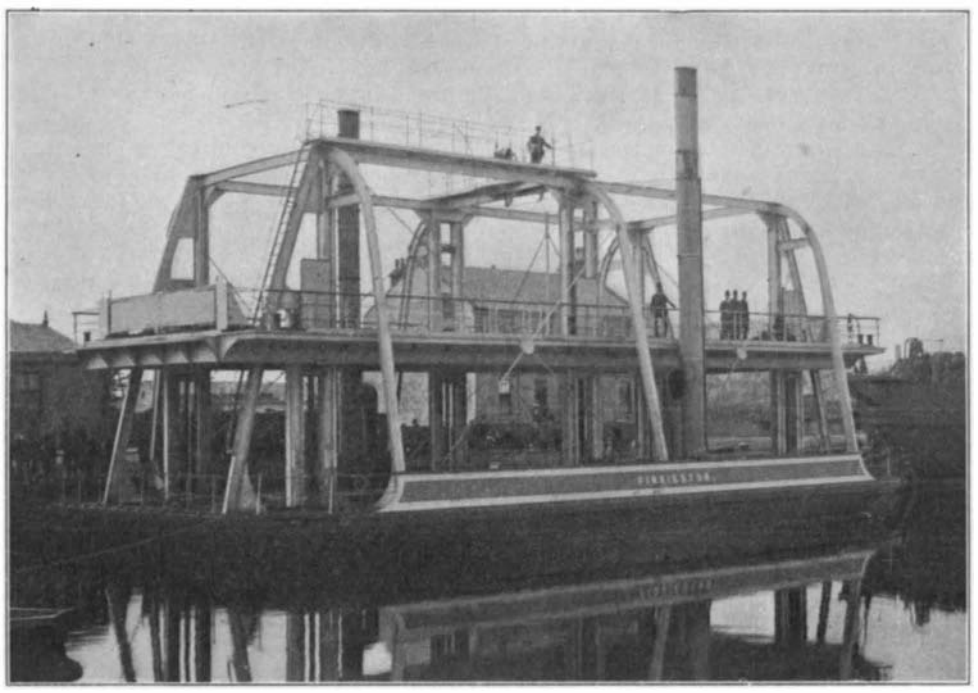
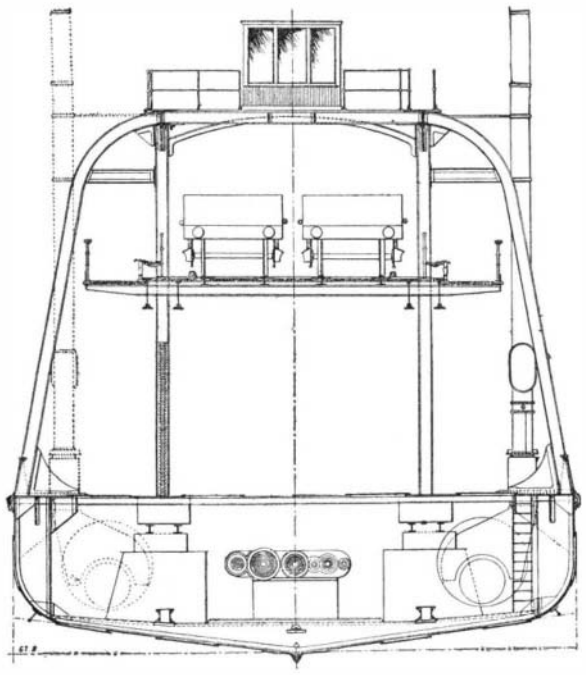
FERRY STEAMER WITH AN ELEVATING DECK.

The city of Glasgow, like many of the maritime cities of the world has to deal with the question of harbor ferriage, and in this case it is complicated by a considerable rise and fall of the tide. The construction of a ferry boat is a simple matter in itself, and calls for no particular engineering skill. The difficulty arises in making a suitable connection between the ferry boat and the shore at the various landings. The usual method of accommodating the variations in tide level is that which is adopted in New York city and vicinity, which consists in the provision of floating pontoons at each landing whose deck is always at approximately the same level as the deck of the ferry, the pontoons being connected with the shore by a hinged bridge gangway. Bridges, of course, are the most desirable method of crossing a waterway; but if they are to be used in place of ferries across a river which, like the Clyde, is crowded with shipping, great expense is incurred in having to either build a high level bridge or some costly form of swinging, roller or lift bridge.

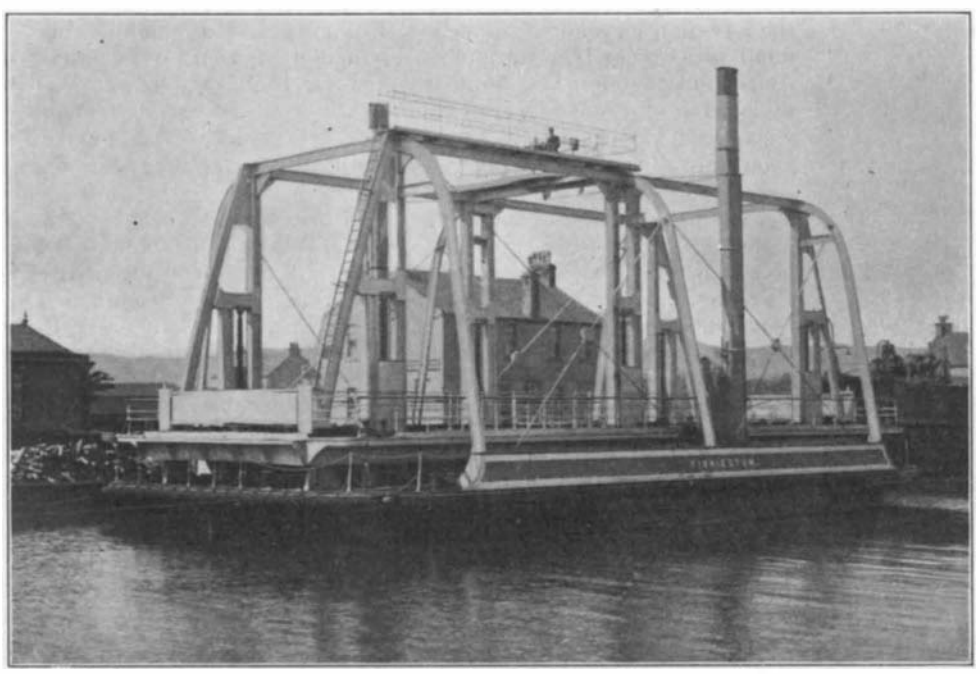


ELEVATING DECK IN THE RAISED POSITION.

The ferry which is shown in our illustration was constructed for service at Finnieston, in Glasgow harbor, at a point which is about equidistant between the Glasgow bridge and a ferry which is running at Govan, at which latter place there are sloping slipways to allow vehicles to pass to the ferry at all stages of the tide. In order to avoid the well-known inconveniencss of a sloping slipway, the "Finnieston," as she is called, was built with an elevating deck which can be raised or lowered by bevel and worm gearing so that the deck may be brought to the same level as the quay at all stages of the tide. The vessel is 80 feet long and 43 feet broad, and she maintains approximately the same beam throughout her whole length. When in its lowest position, the elevating deck, rests upon the iron main deck of the boat, leaving the sides clear for the smokestack, steering gear, etc. The elevating deck is 78 feet long, and its breadth is 32 feet. It is divided into a driveway, 19 feet wide, for vehicles, upon which are laid two tracks for the accommodation of the railway cars, and two 6-foot sidewalks, one at each side. The deck is raised and lowered by means of six vertical screws, three on each side, and these are supported by six double steel, box-girder columns, 12 inches by 14 inches in sections, arranged in pairs, as shown in the illustration. Within each column is a 6 inch screw of forged steel, which turns at the level of the steel deck in a flanged socket, while at the top each of the screws works in a manganese bronze casing, which is bolted to the inside of the box columns. The clear lift of the platform is 14 feet. The nuts, which are of manganese bronze, are enclosed in steel castings which fit in between the pair of box-girders which forms each column, and are provided with guide bars which work against girders and serve to keep the nut-box in place. The elevating platform is carried on two fore and aft girders, 13 inches in depth, which are bolted to the nut casting. The floor beams of I section are 5 inches in breadth by 9 inches deep, and are spaced 3 feet center to center. The box girders of the elevator frame, on each side of the vessel, are connected at the top by a 12-inch longitudinal girder, and from the point of intersection of this girder with the vertical posts heavy inclined struts extend to the gunwale of the ship and serve to keep the whole framework rigidly in position. There is also a pair of similar struts at each end of the ferry to afford the necessary longitudinal stiffness.



CROSS-SECTION THROUGH THE "FINNIESTON."



ELEVATING DECK FERRYBOAT "FINNIESTON."

The hull of the vessel is divided internally into a number of watertight compartments. The machinery for elevating the platform and driving the vessel is situated amidships and on either side amidships is a boiler, each of which is 7 feet in diameter by 7 feet 6 inches long. There are three sets of triple-expansion engines, identical in size and pattern, with cylinders 9 inches, 14½ inches, and 24 inches in diameter, and a common piston stroke of 18 inches. Two of the engines are placed athwartships, one driving a line of shafting which runs fore and aft and operates the port screws at each end of the vessel, while the other drives a length of shafting for the starboard screws. The third engine is placed on the center line of the vessel between the two propelling engines, and drives a line of shafting which runs athwartship, connecting through spur and bevel wheels with two lines of fore-and-aft shafting, which are geared with the vertical raising and lowering screws of the platform. The "Finnieston" which has accommodation for about 300 passengers and 10 teams, or a capacity of 600 to 700 passengers, if no teams are carried, has proved to be well adapted for the Clyde ferry service.

New Compounds Formed From Boric Acid.

Although normal boric acid should combine with three atoms of a monad metal to form a salt, up to the present time but few compounds of this kind have been formed. M. Ouvrard has recently presented to the French Académie des Sciences an account of his experiments in the formation of metallic borates, in which he has succeeded in producing a number of new compounds. Among the inorganic borates the only one formed up to the present time is the borate of magnesium, Bo_2O_3, 3MgO, which has been prepared by Ebelmen, who dissolved magnesium in a great excess of melted boric anhydride, which is then volatilized by the prolonged action of heat in a porcelain furnace. He thus obtained crystals of a pearly appearance, insoluble in water. Analysis gave the proportions corresponding to the above formula. M. Ouvrard describes the attempts of various experimenters to produce the borates of other metals, but their results have been at best doubtful, and it is especially by its organic compounds that boric acid has been definitely found to be tribasic. The experimenter has been successful in preparing a number of metallic borates by the following process. The first tribasic borate obtained was that of cadmium. In a platinum crucible was placed a mixture of fluoride of potassium and boric anhydride, and to this wasaddedoxide of cadmium. The mixture is heated slowly for some time, and then brought to fusion. Gaseous fluoride of boron is given off, and when this ceases and the mass becomes well fused it is allowed to cool slowly. When acted upon by water, the mass separates, leaving needle-like crystals of cadmium borate. This body presents itself in the form of prisms several millimeters long, which have a marked action upon polarized light. The crystals are not affected by hot or cold water, but are easily soluble in dilute acids. The experimenter describes two different processes of analysis, by which he finds that the compound corresponds to the formula, Bo_2O_3, 3CdO. The borate of zinc has also been formed by a similar process. Oxide of zinc is added to the fused mixture of fluoride of potassium and boric anhydride. Upon cooling with care, needle-like crystals are seen to form upon the surface and this action continues throughout the mass. By treating with cold water these crystals are obtained in the form of prisms, which also act upon polarized light. Hot water decomposes these crystals, taking away the greater part of the boric acid and leaving a residue which consists mostly of zinc oxide; the crystals are very soluble in dilute acids. Analysis gives for this compound the formula Bo_2O_3, 3ZnO. By substituting the oxide of manganese for that of zinc needle-like crystals are obtained, usually of a brownish color, but transparent and having a marked action upon polarized light. They are not attacked by hot water, but are soluble in acid. By an analogous process, the borate of nickel has been obtained in the form of short prisms of a light green, corresponding to the formula Bo_2O_3, 3NiO. The borate of cobalt appears in flattened crystals of a fine rose color.

An Air Brake Patent Upheld.

The petition of the Westinghouse Air Brake Company for a writ of certiorari to review the judgment in the case of the Westinghouse Air Brake Company vs. the New York Air Brake Company was denied by the Supreme Court of the United States on March 19. The Circuit Court upheld the validity of the New York company's patent and judgment was affirmed by the Court of Appeals, and the Supreme Court now refuses to review this judgment.

$20,000 for an Airship Test.

An anonymous donation has been made to the Aëro Club of France, so that they can offer the sum of 100,000 francs or $20,000 to the aeronaut, who will start from Longchamps, go round the Eiffel Tower, and return to the starting point, a distance of seven miles in thirty minutes. The competition is to be international. This is one of the most substantial prizes ever offered to inventors, and it is probable that we may look for some remarkable results.