AN ENGLISH ELECTRICALLY OPERATED EVAPORATIVE CONDENSER PLANT.

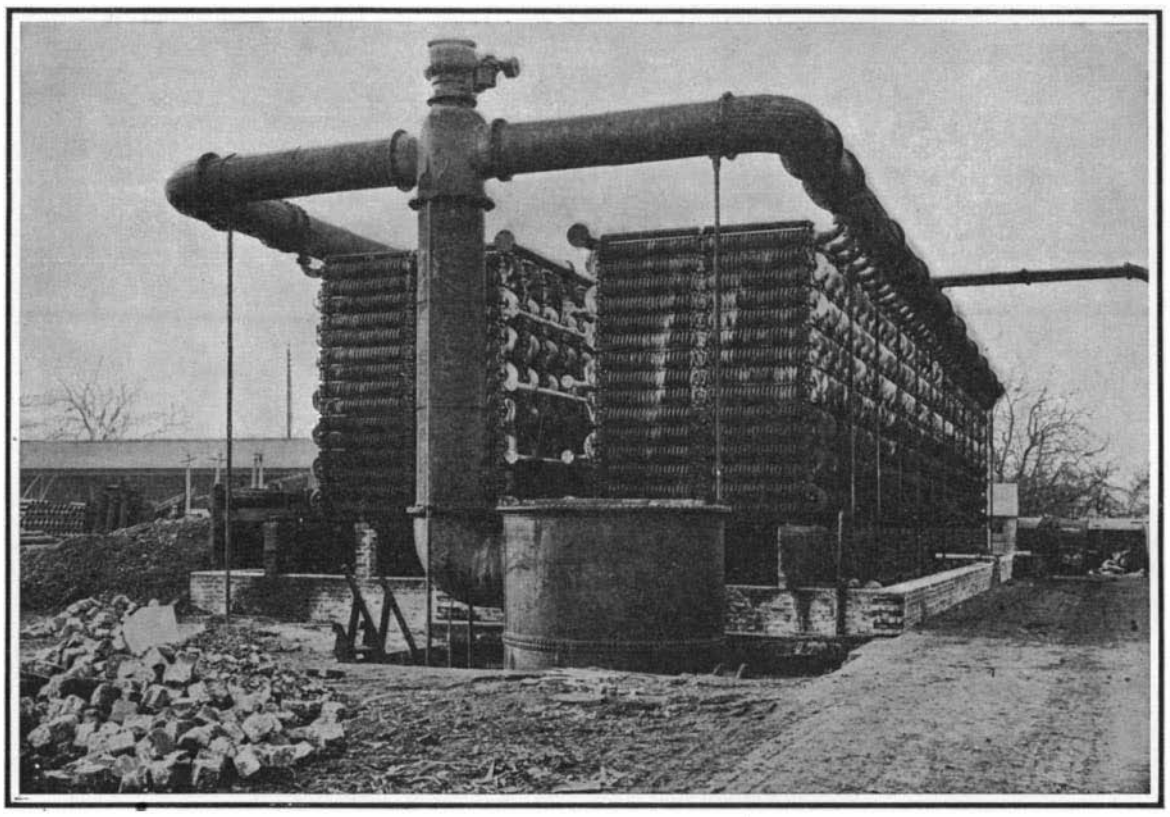
BY FRANK C. PERKINS.

The accompanying illustration shows the construction of an English evaporative condenser constructed to do for the atmospheric condenser what the Contrafio does for the ordinary wet-surface condenser, utilizing compartmental drainage. This plant was installed to deal with 60,000 pounds of exhaust steam per hour and to maintain a vacuum of 25 inches under severe conditions, there being no available water except from the city main.

It will be noted from the illustration that the condenser is formed of two sections of pipes supported by a base of brick and concrete, forming an enormous tank. Each of the two groups or sections is divided into smaller sections, collectors being placed at the end of the coils for separately draining them in such a way as to separate the water from the vapor. The water of condensation then flows into a seal box, and an electric motor-driven pump carries a larger part of it away directly to the hot well, while still at a high temperature.

Sectional drainage is regulated to suit the load on the condenser, in order to obtain at the same time both a high vacuum and a hot feed. Care was taken in the design of the installation to prevent all the water of condensation from being drained from the pipe, for in order to obtain efficient condensation of steam, the effervescent action is necessary. Valves are arranged so as to provide the adjustment of the sectional drainage to synchronize with the load and to secure a hot feed on light load as well as on peak load.

A slow-speed electric motor is utilized for driving each of the two sets of three-cylinder air pumps. In the same pump room are located two direct-connected electric-motor-driven centrifugal pumps for circulating the water over the condenser pipe.



A HUGE EVAPORATIVE CONDENSER.

A NEW ELECTRIC TRAVELING SCALE CRANE.

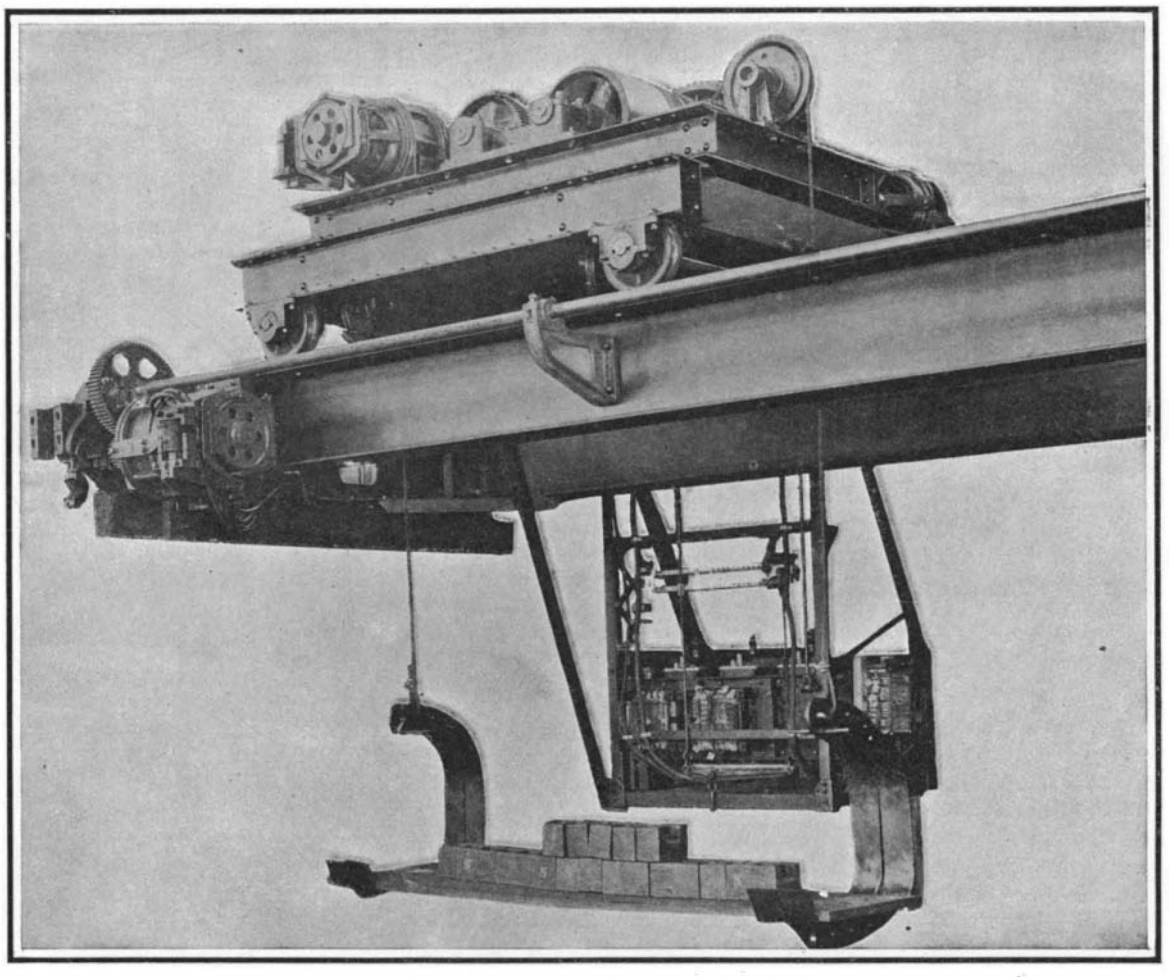
BY WALTER BAILEY.

The accompanying illustration shows the construction and method of operation of a three-motor electric traveling scale crane, all movements of which are accomplished by electric power. The scales are supported on a trolley truck frame and carry the hoisting mechanism on an independent steel framework, while the scale beams are in the cage suspended from the trolley, and readings are taken and recorded by the operator.

It is of interest to note that the crane is provided with three beams, two scale beams with several recording poises and one tare beam, permitting the scale weights of several different items of material to be easily and accurately determined. A movement of the hand lever transfers the load from the knife edges of the scale to the trolley truck frame when desired, and the operation thereafter is the same as with an ordinary trolley.

It will be seen that an open side platform is furnished for carrying long pieces such as bars and rods, this platform being designed to suit the material to be handled. The crane is adapted for weighing material when loading, checking invoiced weights, and for loading for shipment as well as for inventory.

The illustration shows a three-motor electric traveling scale crane fitted with alternating-current 3-phase 60-cycle 220-volt motor. This construction is used in warehouses for handling freight, structural material, or any other class of goods of which the weight is desired. The scale beams are so arranged that record of the weight of each piece can be made automatically. The scale mechanism can be thrown out of service and the carrying beam cast off, so that the crane may be used as a standard traveling crane for general work.



A NEW ELECTRIC TRAVELING SCALE CRANE.

"Speaking" Dynamos and Transformers.

The human voice is perfectly transmitted a considerable distance by undulatory or induction currents, produced by periodic alterations in the magnetism of a magnet. Prof. W. Peukert, of Brunswick, Germany, has tried to magnetize an iron core by currents of the kind produced when a microphone is spoken into. To this effect he inserted a coil surrounding a closed bundle of soft iron wires in the circuit of a microphone. The sounds pronounced in front of the microphone caused the iron core to vibrate slightly, thereby rendering conversation with perfect distinctness, though so feebly that the ear had to be brought close to the iron core.

It is well known that the permanent magnetism of iron under certain conditions is markedly influenced by feeble, variable magnetizing forces. [illegible] the idea of subjecting the iron simult[illegible] constant magnetizing force. With this obj[illegible] the core was surrounded by a second coil of w[illegible] versed by direct current. The iron core immed[illegible] began to give out intense sounds. In fact, by [illegible] a direct current of proper intensity, speech wa[illegible] loudly reproduced as to [illegible] distinctly audible at a distance of several yards.

In another arrangement a coil and soft iron core were inserted between the poles of an electro magnet. Again a very intense and distinct reproduction of speech was produced. The sound intensity, in this case as well, depended mainly on the excitation of the electro magnet. A reproduction, though of considerably less intensity, is also obtained when using a coil without iron core.

These experiments having shown a considerable permanent magnetization to be the main factor, the substitution of a large steel magnet for the electro magnet was suggested. Accordingly, a horse-shoe magnet, on a wound iron core, was used with excellent effect. Speech was reproduced very distinctly. By properly choosing the shape and dimensions of the various parts it thus was possible to obtain a novel telephone apparatus, remarkable for its simplicity, and free from the disadvantages of vibrating plates or membranes. This telephone comprises a magnetic circuit as perfectly closed as possible, whose ultimate particles partake in the oscillation, insuring—because of the magnitude of the vibrating mass—a considerable sound intensity. These effects can even be increased by using an acoustic funnel, the whole system constituting an extremely simple loud-speaking telephone, free from the upper harmonics that usually spoil the timbre.

Similar experiments with equally satisfactory results were made on different alternating-current transformers. Even a dynamo could be made to talk. The field magnets of the dynamo were excited from a special source of continuous current. The microphone circuit being applied to the brushes, the dynamo repeated with perfect distinctness the words pronounced in front of the microphone. Speech and song were reproduced with equal clearness, a small 500-watt shunt dynamo producing sounds distinctly heard throughout a hall of fair size.

While large-sized machines show the same effect, the sound intensity of the reproduction by no means increases with the size of the machine, the microphone current undergoing no corresponding increase.

It is doubtless an interesting physical phenomenon that the heavy iron masses used in connection with dynamos and transformers should be acted upon to such an extent by feeble microphone currents.

The government commission appointed to regulate the Russian platinum industry has, in conjunction with representatives of that industry, drawn up a scheme for the formation of a compulsory syndicate. In connection with this scheme, the exportation of unrefined platinum is to be prohibited, its production is to be regulated by law, and credit is to be allowed on platinum by the State Treasury until the export trade in that article to foreign countries shall have become more favorable.

...eless Telegraphy and Meteorology.

According to ..., the director of the meteorological observatory at Aix la Chapelle, visited the United States in this ... and, having become convinced in Washington of the reliability of regular wireless communication between vessels, instituted, in the course of his return voyage, experiments which demonstrated the feasibility of transmitting weather indications from ship to ship in this way. The coast wireless stations which are most important for communication with vessels navigating the Atlantic Ocean are those of the English Channel, the west coast of Ireland and the eastern shores of the United States and Canada. Several of these stations can make themselves understood to a distance of 2,000 miles, so that vessels can receive intelligence from land during the entire voyage across the Atlantic. The wireless transmitters on shipboard, however, are much less powerful. Their radius of action never exceeds 500 miles, and they cannot send messages directly to land from a greater distance than this.

During the summer of 1908 Dr. Polis made an experimental voyage across the Atlantic and back, on the Hamburg steamer "Kaiserin Auguste Victoria." He had arranged with several steamship companies to take part in the experiments, and from their vessels he received 25 wireless messages on the outward and 19 on the return passage.

In addition, the Aix la Chapelle observatory sent him, *via* the wireless station at Clifden, Ireland, daily reports of meteorological observations made on the English and French coasts. The transmission was perfectly successful up to the end of the fourth day of the outward voyage, when the ship was about 2,000 miles from the Irish coast. The messages, which were in cipher, were transmitted without a single error.

When the ship came within the zone of influence of the American stations, it received daily reports from the Weather Bureau at Washington. These reports were transmitted more rapidly than those from Aix la Chapelle, but they were often curtailed, a fact which was attributed to the employment of code words instead of ciphers.

Conversely, meteorological observations made on the ship were sent out daily by wireless, for transmission to Aix la Chapelle. During the first two days of the westward voyage these messages were received directly by the wireless stations on the English Channel. Afterward, the messages were transmitted indirectly through vessels nearer shore. This system was employed until the ship was in mid-ocean, and the transmission of the message to Aix occupied two full days. The messages sent directly on the return trip reached Aix in less than 13 hours—one of them in one hour and forty minutes.

Daily weather charts were drawn from the reports received from land in combination with observations made on board. A German commission has since been appointed for the purpose of conducting a more extensive series of experiments.

Collaboration between meteorological and wireless stations, ashore and afloat, would benefit navigation as well as meteorology, for the captain of a ship at sea has a profound interest in forthcoming weather changes. The receipt of various meteorological data from a few stations would not always suffice, but the void would be filled if the wireless stations on the coast should send out daily, at a predetermined hour, weather forecasts obtained from neighboring meteorological stations, for the benefit of all ships within the zones of influence of the wireless stations. In particular, effective warnings of approaching storms might be given in this way.

An attempt in this direction has already been made in Holland. The police schooner of the North Sea fisheries receives daily, while within the zone of influence of the wireless station of Scheveningen, the weather forecasts of the meteorological institute at Bilt. Whenever it is possible, special storm warnings are also sent to the schooner, which transmits the messages to the fishing boats by flag signals.

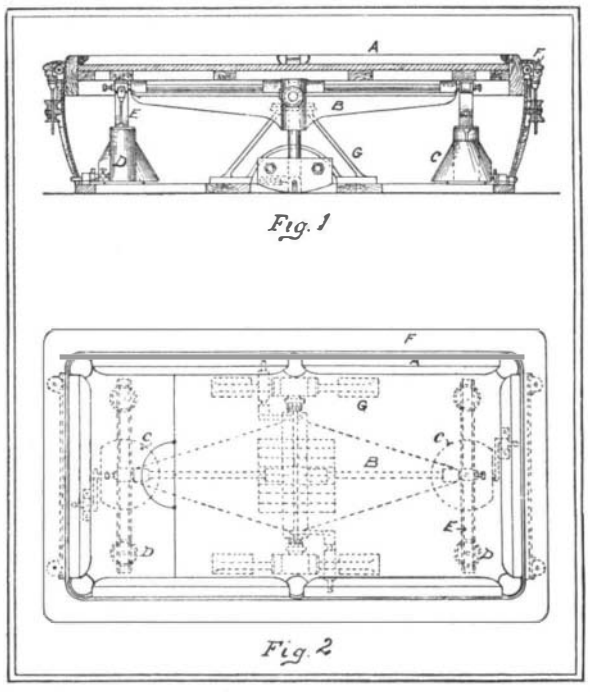
It may be expected that, as the number and frequency of weather reports sent by vessels to meteorological stations increase, the forecasts will become more accurate and more valuable to the vessels which receive them.—Cosmos.

Experiments in abrasion conducted at a French mint have proved that aluminium coins will be less rapidly worn by use than coins made of gold, silver, or even bronze.

A BILLIARD TABLE FOR SHIPS.

BY HAROLD J. SHEPSTONE.

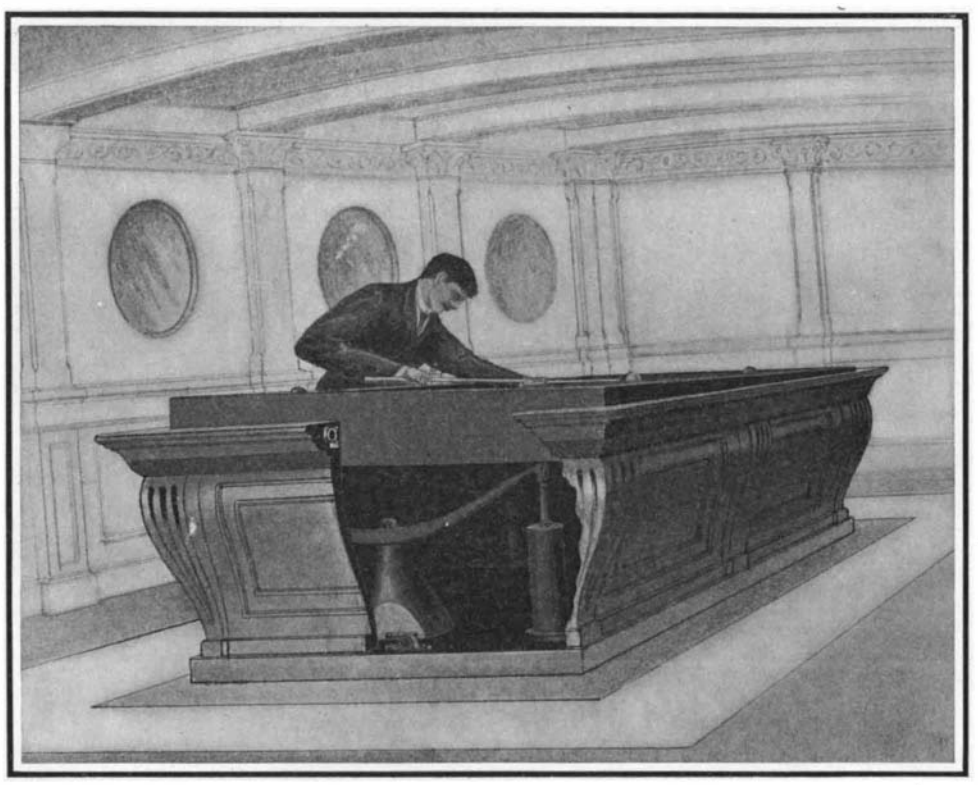
To the wide range of amusements now found on the leading liners, billiards may be added in the near future. This has been rendered possible through the invention of an ingenious movable table top by two London inventors, Messrs. Terrey and Warren. Hitherto it has been impossible to play billiards at sea, chiefly for the reason that billiard balls, like other things, are inexorably subject to the law of gravitation. It seems an undoubted fact, nevertheless, that a billiard table was put into the "Great Eastern." The assumption may possibly have been that the huge proportions



SIDE AND PLAN VIEWS OF THE BILLIARD TABLE.

of the mammoth liner would insure so stable a platform at sea, at all events in ordinary weather, that the balls would not cannon of their own account. If such was the expectation, however, it was doomed to disappointment. To-day it would be just as impossible to play billiards on the "Lusitania" or on the "Adriatic," unless they were at anchor, as it was on their precursor of fifty years ago.

A comparatively modern idea—for the question of a suitable billiard table for ships has received the attention of the makers for a considerable time past—was to fit up a ship with a saloon so suspended that it would remain unaffected by the vessel's movements.



A BILLIARD TABLE FOR SHIPS.

Its floor, it was hoped, would remain perfectly horizontal, whatever the rolling or pitching, and its occupants would be immune from sea-sickness. This notion, despite its humanitarian motives, was doomed to disappointment. The swinging cabin did not work satisfactorily in practice. For one thing, it proved too jerky, and did not add to the safety or comfort of the ship.

A reference to our plans will show how these desirable qualities have been secured. *A* is the bed of the table, which is secured to transverse girders, situated near the ends of the table. Each girder carries, at the center of its length, the hollow element of a pivot whose axis is longitudinal to the table, the solid element of the pivot consisting of the shaft *B*. This latter is secured to a cross piece, to which is also secured a transverse shaft, which is carried in brackets *G*, bolted to the deck of the billiard saloon of the ship. The horizontal position of the bed of the table is maintained by depending counterbalance weights, of which there are three, namely, one at each end, secured to the transverse girder, for counteracting the effect of the list of the ship, and a central counterbalance, for counteracting the effect of a change of trim. *D* is a dashpot to hold the opposite end of the table in balance. The two shafts are each carried on ball bearings for the purpose of eliminating friction as much as possible. The table shown in our illustration measures 6 feet by 3 feet, or three-quarters size. A full-size table, of course, could be erected on the same principle, but space being valuable on board ship, it is probable that the smaller size would be chosen.

A Project for the International Exploration of the Atlantic.

At the international geographical congress which met recently in Geneva two delegates called attention to the necessity for an international exploration of the Atlantic Ocean, and suggested the formation for this purpose of an association similar to that which has already been formed for the study of the seas of northern Europe. All Atlantic exploring expeditions of recent years have proceeded southward from Europe and have confined their observations almost entirely to the southern half of the Atlantic. Since the memorable voyage of the "Challenger" (1872-1876) and the last American expedition no ship equipped with modern apparatus has made explorations in the Gulf Stream and the northern Atlantic, although thorough knowledge of these waters is necessary to a complete understanding of the phenomena of the south Atlantic. Almost nothing is known about the laws and range of temperature and the velocity of currents in the north Atlantic, although the variations of temperature of the Gulf Stream undoubtedly exert a powerful influence upon the climate of all northern Europe. A study of the meteorological conditions of the northern Atlantic is also greatly needed, for through this region sweep the barometric depressions, the frequency and paths of which seriously affect the crops of western Europe. The connection between hydrographic and atmospheric phenomena, about which so little is known, also demands study.

Many biological problems, too, await solution. The larvæ of the European eel have been found in the Atlantic, west of Ireland, at a depth of 3,300 feet, and Dr. Hjort has found larvæ of other fishes at great depths in the ocean between Norway and Jan Mayen, so that a systematic and scientific north Atlantic fishery would probably produce surprising results. In this connection the quantity and character of the plankton, which both directly and indirectly influence the migration of fishes, demand thorough study. Finally, the exploration of the waters of northern Europe cannot be regarded as complete, so long as we remain in ignorance of the currents, temperatures and biology of the Atlantic, of which the North Sea, the Baltic, the English Channel, etc., are dependencies.

It is the more remarkable that the north Atlantic is one of the least known of oceanic regions, as the most important highways of traffic traverse this region. It is true that the profile of the sea bottom has been made known, in rough outline, by the work of the cable layers, but we know very little more of the physical characters of this region.

The Gulf Stream requires especially thorough study, because of its great influence on the climate of Europe. Voyages of exploration should be made four times each year and the operations should always include measurements of temperature and salinity at various depths and the collection of specimens of plankton and sea bottom. All the expeditions should use identical instruments, methods, units and constants, so that their results may be directly compared with each other. In order to save expenses the proposed plan does not include an international bureau of operation, but merely an international commission to prescribe instruments and methods and assign to each government the field which it is then to explore with its own men and at its own expense. The participation of individuals will also be welcomed and sought, and the assistance of the great steamship companies is confidently expected.