

16TH AUGUST, 1888.

ADJOURNED DISCUSSION ON MR. HECTOR KIDD'S PAPER ON "A TRIPLE-EFFET APPARATUS FOR EVAPORATING SUGAR SOLUTIONS."

THE PRESIDENT said that at the last meeting Mr. Kidd read a very interesting paper on this apparatus, but was prevented by business engagements from being present that evening. However, his colleague (Mr. German) was there, and would reply to any questions that might be put.

Mr. GERMAN said that in the earlier portion of Mr. Kidd's paper he drew a comparison between the duty performed by the boiler of the Triple-effet Apparatus and that of an ordinary boiler, but he thought that Mr. Kidd had not credited the apparatus with the real amount of duty that it performed. Mr. Kidd stated as follows:—"For every lb. weight of steam used in the first vessel of the apparatus 2·6lb. weight of water is evaporated; or, assuming that 8lb. of water can be evaporated per lb. of coal by the ordinary method, 20·8lb of water per lb. of coal can be evaporated by means of the Triple-effet Apparatus." If the Triple-effet Apparatus is used in connection with the salt-water apparatus, then 1lb. of coal with salt-water in the boiler, will make 32lb. of pure fresh-water instead of 20·8, as Mr. Kidd stated; and his remarks, therefore, had not done full justice to the superiority of the Triple-effet apparatus.

The PRESIDENT said that there did not seem to be any difference of opinion as to the practical value of the apparatus described by Mr. Kidd. What Mr. German had just pointed out seemed to be theoretically correct. There were one or two matters, however, which ought to be placed on the other side of the question. Mr. Kidd, in the opening sentences of his paper, said that the triple-effet principle had nothing new in it; that it

was practically very old ; and that there was a great similarity between the Triple-effet Apparatus and the Triple-expansion recently introduced for marine engines. This similarity was very marked, and Mr. Kidd had hinted as much. It would be well to remember that there had been a very exhaustive and expensive series of experiments conducted some years ago in Great Britain, on the Continent, and especially in America, in which latter country the trials were carried out at the cost of the Government, with a view of finding out the best and most economical rate of expansion for working compound engines. The result of these experiments was, that the most economical working-pressure was found to be that of from 60lb. to 80lb., and the most economical rate of expansion from six to eight times. It was proved that anything over that resulted in loss. There was more economy got out of these rates than by carrying double or even treble the pressure. The introduction of a third cylinder into marine engines was very similar in its results to those obtained in Mr. Kidd's apparatus by the use of the third vessel, inasmuch as economy of working depended in each case, as far as he (Mr. Cruickshank) could see, upon entirely the same principle ; the difference in the temperature between initial and exhaust pressures in the three cylinders being so materially reduced as to become a source of economy. In the ordinary compound engines, at very high pressure, the difference between the pressure on the top of the piston and the exhaust pressure at the bottom was so great that the amount of loss was more than the supposed gain from the increased pressure. It was the re-arrangement of the cylinders which enabled marine engineers to develop 25 per cent. more power in working with the same amount of nominal horse-power. Mr. Kidd had done for the Triple-effet Apparatus (as far as the speaker could judge) the same thing that Mr. Kirk had for the marine engine. There could be no question that by the introduction of certain proportions into the working parts of the Triple-effet Apparatus, Mr. Kidd had obtained a most wonderful degree of economy. Mr. Kirk had done the same kind of thing in marine engines, but not to the same

extent. Mr. German's remarks pointing out that Mr. Kidd had not given sufficient credit to the apparatus was theoretically correct, Mr. Kidd had stated that he obtained a practical co-efficient of 2.6 per cent., and for the benefit of the younger members of the Association he (Mr. Cruickshank) would explain what that meant. When coal is consumed in ordinary practice, using an ordinary boiler, the amount of heat out of every 1lb. is sufficient to evaporate 8lb. of water. That is called "the standard," and its co-efficient is 1. If Mr. Kidd got no more power out of the Triple-effet Apparatus than the ordinary "standard," then his "standard" would be 1 also. But his standard being, approximately, two and a-half times more effective than the ordinary one, his apparatus shows a result of 20.8lb. of water evaporated per 1lb. of coal consumed, as compared with 8lb. by the other system; The whole principle appeared to him (the speaker) to hinge upon having the heating-surface in each vessel proportional to the temperature difference. The defects of the other Triple-effet apparatuses noticed at the last meeting of the Association, seemed to have arisen simply on account of the heating-surfaces of the various vessels not being scientifically proportioned. Mr. Kidd said that the principal feature in the design of the apparatus was that "all the steam and vapour pipes had been figured to keep the velocity of the steam and vapour passing through them, as near as possible, to 6,000ft. per minute; and it was found in practice that at this speed there was very little loss of pressure in the first calandria, or vacuum in the various vessels and condensers." Mr. Kidd also stated that "The areas of these pipes had been obtained by making them directly proportional to the relative volume of the steam-vapour passing through them." That showed Mr. Kidd's intimate knowledge of three things of great importance to the engineer—namely, pressure, temperature, and volume: and by the judicious use of these three he had attained results highly creditable to him as an engineer, as well as to the Association itself, and invaluable to the company with which he was connected.