New York Harbor and slide into her dock as smoothly and easily as a yacht, is truly a sight worth witnessing. Other smaller harbor crafts are dwarfed into mere dots so to speak in comparison to her huge bulk and you marvel at the control of this monster ship.

Visualize, if you can, her three mighty smoke stacks, the first towering 70 feet above top deck and the other two 65 feet and then realize that each of these stacks has a circumference of 100 feet and diameter of 30 feet forming a tunnel through which three of the largest size locomotives could run abreast.

Next we will note a large recess on both port and starboard bow into which is snugly fitted her 16 ton anchors. To each anchor is attached 165 fathoms or 990 feet of chain cable, each single link 2 feet in length and under test a three link section withstood a strain of nearly 700 tons.



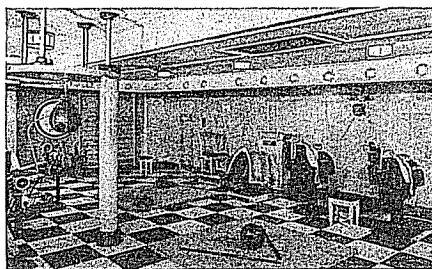
—Reprint Courtesy Cunard-White Star Line
Mammoth deep pitched sirens on forward funnel are audible for 10 miles

of all public rooms so we will confine our notice to outstanding and typical examples.

At the extreme forward end of the promenade deck is the observation lounge and through the great windows in this spacious room a grand view of the sea can be obtained.

The main lounge, also situated on the promenade deck, is perhaps the chief glory of the Queen Mary in the decorative sense. After the cabin restaurant it is the largest apartment in the ship—96 feet in length, 70 feet in width, it rises through three decks to a height at the dome of 22 feet. At the after end is a fully equipped stage for concerts or plays, complete with drop sheets, wing curtains and stage lighting system.

The main restaurant is situated on Deck C and extends the full width of the vessel—118 feet amidship—and is 160 feet in length and rises through three decks to a height of 30 feet. No compartment of this magnitude has ever before been built in a ship and while many people could gather here without discomfort, it is arranged to seat only 815 at one time which completely eliminates overcrowding. Sitting at a table in this immense restaurant, the passenger will find it difficult to remember he is at sea and it is doubtful except perhaps in the stormiest of weather that the slightest motion of the ship will be perceptible. Here, too, there is a continuous flow of purified air regulated to the proper tempera-



Reprint Courtesy Cunard-White Star Line
A view of the finely equipped gymnasium

ture, which a concealed ventilating system keeps this vast apartment absolutely free from the odors of cooking. The sole reminder of one's nautical surroundings is a decorated map on one of the walls and across this map moves an illuminated model of the Queen Mary showing at a glance the exact position of the ship at any given moment.

The main hall, popularly known as "Regent Street" and situated at the top of the main staircase on the promenade deck, is 111 feet long and in places 70 feet wide. It is literally the shopping center with 12 large show windows displaying a great variety of goods and is complete with a cigar stand and book shop. In this hall are also two telephone kiosks, where passengers may call up their friends in London or New York.

Next is the "playground on the high seas," the most wonderful playroom ever installed on a ship and in fine weather is a place of sunshine and sea breezes. In the center is a chute down whose slippery slope the tiniest tot may slide at thrilling speed but in perfect safety and underneath are fascinating caves which will appeal to the exploring instincts of the small boy. Costumes are provided for would-be soldiers, cowboys and Indians and there is even a sentry-box and a log hut. Other notable features of this children's paradise are a tiny cinema, which the children themselves can operate and a miniature aquarium alive with gaily colored fish and for girls there is a luxurious doll's house.

A spacious smoking room with its deep cushioned chairs reflects the atmosphere of the best type of New York or London club life and in this apartment the keynote is solid comfort and snugness.

The cabin swimming pool—60 feet long with its warm sea water of emerald hue—is ideal for an invigorating plunge and with its graduated depth is calculated to attract the inexperienced as well as the experienced swimmer. Then again for those who are athletically inclined, the completely equipped gymnasium and squash court are at their disposal.

What it means to store, prepare and meet every demand of this army of ocean travelers is almost beyond comprehension and some notion of what the catering service alone entails is indicated by the fact that about 50,000 meals have to be prepared during each crossing of the Atlantic. A vast kitchen occupying almost an acre of space has been allotted to the preparation and service of food and the hotel staff numbers 750 men and women. The kitchen staff forms in itself a large contingent, not less than 125 people, many of them highly skilled chefs and many mechanical devices of latest

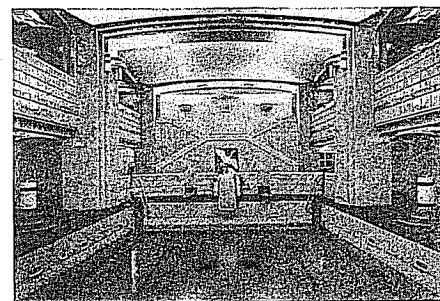
development have been adopted for the preparation and mixing of ingredients and countless dishes. One machine kneads up a whole sack of flour at a time, another prepares for the oven thousands of fresh rolls an hour and a particularly ingenious contrivance like a mammoth churn will wash and peel 1000 potatoes and deliver them ready for cooking.

Beneath the main kitchen are a dozen or more compartments used for the catering service: butcher shop, vegetable preparing rooms, fish room and refrigerated rooms for meat, poultry and all manner of perishable foodstuffs. Staggering quantities are required as the following listing will show when provisions are made for a single crossing, 70 tons of meat, 20 tons of fish, 4000 chickens and ducks, 70,000 eggs, 20 tons of vegetables, 30 tons of potatoes, 3 tons of butter, 1 ton of cheese, 10,000 pounds of sugar, 4,000 pounds of tea and coffee and 4,000 gallons of milk. Then the ship's cellars have to be stocked with 10,000 bottles of wine, 5,000 bottles of spirits, 40,000 bottles of beer, 6,000 gallons of draught beer and 60,000 bottles of minerals, while the tobacco supply includes 5,000 cigars and 20,000 packets of cigarettes.

Naturally there are scores of waiters, each especially trained to minister to the wants of passengers, and also other branches of service including stewards, stewardesses, butchers, bakers, confectioners, bath and lift attendants, swimming and gymnastic instructors and even a qualified gardener. Skilled medical and surgical service is also available at any hour of the day or night as are trained nurses and all the equipment of an up-to-date hospital.

The Queen Mary is an all electric ship with a power station that could meet the needs of a town of 150,000 people. Electric light and power is supplied at the rate of nearly 10,000 kilowatts an hour and there are 30,000 lamps and 325 miles of electric cable on board. All sorts of effects of direct and indirect lighting is employed and the use of new and ingenious devices is a brilliant triumph in illumination.

The ship is virtually a world wide wireless station with the most elaborate and complete radio equipment ever installed on a vessel. Embodying every improvement which has been made to date in the science of wireless transmission this plant is the last word in



Reprint Courtesy Cunard-White Star Line
The Swimming Pool featuring the latest automatic Anti-Splash device

radio technique. She has four large wireless transmitters, each capable of maintaining continuous communication with Europe and America throughout the voyage, and thirty-two wave lengths are used by the two wireless stations on board, eleven for short wave, nine for radio-telephony, seven for long wave and five for medium. Passengers can speak to friends anywhere in the world through one of the 500 state-room telephones and in addition to the ship's own broadcast programs, world programs are picked up and relayed by twenty-eight loud speakers.

Bigness—luxury—convenience and comfort is apparent every where on this wonderland and numberless pages might be written about this marvel of the sea but to this brief description we will add that the ship's daily newspaper the "Ocean Times" is compiled in a completely equipped printing room and through wireless

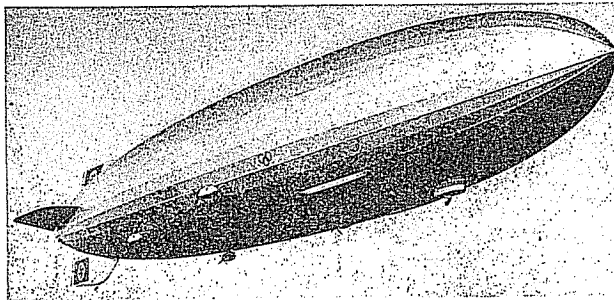


Photo Courtesy Deutsche Zeppelin Reederei

THE "HINDENBURG"—New Flying Leviathan—Largest Zeppelin ever built and capable of carrying 50 passengers from America to Europe in two days

facilities is as complete and up-to-the-minute in current information as any publication of New York or London.

The Queen Mary is truly a floating palace with a new standard of comfort for the ocean traveler.

Speed, comfort and safety are outstanding factors in ocean transportation and through most wonderful developments in aircraft construction, commercialized air routing of the great Atlantic is now a reality.

In this newest form of travel Germany stands supreme and in her latest creation the "Hindenburg" we find a most interesting ship, a passenger carrying craft that flew on her maiden voyage from the old world to the new in the almost unbelievable time of 2 days, 20 hours and 38 minutes and on her return made the remarkable time of 2 days and 18 minutes.

She is the newest monarch of the 153 airships which have been built in the 36 years since Count Ferdinand von Zeppelin flew his first dirigible over historic Friedrichshafen, is the 129th craft of the LZ design and the 119th completed by German "luftschiffahrt."

Ten of the projected LZ ships were not finished, including the LZ-128, immediate predecessor of the Hindenburg, but the two before that have been among the most successful airships in history—the LZ-126 or ZR-3, since known as the Los Angeles, and the LZ-127, christened the Graf Zeppelin in honor of the man after whom the long line of rigid lighter-than-air vessels is named.

Description of the Hindenburg requires superlatives in almost every airship respect. It is the largest zeppelin ever built in point of length (803.82 feet) and lifting gas volume (7,063,000 cubic feet); its payload capacity (15 tons) will permit the greatest combination of passengers, freight and mail ever lifted off the ground in an aircraft, and its flying range at cruising speed (8,750 miles) would allow a non-stop flight from Shanghai to New York or a non-stop round trip journey under favorable wind conditions between its home port and Lakehurst. Passenger capacity for trans-Atlantic travel is 50 persons, accommodated with services resembling those afforded on many surface liners.

Structurally the design of the Hindenburg follows to a large extent recent LZ types, the ship being basically similar to the Graf Zeppelin, although of course, incorporating many

improvements and refinements in design. The system of main rings, intermediate rings longitudinally, lower and central corridors is essentially the same, with the ship being divided into 16 bays, in each of which is a separate gas cell made of a special gelatinoid material.

The ship has 36 sides, that is, it has 36 longitudinal members. Main rings are of the flat, wire braced type, similar to those used on the Graf. The aluminum alloy girders used throughout the ship are of the triangular trussed type, the result of many tests made to determine the most efficient. The outer skin of the ship's body is a cotton material, which is made weather tight by means of coatings of aluminum powder "dope."

Accessibility throughout the ship is provided by two main corridors, one running through the very bottom of the ves-

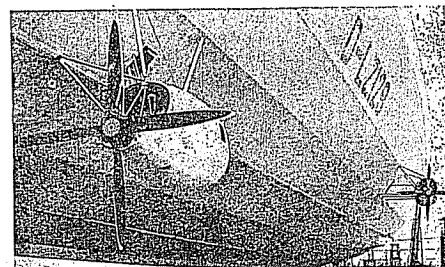


Photo Courtesy Deutsche Zeppelin Reederei

One of the four power cars each containing a 1200 H.P. 16 cylinder Diesel engine. 10 ft. propeller blades are made of wood

sel, which is the main load carrying unit and along which are located all fuel and water tanks, supplies, crews quarters, etc., and the other, which runs through the center of the ship, fore and aft, tying the bow and stern together. The lower corridor handles all traffic through the ship, while the central or axial corridor, in addition to being a primary stress member, serves for gas cell inspection purposes. The axial corridor is made accessible by three ladders from the lower corridor and may also be entered from the bow where the lower corridor also terminates.

On each visit to Lakehurst, the Hindenburg will take on approximately 1,500,000 cubic feet of lifting gas (hydrogen) and 15,000 gallons of diesel oil, both these products coming from the Bayway refinery of the Standard Oil Company of New Jersey, outside Elizabeth. The hydrogen, manufactured from waste refinery gases, is not marketed commercially and is supplied the Zeppelin under special contract.

Power is supplied by four sixteen cylinder Mercedes-Benz water cooled diesel engines, developing approximately 1100 h.p. each. The engines are mounted in power cars outside the ship, two on the port side and two on the starboard. The four bladed wooden propellers are approximately 19 feet, 9 inches in diameter. Reversing direction of rotation of the propellers is accomplished by reversing the direction of rotation of the engine. Each power car is accessible from the hull, permitting mechanics to work on the engine while the airship is in flight. Electric power for the ship is generated in a central plant located in a fireproof room built along the lower corridor. The power units are two 50 h.p. diesel engines, each driving a 33 KW generator. Voltage used is 220 D.C.

The control car and the four power cars communicate by means of a mechanical telegraph system similar to that used on steam ships. Commands are rung up on an indicator in the control car,

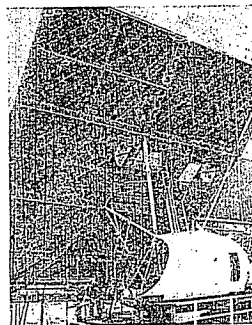


Photo Courtesy Deutsche Zeppelin Reederei

Construction view showing fuel tanks, frame work and engine gondola

and through a system of cables the command is indicated on a similar drum in each power car. The ship is directed from the control car which is located just forward of the passenger quarters. The rudder stand, elevator stand, instruments, central telephone

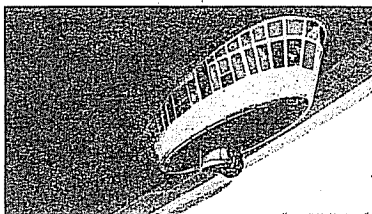


Photo Courtesy Deutsche Zeppelin Reederei

Control car or "Eye" of the Zeppelin—contains only navigational facilities. Note the big tire used as a buffer wheel on landing

station connecting the fourteen most important parts of the ship, and navigating equipment are all located here. Horizontal and vertical control of the ship is normally by hand through a system of gears and cables running from the control car to the control surfaces. It is possible to clutch in an electric motor and drive, which takes the place of man power on the wheel. The elevator or rudder man then controls the ship by switching the motor in or out in the desired direction of rotation. Hand control of the ship can be instantly regained by declutching the electric drive. This system of control has been successfully worked out on the Graf and is the result of thousands of miles of successful operation.

The 16 gas cells are constructed with a tunnel running through their center section in a fore and aft direction, through which the central corridor runs. The cells are equipped with maneuvering valves, which may be operated from the control car, and automatic valves which operate only when the cell is 100 per cent inflated. The maneuvering valves can all be operated simultaneously by means of a hand wheel or individually by means of toggles. The valves are located just above the central corridor in the bulkheads between cells, with gas ducts to carry the valved gas up to the top of the ship, where hooded openings in the ship's cover are provided for its escape.

Quarters are provided along the lower corridor for a ship's complement of 46 men. These quarters are divided into three groups, the officer's quarters with accommodations for 12 officers, being located above the control car forward of the passenger quarters; the deck force quarters with accommodations for 22 are just aft of the passenger quarters; while the machinist's quarters of 12 bunks are placed aft near the power plants.

Above the control car is the radio room, fully equipped for communication by long and short wave, radio telephone and radio direction finding. The short wave unit has been used for messages between Germany and Chatham, Mass., a distance of 4,000 miles, and the ship can easily maintain contact with any properly equipped station in Europe or the Eastern United States or any surface vessel on the North Atlantic.



Photo Courtesy Deutsche Zeppelin Reederei
Passenger cabin or Flying Sleeper

The passenger quarters on the Hindenburg are laid out to accommodate fifty persons, but on a short trip of one day or less 100 persons could be carried due to the lesser load of fuel, provisions, etc. which would be required. The quarters are confined to one bay, being entirely within the ship's hull and constructed on two levels. Included are 25 staterooms, each containing two berths; four public rooms including dining room, lounge, writing room and smoking room; promenades, kitchen, officer and crew mess rooms, bar, bath and lavatories.

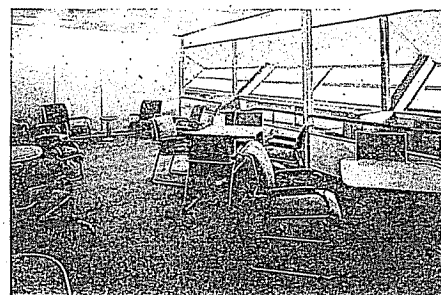


Photo Courtesy Deutsche Zeppelin Reederei

Luxury in the sky. Passenger lounge and starboard promenade on the giant air liner

The arrangement of the quarters is exceedingly compact, with little or no waste space. Although located completely within the ship's hull, ample visibility is provided by windows located along the promenades which extend both sides of the quarters. These windows are built in at such an angle as to provide the widest possible range of vision, both up and down. Windows are available on both upper and lower decks, and obviate the need for artificial lighting in the public rooms during the daytime. The quarters are supplied with heating and air cooling systems, and the walls as well as the cooling plant are insulated with aluminum foil (Alfol). Exhaust gases of the motors are utilized to preheat fresh air carried into the passenger rooms.

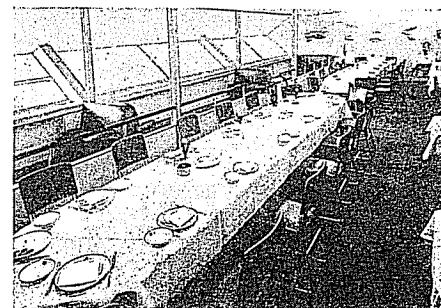


Photo Courtesy Deutsche Zeppelin Reederei

Spacious dining room running the entire length of the port side of the passenger quarters

The interior decorations have been carried out according to designs by Professor Fritz August Breuhaus of Berlin. The walls of the smoking room are covered with a veneer of pear wood which, like asbestos, does not burn. All other rooms are covered with balloon cloth.

In the construction of the furniture duralumin has been chiefly used; wood has been almost completely eliminated. In order to

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