TECHNICAL ABSTRACTS

The following abstracts are reproduced from the "Journal of the British Shipbuilding Research Association," Volume 3, numbers 7-9, July to September, 1948, inclusive.

The New Thornycroft Funnel. *Shipping World*, **118** (1948), p. 619 (30 June).

A new type of funnel, designed to counteract the tendency for smoke to be drawn down towards the deck, has been introduced in the French passenger and cargo-liner *Commandant Queré* built by John I. Thornycroft & Co.

Wind-tunnel tests were carried out on models, and it was found that the tendency for smoke to be drawn down into the area of eddies and low pressure in the lee of the funnel could be avoided if the top section of the funnel were given a cross-section of aerofoil shape. This has been done, and horizontal vanes, extending to the limits of the broader cross-section below, have also been fitted to assist in smoothing the air flow. The efficacy of the new funnel arrangement was demonstrated during the recent trials of the ship ; the smoke was blown well clear of the ship and it was noticeable that it remained in the form of a narrow stream for some time afterwards.

MANOEUVRABILITY AND SEAWORTHINESS

Stability Tests on the *Stockholm*. *Shipbuilding and Shipping Record*, **71** (1948), p. 671 (3 June).

A short description and several diagrams are given showing details of the arrangements for stability tests on the passenger and cargo motorship *Stockholm*. This novel method was adopted by the builders in the tests carried out shortly before the vessel was handed over to her owners.

The arrangement consists of a 25-ton weight suspended on a wire rope from a boom run out from the side of the ship, which was moored head-on to the quay. When the ship lay motionless in the listed position the wire supporting the weight was burned off by an acetylene torch, and the subsequent rolling of the ship was recorded by the stabilograph fitted on board. The rolling period was found to be 22 seconds, which is regarded as very favourable for a passenger vessel.

INSTRUMENTS AND CONTROL DEVICES

Strain Gauges Steer Boat Hull Design. LORD, L. *Marine Engineering and Shipping Review*, **53** (1948), p. 71 (July).

A description is given of the application of bonded strain gauges SR-4 to the study of the pounding stresses set up in the hull of a PT boat when operating at high speed. These boats have proved incapable of going to sea regularly on patrol and returning undamaged, although their interior framing was of high strength. The tests were carried out on the PT 230, and twelve loading units, in which the gauges were mounted, were installed along each chine as new frames were fitted while the craft was being equipped with a new bottom.

It was found that when running at full speed (37 knots), the impact forces on the hull of the vessel exceeded 14 times the static pressure on the hull when floating normally in still water. Further tests were carried out with purely experimental bottoms, to locate concentrations of these pounding forces ; and a pattern has been established which designers may follow in determining the sectional shapes of Vee-bottom boats. Two experimental boats built at Pearl Harbour retained the steadiness of the planing hull without sacrificing the low-speed qualities of the old-fashioned round-bottom displacement hull. The final shape of the non-pounding forefoot was essentially convex, but slightly hooked outward at a wide chine, which was high enough to produce more than 25° deadrise in the bottom.

SHIPBUILDING (GENERAL)

Naval Engineering and Construction in Australia. DOYLE, A. B., Engineer Rear-Admiral, R.A.N. *Engineering*, **166** (1948), p. 141 (6 Aug.).

Rear-Admiral Doyle traces the history of the Engineering and Construction Branch of the Royal Australian Navy, since the latter took over the Australian Station from the Royal Navy in 1913.

The period 1914-22, a period of progress in naval ship design, was followed by the period 1922-34, during which the numbers of personnel and ships in commission were reduced, as a result of the Washington Treaty. The building of the seaplane carrier *Albatross*, from ship working drawings prepared in Australia from guidance plans and specifications only, was the most interesting naval shipbuilding work undertaken up to 1925, but the 1929 depression caused naval building to cease for some time. In 1934, a small building programme, initially of two turbine-driven sloops of about 1,300 tons, was started at Cockatoo Island, and there was a general movement to build up defences. In 1937, it was decided to modernize H.M.A.S. *Australia*. The work was shared between Garden Island and Cockatoo Island, and was finished early in September 1939. The cruiser *Adelaide* was converted to oil-burning within the same period.

Over the period December 1939 to May 1944, 60 corvettes were built to detailed designs produced by the Navy Office and Cockatoo Island. For the first time, orders for the vessels were placed with seven additional firms. The completion of the order for corvettes was followed by orders for 22 frigates, which were larger, faster, and better-armed vessels ; this order was reduced to 12 in 1945.

The work carried out during the War included the demagnetizing of ships for protection against magnetic mines, the building of 3 Tribal Class destroyers, 2 sloops, 12 frigates, 60 corvettes, 4 boom-defence vessels, 15 miscellaneous vessels, and a floating dock for 1,000 tons lift. Many ships were requisitioned and fitted out for special purposes. The initial fitting out of the *Queen Mary*, *Mauretania*, many P. and O., and Orient liners, and large ships of the Dutch Merchant Navy, as well as the completion of the fitting out of the *Queen Elizabeth*, were all carried out.

The Government set up the Australian Shipbuilding Board in 1941, and a Director of Ship Repairs was appointed to take responsibility for naval and merchant ship repairs. Dutch, French, and United States ships, and later, ships of the British Pacific Fleet, were all handled in turn. In 1944 and 1945, apart from other types of work being carried out in the yards, the average monthly number of merchant ships in hand for repairs was 378.

The large Cairncross Dock at Brisbane, started in 1942, was brought into use in 1944. The facilities of the dockyards and shipyards at Cockatoo Island and Garden Island were developed, and a naval boatyard for building wooden craft was established at Green Point, Sydney, in 1942.

The story of the building of small craft during the War is very involved, but a survey in January 1945 showed 9,900 men engaged in this work, which was controlled by the Small Marine Craft Sub-Committee. The Captain Cook Dock, Sydney, was completed just in time to provide the essential docking facilities for the British Pacific Fleet. Before the end of 1945, in addition to the *Illustrious* and *Indomitable*, the *Duke of York*, *Anson*, *Implacable*, *Formidable*, *Indefatigable*, and *King George V* had all been docked.

The need for co-ordination between all Services, when planning for defence, was one of the principal lessons learned during the War ; another was the importance of naval aviation, as part of a balanced naval force. There is a scarcity in Australia of professional naval engineering staff adequately trained in shipbuilding—especially in naval shipbuilding—to produce plans, and of experienced personnel to implement them when made.

WELDING AND OTHER METHODS OF CONSTRUCTION

Influence of Welding on Marine Engine Design. DORRAT, J. A. *Welding*, **16** (1948), p. 276 (July).

The present trends in the application of welded design to the construction of modern engines are indicated. Choice of electrodes and of materials, the most suitable type of joint, and the advantages to be obtained by the adoption of fabricated construction are discussed.

Despite the saving in weight which could be effected by the substitution of mild-steel for cast-iron machinery parts, little use of welding has been made in building steam reciprocating engines. On the other hand, one notable Diesel engine of a large type has an all-welded structure. As an example of the application of welding in this field, the construction of a Diesel-engine bedplate is described. Double or single web design can be used for engine columns. Some of the low-pressure casings of modern marine steam turbines depend on welding for their structural rigidity. The use of welded gear cases has developed rapidly, and an illustration is included showing the two main parts of a typical casing of a double-reduction gear for a two-stage 7,000 h.p. turbine.

Radiographic Control of Welded Repairs in Steel Castings. HALMSHAW, R. *Welding*, **16** (1948), p. 284 (July).

In this paper, presented to the Industrial Radiology Group of the Institute of Physics, the Author deals with the techniques involved in the examination of steel castings and the elimination of the detected flaws, from the point of view of one who visits different steel foundries on radiographic work.

Radiographic examination of certain areas is specified for certain types of casting, the area chosen being selected by the radiographic inspector, a representative of the buyer, and a representative of the foundry. Unfortunately, X-rays produce the least satisfactory radiograph at the very places where shrinkage defects are most likely to occur, but a good radiograph can usually be obtained with gamma-rays. Defects likely to cause leakage or to lead to failure under stressed conditions should be repaired. For example, hot tears and cracks, as well as all shrinkage of a filamentary form, unless very shallow, are marked on the film to be cut out. The problem of indicating on the casting itself which areas need repair is discussed, as well as the way in which the repair should be carried out. When it is thought that the defect has been completely removed, a magnetic crack detector is used as a first check preparatory to repairing the casting. The Author prefers the A.C. transformer type of detector instrument for convenient handling. After welding, etc., the weld surfaces are ground smooth on both sides of the casting if possible, and the weld, plus surrounding parent metal, is again examined with a magnetic crack detector.

The procedure to be followed with castings in which defects have been revealed by mechanical tests is very similar. It is often possible to remove the major portion of the defect before taking a radiograph.

Arguments for and against the use of gamma-ray radiography for the examination of castings, and the control of casting repairs, are discussed, and the Author concludes that gamma-ray radiography has a very definite place in the non-destructive examination of steel.

MATERIALS

Shotpeening. LANDECKER, F. K. *Transactions Society of Automotive Engineers,* **2** (1948), p. 191 (April).

Many examples are given, illustrating the improvement to be obtained in the fatigue life of car components subject to fatigue, shock, or impact, by the process of shotpeening. This process, which causes plastic flow of the surface layers, sets up a high residual compressive stress in the surface. The depth of the layer cold-forged in this way varies from 0.005 to 0.015 in., depending on the material and intensity of peening. It is important that the correct combination of such variables as shot size, nozzle size, and air pressure, or wheel speed be used. The shot used should never be more than half the radius of the smallest fillet or corner. An Almen gauge is described, which can be used to measure the intensity of the peening. Its operation is based on the measurement of the curvature of a standard steel strip, which has been subjected to the same cycle of operations as the part to be treated, and then shotpeened on one side while bolted to a block.

Curves obtained by plotting Almen arc height against time of exposure to peening show that a state of saturation is obtained after a definite time, the curve becoming parallel to the time axis. In the Author's experience it is essential that the treatment should be carried to saturation, but no ill effects accrue if it is continued beyond this point.

Although light lapping or honing have frequently been found to be beneficial after shotpeening, if the lapping is taken too far the advantages of the process may be lost. The thin compressive surface will be destroyed by grinding or machining.

The process has been found to be just as effective for non-ferrous metals, but for some of these, such as magnesium and soft aluminium, non-metallic shot made of walnut shells, plastic, or glass must be used.

BOILERS AND STEAM DISTRIBUTION

A New French High Pressure Boiler. *Shipbuilding & Shipping Record,* **72** (1948), p. 133 (29 July).

Four passenger liners at present building in France will be equipped with high-pressure water-tube boilers operating at 855 lb/sq. in. and 890° F., but all of different types. A description is given of one of the types, the F.C.M. 47/60, which is of entirely new design ; three of these are being installed in the 10,000-ton *Ville de Marseille.* Her sister ship *Ville de Tunis* is being fitted with three Velox boilers. Both ships are turbine driven with machinery output of 15,000 s.h.p.

Patented by the Forges et Chantiers de la Méditerranée in 1939, the experimental plant shown in the illustrations accompanying the paper first operated successfully at La Seyne last year. An accelerated natural-circulation type of boiler, with the combustion-chamber walls composed entirely of generating tubes, ensures rapid steam-raising properties, and furnace brickwork is practically eliminated. The new boiler consists of two welded drums between which the tubes forming the walls of the combustion chamber are arranged. The steam and water drums are connected by a downcomer in front of the boiler. A small saturated steam drum is provided above the steam drum. The main particulars of the boiler are :—

Steam pressure : 855 lb/sq. in.
Steam temperature : 890° F. (480° C.).
Continuous rated output : 66, 150 lb/hr.
Heating surface : 1,865 sq. ft.

Three F.C.M. type oil burners are fitted, fuel being supplied at pressures varying from 215 to 415 lb/sq. in. The boiler is fitted with a superheater, economiser, and air heater. The generator and superheater tubes are of chrome-molybdenum steel, the economiser of cupro-steel, and the air preheater of steel.

The first official trials took place last November. The boiler was cold when lighted up, but a steam output of 20 tons was available within half an hour at a pressure of 700 lb/sq. in., the pressure necessary for manoeuvring. In an endurance test, the average hourly output was 28 metric tons of steam for a fuel consumption of 2 metric tons. Steam temperature averaged 905° F, the temperature of the funnel being 347° F and of the feedwater, 310° F. The boiler pressure remained steady at 855 lb/sq. in. Several rapid manoeuvres were carried out, during which the steaming rate of the boiler was made to vary several times from 8 to 25 tons and then back to 8 tons. The burners were shut off or lighted up as required throughout the trials.

The ease of access to the boiler drums, superheater, economiser, and air heater for examination and cleaning was also demonstrated during the trials.

Velox Marine Boilers. SACHS, K., and MELDAHL, A. *Brown Boveri Review*, **34** (1947), pp. 4 and 58 (Jan.-March).

The ash content of the residual oil usually sold for firing purposes has increased considerably in the last few years. By re-designing the evaporator and superheater, it has been possible to eliminate the danger of choking. Reference is made to a device for regulating the temperature of superheat of marine boilers. It can also be used to reduce the temperature of the steam during manoeuvring, thereby reducing the stresses in the astern turbine.

One advantage of the Velox boiler is the completely automatic regulation, which means a reduction in the personnel required. Further, the absence of any brickwork in the combustion chamber makes it possible for the boiler to be examined and overhauled within a short time after it has been shut down.

STEAM PROPELLING MACHINERY

Design and Manufacture of Main Propulsion Turbines. DAVIES, J. A. *Marine News*, **35** (1948), p. 13 (July).

In this discussion on the design and manufacture of marine turbines, emphasis is laid on the importance of keeping down the cost of production without sacrificing efficiency, and the construction of the various components is discussed from the practical rather than the theoretical point of view.

The feature that distinguishes a marine from a land turbine is the provision of some means for reversing the direction of rotation. Various factors to be considered in the design of the astern turbine are discussed, and the importance of making allowance for differential expansion between cylinder and rotor during astern working is stressed. The present state of knowledge of the strength of materials at the temperatures commonly used in turbines has greatly reduced the likelihood of blade failure during normal operation, but the possibility of this occurrence has not been eliminated. Except for loss of oil, failure of a turbine bearing is a rare occurrence, but the glands are still open to criticism.

It is seldom possible to standardize marine turbines, and it is essential therefore that, during the design stages, every care should be taken to avoid unduly expensive designs, to eliminate hand fitting of components as far as possible, and to reduce machining time. Although a factor of safety of 3 on the yield strength of the material is allowed for parts rotating at high speed, the quality of machine finish must be of a high standard to avoid the possibility of stress concentrations which might be caused by a rougher finish.

From the point of view of both design and manufacture, the horizontal joints of the cylinders should be straight. Wherever possible, the design should be such that the cylinder can be bored on a vertical mill with the ends of the bore open. At the high pressure end of a well-insulated turbine, the temperature of the bolts and the cylinder joint will approximate closely to that of the steam at that point. This should be borne in mind when the bolts are being designed.

Although it is possible to improve steam consumption by using higher pressures and temperatures, the initial cost involved, due to the increase in strength called for in the cylinder and steam pipes, is greater than is commonly supposed.

The design of turbine rotors has kept pace with the requirements of higher speed and greater efficiency, and once they have been balanced accurately very little wear occurs. It is suggested that the needs of the average cargo ship and tanker could be met adequately by simplifying the design, so that there is only one nozzle-control valve instead of the wide range of nozzle controls normally provided.

Turbines and Boilers of the *Orcades*. *Marine Engineer* (*Annual Steam Number*), **71** (1948), p. 234.

The new passenger liner *Orcades* is being built for the Orient Steam Navigation Co., Ltd., at the Barrow Yard of Vickers-Armstrongs, Ltd., where the propelling machinery and boilers have also been constructed.

Steam is provided by two large and two small Foster-Wheeler boilers of the high-pressure two-furnace controlled-superheat type. They are designed for a steam pressure of 525 lb/sq. in., and a temperature of 850° F, and are arranged to give superheat control down to 600°-650° F. when manoeuvring the main engines. Each large boiler is designed for a maximum continuous output of 165,000 lb steam per hour, and each small boiler 84,000 lb of steam per hour. They burn oil only, under Howden's balanced-draught closed-duct system, with open stokehold.

The turbines are of the Parsons type arranged for triple-expansion working ahead and driving twin screws through single- and double-reduction double-helical gearing. Each shaft has three turbines working in series, namely, one high-pressure turbine of impulse-reaction type, an intermediate one, and one low-pressure turbine, the two last being of the all-reaction type. The turbines are capable of developing a normal ahead power of 34,000 s.h.p. with propeller revolutions of 130 r.p.m., and an overload power of 42,500 s.h.p. at 140 propeller r.p.m. The total astern power available is about 65% of the normal ahead power.

Diagrams are included which show the general arrangements of the Foster-Wheeler boilers and turbines.

Solving the Problem of Astern Turbine Power. *Journal of Commerce (Shipbuilding and Engineering Edition)*,—(1948), p. 1 (13 May).

It has long been recognized that the incorporation of an astern turbine in a low-pressure turbine casing is only an improvization, and introduces many troubles. Considerable difficulty was experienced with the low-pressure casings of the standard cargo liners built in large numbers during the War, owing to hogging due to varying temperatures. The problem was solved by the introduction of a water jacket, which ensured a more even distribution of temperature. The ideal solution would be to use unidirectional turbines. Mr. A. W. Davis put forward a scheme of this nature in a paper entitled "Application of the Reheat Steam Cycle to Marine Propulsion with special Reference to the C.P.R. *Beaver* Class Turbo-Electric Cargo Liners," published in *Trans. North-East Coast Institution of Engineers and Shipbuilders*, **63** (1946-7), p. 71. In Section VIII of this paper Mr. Davis discusses possible trends in the future development of steam propulsion. He describes an oil-operated clutch which he claims would ensure that there would be a minimum reduction of turbine rotor speed when running astern.

Another possible solution to the problem is provided by the variable-pitch propeller, but this is subject to several serious disadvantages. Because of the comparatively large diameter of the boss, these propellers cannot be designed to be as efficient as a screw of normal proportions. Any defect arising in the operating mechanism means dry-docking. Further, when the blades are set for astern working the drive is concentrated on the outer edges as the pitch is at a maximum at the tip.

Discussing this subject with the writer of this article, Dr. T. W. F. Brown envisaged a double-reduction gear case of the locked-train type with a fine-tooth coupling and a quill shaft with impellers solidly bolted to it. The corresponding driven elements in two fluid-coupling casings would be rigidly connected to the extremities of the pinion. If the coupling nearest the turbine is filled the coupling drives the pinion in the ahead direction, whilst if the astern coupling is filled the pinion is driven astern. The arrangement has been designed to give an ahead efficiency of 98%. Both couplings are filled for manoeuvring. Operation is reduced to the turning of a single change-over cock admitting oil to one or other coupling. This type of coupling is, moreover, not sensitive to slight misalignment. A model is in operation at the Pametrada Research Station.

Notes on the Operation of the *Beavers*. *Marine Engineer (Annual Steam Number)*, **71** (1948), p. 258.

A full description of the engine and boiler installations of the latest *Beaver* class vessels of the Canadian Pacific Steamship Co. was given in a paper by Mr. A. W. Davis (see previous abstract). These turbo-electric vessels are noteworthy for their advanced steam conditions (850 lb/sq. in. and 850° F.). Certain features of the boiler installation are described in this article, which is however, manly concerned with the successful operation of these ships on the North Atlantic cargo service.

The simplicity with which control of the steam temperature can be obtained, despite the high working pressure and full-load temperature, has been demonstrated by experience. It should be noted that this result is obtained by the simple operation of a damper. There has been a tendency in recent years to adopt the more complicated twin-furnace boiler method for controlling steam temperature. The relative merits of the Melesco single-pass superheaters with multi-loop elements, as used in the *Beaver* boilers, and the U-tube multi-pass superheaters are discussed.

The practical advantage of having only one main boiler has been definitely established. With regard to the upkeep of the boiler unit, the elimination of the deep banks of generating tubes and the disposition of the superheater, reheater, and economiser result in an arrangement in which the surfaces can be kept clean by the use of soot blowers only. The reduction of brickwork in the furnaces also reduces the cost of upkeep.

MARINE POWER INSTALLATIONS (GENERAL)

Some Notable Belfast-Built Engines. POUNDER, C. C. *Belfast Association of Engineers, paper read* 3 *March* 1948.

The Author describes the successive steps in the evolution of the marine engine as applied to Harland & Wolff-built merchant ships ; he covers the period from 1859, when the first steamer *Venetian* was launched, up to the present time. The development of steam engines, Diesel motors, and steam turbines, together with the ships in which they were installed, are described and there are several illustrations of typical installations.

The Author states that both Diesel and steam-turbine propelling installations are now approaching the final phases of their evolution and that the new machine with much promise, but requiring development, is the gas turbine. In the meantime, the Diesel engine and steam turbine will be used for many years to come. When all factors are equitably considered, the Diesel-engined ship is measurably smaller than the equivalent turbine-propelled ship ; the weight-plus-fuel favours the Diesel engine. At present, a Diesel installation costs less than an equivalent steam-turbine installation. Maintenance costs favour the turbine.

The thermal efficiency of the Diesel engine is about 37%, and of the steam turbine working at 500 lb/sq. in., 800° F., and 29 in. vacuum, about 26% ; the fuel consumption is about 0.36 lb/s.h.p. hr. for the Diesel and 0.53 lb for the turbine. The all-purpose rate for a Diesel installation is approximately 0.39 lb ; for a steam-turbine installation it may be 0.58 lb.

The Author is of the opinion that for the direct-driven Diesel engine, 20,000 s.h.p. total for twin-screws is not likely to be exceeded in the future ; for higher powers, geared Diesel engines or Diesel-electric sets are likely to be preferred. There is every reason why steam turbines and Diesel engines should continue to be developed together in the keenest rivalry, thereby stimulating progress.

Of the total of 184,000 tons of shipping launched last year at the shipyards of Harland and Wolff, 45% of the merchant ship tonnage was steam-turbine propelled, and 55% Diesel-engine propelled.

Report from America. HARDY, A. C. *Marine Engineer*, **71** (1948), p. 275 (June).

This article consists of notes on contemporary marine engineering practice and progress in America, based on information obtained by the Author during a recent visit to that country.

During the War, much money was laid out in providing the best facilities for manufacturing geared turbines, and therefore, for some time to come, this mode of propulsion is likely to be widely adopted. America's largest and latest post-war liners are, it is true, turbo-electrically propelled, but they were designed during wartime, with troop-carrying primarily in view. Probably because of the almost " push button " simplicity of the modern turbine-driven U.S. merchant ship, steam-turbine operators are more easily obtainable than specialists for handling large Diesel engines.

Small American marine Diesels, up to about 1,200 h.p. per shaft, have been popular for a long time, and, partly because of the servicing organization provided by the General Motors Company for their equipment, this firm will prove a serious rival to British firms building engines of similar power. A current feature of the U.S. Diesel building programme is the equipment of trawlers with main propulsion and trawl winch generator units. There is no difficulty in obtaining competent Diesel operators for engines up to 1,200 h.p.

Steam-turbine research and development is tending towards the use of higher temperatures and pressures. Common steam conditions today are 450 lb/sq. in. and 750° F, but it is considered that saving in weight and space, as well as improvement in fuel consumption, can be effected by operation at 600 lb/sq. in. and 850° F, which is common practice in the larger American naval vessels.

In the auxiliary field, there seems to be a reluctance to employ oil-engine-driven generators in place of turbo-generators, despite the many obvious advantages of the former. The use of A.C. current is still, on the whole, no further advanced than in other countries.

Attempts have been made to reduce weight and cost to a point where turbo-electric propulsion would be as attractive as geared-turbine-drive. An imposing array of U.S. all-electric ships could be listed.

Gas-turbine development is being carried on steadily, although less practical experience is probably available than in Great Britain.

DIESEL AND OTHER I.C. ENGINES

The Nordberg Radial Engine. Motorship, **33** (1948), p. 34 (July).

A new engine, with cylinders arranged radially about a vertical crankshaft, has been manufactured and tested by the Nordberg Manufacturing Company. The success achieved by the pilot model in stationary electric generating service would seem to recommend this engine for marine application on Diesel-electric propelled motorships.

The advantages claimed for this engine include a high degree of balance, which tends to reduce vibration. The design is compact, and requires head-room less than twenty feet from the engine foundation and lateral space of little more than twelve feet, for a unit developing 1,800 h.p. or 1,250 kW at 400 r.p.m. Considerable saving in weight is also achieved, the unit weight per horsepower for the pilot model being about 47 lb. Ease of maintenance is a further advantage. The short, counterweighted crankshaft requires the maintenance of only two bearings, each of which is an easily renewable bushing. All heads, pistons, and cylinders are interchangeable.

The engine is designed to run on gas or oil. The eleven cylinders are 14 in. bore and 16 in. stroke. The engine operates on the simple two-cycle principle with port scavenging and exhaust. Power is transmitted through connecting rods to a master gear mounted on the single crankpin of the shaft. The gearing has been designed to ensure the optimum position of the master gear, and counterweights are provided for the absorption of piston thrust and balance of forces.

GAS TURBINES

Performance of Commercial Gas Engines. SIDLER, P. R. *American Society of Mechanical Engineers, paper read at Spring Meeting, New Orleans, 1 March* 1948.

The Author reviews a number of gas-turbine power plants installed by the Brown Boveri Corporation.

The stand-by and peak-load gas-turbine set at Neuchatel was the first unit of this type. It is the simplest open-cycle turbine with directly-coupled generator without heat recovery, and its overall thermal efficiency is 18%.

The second gas turbine, built in 1941 for the Swiss Federal Railways, develops 2,200 h.p. and includes an air pre-heater. It has now been in service for some 7,000 hours. A similar unit of 2,500 h.p. is under construction in England for British Railways.

CORROSION, FOULING, AND PREVENTION

Plastic Coating Baffles Corrosion of Ships. *Marine News,* **34** (1948), p. 41 (June).

Plastic commercial paint for the topsides and interiors of ship has been recently introduced in U.S.A. under the trade name of Corrosite. It may be applied by brush or spray to metal, wood, concrete, or over old paint. Two coats of Corrosite are sufficient for ordinary corrosive conditions, although three or four can be used if exposure is severe. The paint will cover up to 450 square feet per gallon and dries in less than an hour. It is claimed that it is more flexible than ordinary paint, is non-contaminating, tasteless, odourless, and non-inflammable when dry. No priming coat or undue surface preparation is required, and special grades are available for boilers, tanks, and funnels.

The coating has been exposed and subjected to all types of weathering and also severe climatic temperature ranges. Its protective power and lasting qualities are outstanding in the tropics, and it is important to note that when applied to wooden surfaces it will seal them against termite action. It will also resist salt spray and salt air attack. The paint is not recommended as a bottom paint.