156. What is the "cover" or "lap" of the valve? What is its object? About what proportion of the stroke of the valve is it made?

157. What is the "exhaust cover" of a slide-valve? What is its effect upon cushioning and upon exhaust?

158. What is "minus cover" or "minus lap" on the exhaust? What is its effect upon the exhaust and upon cushioning?

159. What is "cushioning" or "compression" in a steam-cylinder? How is it affected by the amount of cover or of minus cover there may be upon the exhaust? How is it affected by the exhaust pressure?

160. What is "mean effective pressure"? How is its amount ascertained?

161. What is a dial vacuum-gauge? What is its construction? For what is it used? About what amount should it show when the engine is working all right? What effect have the variations it indicates on the performance of the engine?

162. Does the vacuum-gauge enable you to tell what pressure there is in the condenser, or must you have recourse also to the barometer to arrive at that? How would you ascertain the actual amount of back pressure there is in the condenser?

163. What is a barometer? What is its construction? Is a barometer sometimes used instead of a vacuum-gauge? In what respect does the weather barometer differ from the vacuum-gauge barometer?

164. The common vacuum-gauge and the common steam-gauge: In which of them are the graduations marked from atmospheric pressure? Does either of them tell what is the true actual pressure in the boiler or in the condenser?

165. Do steam and vacuum gauges vary with the variations of the weather barometer? When the weather barometer varies from 29 to 31, how much will the vacuum-gauge vary, and how will that affect the working of the engine? Why?

166. Vacuum is generally stated as so many inches: What is meant by, say, 20 inches vacuum? What does that tell us about the absolute pressure of the vapour then in the condenser?

167. From what depth will a pump draw water? Is there any limit? Why?

168. What is vacuum? Can vacuum move a piston? When the temperature of the water in the condenser is 212° F., what is the greatest degree of vacuum there can then be in the condenser?

169. What is a thermometer? What is its construction? What is the property of matter that is the principle of its construction? What temperatures are regularly noted by careful engineers?

170. What is the temperature of (1) melting ice, (2) of boiling water, (3) of steam about 60 lb. pressure by the steam-gauge, (4) of steam about 100 lb., and (5) of steam about 150 lb., also (6) of smoke in the funnel, and (7) of water in the hot well?

171. What is meant by the "conduction" of heat? Give examples of it in the boiler and in the engine.

172. What is meant by the "convection" of heat? Give examples of it in the boiler and in the engine.

173. What is meant by "radiation" of heat? Give examples of it in the boiler and in the engine.

174. Which is convection, which is radiation, and which is conduction in the following cases: (1) Heat from the glowing fuel to the furnace-crown, (2) heat passing from one side of the furnace-crown plate to the other, (3) heat passing from the steam-pipes in the engine-room, (4) the heat of evaporation?

175. What are the effective heating-surfaces of a marine boiler?

176. What parts of a marine engine are exposed to danger when the temperature is below freezing-point?

177. What precautions are necessary in cold climates when the temperature is below freezing-point?

178. State as many ways as you can by which a boiler might not get its full feed. A boiler, or one of a set of boilers, gets short of water although the feed-valve is open its proper amount: to what causes might this be due?

179. Of what are furnace-bars generally made? About what thickness are they at the top? About what space is between them? Whether are the bars put further apart for Newcastle coal or for Welsh coal?

180. Which burns faster, Newcastle coal or Welsh coal? Which is the flaming coal? Which makes most smoke?

181. About how many tons of steam-coal will be burnt per day in four furnaces, each 3 ft. wide and of about the usual length? On what grounds do you say so?

182. About how many tons of steam-coal will be burnt per day with good triple-expansion engines to drive an ordinary steamer of 40 ft. beam ten knots an hour by steam alone? On what grounds do you say so? What percentage more coal would be required to propel the same steamer one knot faster?

183. About how many tons of steam-coal will be burnt per day with a good triple-expansion engine, surface condensers, the low-pressure cylinder 60 in. diameter, doing average work? On what grounds do you say so?

184. A pair of inverted-cylinder direct-acting engines; there is a liner half an inch thick between the ahead eccentric-rod and the eccentric-strap; in overhauling the engine this piece is lost and forgotten: what difference will its omission make in the working of the engine, on the admission, on the cut-off, and on the exhaust of the steam? Which will take place earlier and which later, distinguishing between the upstroke and the downstroke?

185. A pair of inverted-cylinder direct-acting engines driving a right-hand screw: on which of the cross-head guide-bars is the pressure greatest in the upstroke, and on which in the downstroke?

186. A screw propeller is getting loose, it has a little play on the shaft, sideways on the key or feather: how will this show in the engine-room?

187. How would you prove whether the centre line of the trunnions of an oscillating-cylinder be fair with the centre line of the main shaft?

188. How can the fairness of a line of screw-shafting be tested without lifting the shafts?

189. Where are steel forgings generally used in marine engines?

190. What is the composition of nickel steel? Where is it sometimes used in engines and boilers?

191. How is forced draught generated on board ship and supplied to boiler-furnaces? Is the air heated before delivery; if so, how?

192. What is "induced" draught? Compare the merits of "forced" and of "induced" draughts.

193. How is the intensity of forced or induced draught measured? What is the usual pressure employed in the mercantile marine?

194. An explosive gas is liberated from bunker coal; usually in well-ventilated bunkers this gas escapes into the atmosphere without doing harm; in ill-ventilated bunkers the gas, after mixing with a