

ONE HUNDRED AND TWENTY-SECOND PAPER
(OF TRANSACTIONS).

THE
WORK OF THE STANDARDS COMMITTEE.

BY
MR. D. HULME (REPRESENTATIVE MEMBER).

READ AT
58 ROMFORD ROAD, STRATFORD, E.,
ON
MONDAY, MARCH 27th, 1905.

CHAIRMAN :
MR. J. E. ELMSLIE (MEMBER OF COUNCIL).

THE CHAIRMAN : We have met to hear a paper on the report of the Standards Committee by Mr. D. Hulme, who was appointed by the Institute to serve on the committee which sat to consider the standardisation of screw threads and limit gauges. Mr. Hulme has very kindly given a good deal of his time to this work, and although the report and work of this special committee are not completed, we will hear what has been done so far as may be put before us.

Mr. HULME then read his paper as follows :

The Engineering Standards Committee first commenced its operations in April, 1901. A work of this kind must necessarily be of a laborious and protracted nature, and though an enormous amount of information and material has been collected, a large number of specifications and findings are approaching the stage of completion. Before a standard specification can be arrived at, many interests have to be consulted, and conflicting views harmonised as far as possible. The simplest way to give an idea of the multifarious inquiries and operations being carried on will, perhaps, be to deal *seriatim* with the various committees and the work in which they are engaged.

The whole work is under the entire control of what is known as the Main Committee, consisting of the official representatives

of the five supporting institutions, viz., the Institution of Civil Engineers, the Institution of Mechanical Engineers, the Institution of Naval Architects, the Iron and Steel Institute, the Institution of Electrical Engineers.

To this committee, of which Mr. James Mansergh, P.P. Inst.C.E., is chairman, falls the duty of organising the work, considering what subjects shall be dealt with, appointing the chairmen of the various committees, passing the reports of the committees before they are published, controlling the expenditure, and devising the means of raising the necessary funds to carry on the work.

Immediately under the Main Committee there are 12 sectional committees, and under these again 23 sub-committees, the total membership being now 255. The different committees and sub-committees have been holding meetings as occasions have required—some sitting once a fortnight, others at longer intervals. The first report issued was that on Standard Rolled Sections for Constructional Work, drawn up by the Committee on Sections used in Shipbuilding (chairman, Mr. Archibald Denny), the Committee on Bridges and Building Construction (chairman, Sir Benjamin Baker, K.C.B.), and the Committee on Railway Rolling Stock Underframes (chairman, Sir Douglas Fox). A copy of these three committees' combined report is on the table.

The standard sections are now gradually, but surely, finding their way into use throughout the Government departments, as well as the general trade of the country. No findings are arrived at without the most careful inquiry, and, if need be, extensive experiments. Professor Unwin's report on the work carried out by him for this Committee, which has recently been published, forms an admirable example of the thorough way in which the Committee's work is being done. A small sub-committee, nominated by the Committee on Tests for Steel and Iron Material used in the construction of ships and their machinery, formulated a specification for structural steel for marine boilers, which was approved by the Main Committee at their meeting on December 8th, 1904.

The Locomotive Committee (chairman, Sir Douglas Fox) has completed the consideration of a very interesting question referred to it by the Government of India, namely, that of recommending a series of standard types of locomotives for Indian railways. A conference was convened between the leading consulting engineers for Indian railways and the principal locomotive manufacturers, and after many meetings a

report was drawn up and forwarded to the Secretary of State for India, who now has it under consideration. The Locomotive Committee has the following five sub-committees dealing with different branches of their work, viz.: (1) A Sub-Committee on Component Parts and Types (chairman, Mr. F. Wooley-Dod) has been chiefly engaged in preparing, in conjunction with the conference of locomotive builders and consulting engineers, the report on standard locomotives for India mentioned; (2) A Sub-Committee on Locomotive Steel Plates (chairman, Mr. William Lorimer) has drawn up a draft specification for locomotive boiler steel plates, which has still to be considered by some of the other sub-committees; (3) A Sub-Committee on Tyres, Axles, and Springs (chairman, Mr. William Lorimer) has been engaged in drafting standard specifications for tyres, axles, springs, castings, and forgings, and it is hoped that these will shortly be reported to the Locomotive Committee for approval; (4) A Sub-Committee on Copper and its Alloys (chairman, Mr. William Dean) has prepared a standard specification for copper plates, rods, tubes, etc., used in locomotives, and this will shortly be issued; (5) A Sub-Committee on Tyre Profiles (chairman, Mr. James Holden) is preparing a set of standard tyre profiles, which will be published when the series of standard rails have been finally decided upon. I have not as yet seen any of the reports of these sub-committees.

The Committee on Rails (chairman, Sir John Wolfe Barry, K.C.B.) has divided its work into two sections, which are being dealt with by two sub-committees: (1) The Sub-Committee on Railway Rails (chairman, Mr. James C. Inglis) is engaged in drawing up two series of standard rails, rising by increments of 5 lb. at a time. The series of bull-headed rails ranges from 60 to 105 lb. per yard. This specification and sections were approved by the Main Committee on July 26th, 1904. The series of flat-bottomed rails ranges from 20 to 110 lb. per yard. This specification and sections were approved by the Main Committee on February 1st, 1905. These sections and the accompanying specifications have now been circulated amongst the leading railway companies and engineers of this country, and will, it is hoped, be published at no very distant date. (2) The Sub-Committee on Tramway Rails (chairman, Mr. Howard Smith) has already issued its report, and published a series of standard sections and accompanying specification.

Two committees, presided over by Mr. H. F. Donaldson, are

dealing with the subjects of screw threads and limit gauges. These committees have held several meetings and collected a large amount of information on these two intricate and difficult subjects. The question of standardising screw threads and limit gauges was first discussed by the Main Committee at their meeting held on October 23rd, 1902, when it was decided to obtain the opinion of the various sectional committees and sub-committees as to the advisability of forming a separate committee to deal with these subjects. The opinions of the various sectional committees being favourable, a Committee on Screw Threads and Limit Gauges was appointed at a meeting of the Main Committee held on February 13th, 1903. The wide range of the work of this committee is seen from the constitution of it, which is published in the report issued by the Engineering Standard Committee. On this committee I have the honour to be one of the representatives of this institution, although I regret that owing to the meetings being held during business hours I have not been able to attend as many of these as I should have liked. But as all reports of committee meetings have been sent to each of the committee, I have been able to follow the work done by those sitting, and been able to give my approval or dissent when necessary. This committee met for the first time on April 21st, 1903. The general terms of reference were discussed, and it was agreed that in order to secure limit gauges for screw threads—if such were possible—it was desirable that the gauging of cylindrical work by the limit gauge system be considered at the same time. The earliest meetings of the committee were taken up in agreeing on the nomenclature and definitions to be used, as it was found that the terms employed by engineers had meanings differing in various districts, and that much future time would be saved, both in meetings of the committee and in the drafting of questions to be put to the trade, if these two subjects were to be dealt with first. I hope to be able to bring the report of this committee on some future occasion, when it has been approved by the Main Committee.

The Committee on Pipe Flanges (chairman, Mr. William H. Maw) has drawn up a series of standard flanges for low, medium, and high pressures, the work being done by a sub-committee engaged in drafting the proposed lists of flanges. The report of the work done by this committee, and approved by the Main Committee, was read here on February 6th by Mr. John Dewrance (Vice-President), who represented the Institute on this committee.

The Committee on Cement (chairman, Mr. William Matthews, C.M.G.) handed over to a small sub-committee the preparation of a draft standard specification, now completed. The report of this committee was approved by the Main Committee at their meeting on December 8th, 1904. A copy is on the table.

The Committee on Cast Iron Pipes (chairman, Mr. Charles Hawksley) is at present in process of formation, and has barely begun its labours, but an important conference of the leading pipe founders of this country has already been held in connection with the work of the committee.

The electrical section is a large and important one, consisting of the Electrical Plant Committee (chairman, Sir William Preece, K.C.B.) and the following sub-committees: (1) The Sub-Committee on Generators, Motors, and Transformers (chairman, Colonel R. E. Crompton, C.B.) is engaged in drawing up standard sizes of generators and motors, and in standardising speeds, frequencies, electrical pressures, etc. The standardisation of electric pressures and frequencies was the first portion of this important work entrusted to the sub-committee; the recommendations of the sub-committee were then submitted to the Electrical Plant Committee, the Main Committee, and the Board of Trade for their approval, and this is now on the table. (2) The Sub-Committee on Transformers (chairman, Mr. C. P. Sparks) deals with the standardisation of transformers. (3) The Sub-Committee on Physical Standards (chairman, Dr. R. T. Glazebrook) deals with all subjects touching the physical standards upon which the various reports are based, as well as undertaking any experimental work which may be required. (4) The Sub-Committee on Nomenclature (chairman, Professor Silvanus P. Thompson) is engaged in bringing into line, as far as possible, the nomenclature employed in this important branch of engineering. (5) The Sub-Committee on Telegraphs and Telephones (chairman, Mr. John Gravey, C.B.) has drafted a standard specification for wires used in the construction of telegraphs and telephones. (6) The Sub-Committee on Cables (chairman, Mr. Robert Kaye Gray) has also drafted standard lists of sizes of cables, etc., and the wires composing the same. The interim report of this committee is also on the table before you. (7) The Sub-Committee on Electric Tramways (chairman, Mr. A. P. Trotter) is at present engaged in dealing with the standardisation of tramway poles, trolleys, etc. Three other sub-committees dealing with electrical matters are in process of formation.

The Publications and Calculations Committee is responsible for the supervision of the various calculations which have to be made and for the final revision of all reports prior to publication. The calculations in connection with standard beams have already been published, and those for the other sections will follow at no very distant date.

The Committees are indebted to the generosity of His Majesty's Government, the five supporting institutions, the railway companies, and the leading engineering firms of this country for the funds necessary to carry on the work. The funds are administered under the Main Committee by two committees: (1) The Finance Committee, which controls the ordinary expenditure of the Committee; (2) a committee appointed by the Institution of Civil Engineers, at the request of the Government, to control the expenditure of the grant in aid, and on which the Board of Trade have appointed Colonel Sir Herbert Jekyll, K.C.M.G., R.E., as their representative.

From the number of subjects being dealt with and the number of members of committees actually at work some idea may be gathered of the far-reaching extent of the Committee's labours and the enormous influence which their findings must ultimately have on the trade and commerce of this country.

His Majesty's Government has recognised the utility of the Committee's labours, and made them a grant towards the necessarily heavy expenses incurred in carrying on a work of that nature. Having made their grant dependent upon the amount subscribed by the industries interested, it was confidently hoped that the leading firms in this country would not allow the work of the Committee to be curtailed for want of financial support. The secretarial work is carried on by Mr. Leslie S. Robertson, at the offices of the Committee, 28 Victoria Street, S.W.

Mr. HULME, continuing, said they would see that the committee on which he had represented the Institute—the Screw Thread and Limit Gauge Committee—had not yet completed their work, and he was unable, therefore, to report upon it. A copy of the report of that committee had been sent to him, but it was not dated as being approved by the Main Committee. He had with him some of the reports of the committees that had been approved, and he was willing to read some of them. As he had said in his paper, when the Screw Threads Committee had finally settled he would be pleased to read a paper and also the report. He had no doubt they would find ample

ground for debate upon it. The Standards Committee on Threads had as yet only dealt with threads up to 6 in. He had seen some interesting appliances for taking very accurate measurement at the Royal National Physical Laboratory, but for ordinary commercial purposes those appliances were far too fine in his opinion. He might remark that the object of each of the committees was to get out a standard which would be suitable for the commercial world. They would, he had no doubt, appreciate the difficulty in getting the different manufacturers and consumers to agree as to what was required.

Mr. W. LAWRIE (Member of Council) said that Mr. Hulme's paper had shown them the very wide range of the Standard Committee's work. It was bound to be far-reaching in its effect, provided that it could be unanimously adopted. He thought that a good many of our leading manufacturers had responded very nobly to the call that had been put on them with respect to the taking up of that very much needed work. It was a very difficult thing to get it taken up as it ought to be. Where it involved an amount of expense in the matter of new machinery it was scarcely to be wondered at if the manufacturer hesitated. He sincerely hoped that all the valuable work that had been put together by the various committees and sub-committees would not be lost. It was, of course, impossible to discuss the reports they had before them that evening, as they had not had time to go over them, and unfortunately they had not the report of the committee with which Mr. Hulme had been most intimately connected. But, as he had remarked, they would have an opportunity of discussing that report at a later date. He was afraid he was not in a position to ask Mr. Hulme any particular question. The very exhaustive reports which had been put before them required very careful digesting, and unless one really possessed some knowledge of the subject it was rather a difficult matter to proceed. He had no doubt that by the time they had had an opportunity of going through the reports carefully many questions would occur to them. The Institute was indebted to Mr. Hulme, as the committee work must have taken up a considerable amount of his time, and they were pleased that he had seen his way to take up that matter, and so keep the Institute of Marine Engineers in touch with anything in the way of progress.

Mr. W. McLAREN (Vice-President), referring to the question of pipe threads, said that even makers with high reputations

were very varied in their sizes—at least, above two inches. He could not speak of smaller sizes. In regard to the question of electric pressure, he would be glad, as a householder, to gain some information. That was a subject which appealed to him very frequently. Within a few miles' radius they had various pressures—250, 240, and 230 voltage—and as they went eastwards into quieter suburbs they had lower pressures. If they carried their fittings away to the eastward suburbs they found them useless. In one case he knew of, the electricians fitted up lights in a chapel. The district voltage was 240, but they had put in the majority of lamps for 230 voltage. For a time they had a beautiful light, but when the lamps were done they had to refit for the 240 voltage.

Mr. HULME remarked that they would see that the Standards Committee were making an effort to standardise throughout the world.

Mr. W. McLAREN then referred to the maximum and minimum demand method of charging. He said that not one in twenty understood that system, while if they could obtain a unit at such and such a cost then they would be done with it; but when they were offered the maximum and minimum demand they were in doubt as to their choice. It was a pleasure to see some progress being made to come to some fair standard.

Mr. HULME said it was surprising when he came on to one of those committees to find that those who were manufacturers clung to their own ideas, and how they thought that a standards committee ought to adopt the whole of their system.

Mr. W. LAWRIE: Have the Americans and Germans adopted the screw thread and limit gauges throughout?

Mr. HULME replied that he had written to Mr. Leslie Robertson to know the result of a deputation sent over to America by the Standards Committee to see what they were doing over there, and he had received a copy of their report to the Standards Committee. He wrote asking if he might read that report to the Institute, but unfortunately their reply to his letter had not yet reached him.

Mr. W. McLAREN asked whether the standardisation of locomotives had not been gone into in regard to engines sent

to Egypt. Those, he thought, were Government locomotives, and by standardising them they could repeat them, just like a ship's engines. But different railway superintendents had different views, and stuck to them.

The CHAIRMAN said Mr. Hulme had given them a very interesting and instructive report of the work of the Standards Committee and of its mode of procedure. The results of its labours must ultimately lead to a considerable saving in the cost of manufacture. But he was very strongly of opinion that if progress was not to be stopped standardisation must be largely confined to material, and not to the manufactured article—at least, so far as mechanical engineering was concerned. The standardisation of the section of material for ship or bridge construction, pipe flanges, screws, and many other details was good. Standardising ships and marine engines was quite another matter. When they came to standardising locomotives he thought they were stopping progress. Locomotives building at the present time were increasing in size, and although they might standardise in regard to cylinders and wheels, he thought they would come to a stop if they tried to standardise the whole locomotive. Take the last twenty years. There would be found in the *Engineer* and *Engineering* from time to time very fully described the latest types of locomotives of different classes on all the leading British railways. It would be seen that there was a constant and gradual increase in size, and a wide difference in the locomotives of the same period on different lines. That might be partly due to the views of the locomotive superintendents of the different lines, but if looked closely into it would be found to be largely due to the different roads on which they had to run and the nature of the traffic.

Continuing, the CHAIRMAN said: Take a fast train on one of the long-distance lines. A set of locomotives are built for the special work. For a time these trains are well up to time. The traffic grows, and the traffic department complain that the trains can't be kept up to time, with the result that the locomotive department have to provide more powerful engines to deal with the altered conditions. The superintendent increases the diameter of his cylinders, the length of his stroke, the size of his boiler. When he has done this, though he may have kept to his general arrangements, most of the detailed dimensions will have altered.

Take the Brighton line. Many years ago the late Mr. Stroudley built the "Grosvenor," which was very successful,

and was, I fancy, awarded a medal at an exhibition of locomotives at Darlington. Several years later, shortly before his death, he built the "Edward Blount." About eighteen years ago this engine was very successful, and took the gold medal at the Paris Exhibition held previous to the last one. His successor, the late Mr. Billington, produced, not a great time before his death, the present powerful express locomotives "Tasmania," "Sirdar," and others of the same class. The "Edward Blount" is far larger than the "Grosvenor," and the difference is much greater between the "Tasmania" and the "Edward Blount," as to size, power, and type also. If either of the former had been standardised, would the company have arrived at the latter? This increase of size and power applies to all classes of engines on this line. There have been no sudden jumps, but a gradual increase of size and power. Taking the three express engines named, which are in each case many years apart, had the "Grosvenor" been standardised as the largest type of the company's engines, would they have produced the "Edward Blount"? if the latter, would they have produced the "Tasmania"? It seems to me that if you are going to standardise the locomotives for only one line you must first standardise the traffic, or the increase of traffic will, in the future as in the past, require variation in the power of the engines. If you are going to have a standard set of types for all lines in this country, you must standardise all the gradients for the various roads. In spite of all standardising, each superintendent will continue to build the engine that will best suit the traffic that has to be dealt with and the road over which it has to run.

Mr. JAMES ADAMSON (Hon. Secretary) said he would like to propose that they accord to Mr. Hulme a hearty vote of thanks for the labours he had done in connection with the Standards Committee. Although he had not been able to give them a very full report that evening, on account of some of the trade secrets in connection with the Committee, he thought he had given them a little insight into the work.

Mr. E. W. Ross seconded the motion, and said that screw threads was a subject which had given them a great deal of trouble, especially their old friend the boiler stays. Those were a prime source of trouble and anxiety. He hoped that on some future occasion they would have some further information to discuss, and some of the secrets to be divulged. He

looked forward to an interesting discussion on some future occasion.

Mr. HULME, replying, said that, as they would see from the card, he had only promised to give a report of the work in hand by the Standards Committee. He had hoped, as a surprise, that he would have been able to give them a copy of the report of the Committee on Screw Threads and Limit Gauges, and also a paper on the subject. Unfortunately he was not able to do so, because that report had not yet been approved by the Main Committee. However, they would only have to wait a little longer before it was freely published.

This concluded the business of the meeting.

