PAPER No. 166.

USES OF BIBLIOGRAPHY IN ENGINEERING.

By A. M. R. Montagu.

Webster's dictionary defines bibliography as follows :—

(*i*) the writing or transcription of books,

(*ii*) the history or description of books and manuscripts, with notices of the editions and dates of printing, etc., and

(*iii*) a list of books relating to a given subject or author.

The word bibliography in this paper is also used in a fourth sense, *viz.*, the art of producing bibliographies as defined by Webster.

2. When an engineer is faced with a problem outside his experience he turns naturally to a librarian for its literature—in short he seeks a bibliography. Librarians may be trained or untrained, but at the best even the trained librarian cannot be *au fait* with all the subjects dealt with on his library shelves. Even the trained librarian will doubtfully lead the enquirer to the shelves upon which the engineering books are placed and will invite his attention to a few leading treatises on the general subject which may or may not touch upon the matter under enquiry.

The engineer will then browse among these books and may or may not find something answering to his requirements. If not, he will return to the librarian and complain bitterly of the inadequacy of the library.

3. Information on almost every subject in the world is now available in periodicals or the transactions of societies devoted to the subjects. But few enquirers can devote the necessary time to examine the periodical literature and the transactions of scientific associations in order to discover—or possibly fail to discover—papers dealing with the subject-matter of his enquiry.

4. This primary difficulty of keeping records of literary efforts has been recognized probably ever since writing was first invented but the difficulty has been vastly increased during the last century on the score of the mass of printed matter which is turned out of the presses month by month and year by year.

Many systems have been devised with a view to rendering access to available information readily obtainable. In fact over a hundred and fifty systems have been tried of which probably a hundred were invented during this last century.

The very large majority are "alphabetical," that is to say, consist of indexes arranged alphabetically under some catchword relating to the subject classified. Such systems have proved inadequate.

5. Some idea of the difficulties to be encountered will be obtained from the following extract from the paper presented at the Seventh Annual Conference of the Association of Special Libraries entitled "The inadequacy of the alphabetical subject index" by Professor A. F. C. Pollard, and Dr. S. C. Bradford.

" On account of the large number of combinations of words that may be selected as the basis of an alphabetical index, the system of Alphabetical Subject Indexing differs in every publication ; and consequently the searcher must learn the particular system of each index he consults. In some well-known bibliographies the system is so involved as to be positively misleading, in the sense that the searcher may be led to suppose that he has been exhaustively directed to the references sought.

" In practice the concealed classification, with its net-work of cross-references, must be incomplete, and is usually supplemented by words from the title of the publication to be indexed. In the sequel, owing to the mass of synonyms available to authors in titling their contributions, articles of essentially similar contents are hopelessly scattered under a series of headings, which even an elaborate time-wasting system of cross-references can hardly save from complete futility. On the other hand, only too often the code-word selected by the indexer is a very general one, so that articles of widely different characteristics come together in the index.

" Classification by title is nearly always disastrous, and the chance of suitable selection of the index heading is remote. We substantiate these remarks by a few examples taken at random from good-class indexes."

These examples clearly prove that it is impossible to index satisfactorily all literature dealing with a subject under one title, in one language. When information in several languages is to be indexed, the impossibility of utilising an alphabetical classification, becomes immediately apparent.

6. When the author was invited to take charge of the Information Bureau attached to the Office of the Secretary to the Central Board of Irrigation, he realised at once that the usefulness of the Bureau would depend solely on the system adopted for classifying information and rendering it readily accessible to enquirers.

Large sums of money have been wasted in printing and issuing catalogues, based on various indexing systems. Such catalogues frequently have to be brought up-to-date by the issue of correction slips.

During the past five or six years when money has been so hard to come by for other than essential purposes, cataloguing of books has been suspended and many printed library catalogues are now almost useless.

7. It was with a view to acquainting himself with the most modern systems of bibliography and avoiding the use of printed catalogues that the author took four months' leave in January 1931. By a series of

coincidences, enquiries led the author to the Scientific Library, South Kensington and the Imperial Council of Agricultural Research in Westminster, London. It was here that the author came in contact with the system which has been adopted by the Central Board of Irrigation and which is known as the "Classification Décimale de l' Institut International de Bibliographie." It is the purpose of this paper to describe this system and in doing so, the author has two objects in view :—

(*a*) to make more widely known the most successful and the only International system of classifying literary effort, and

(*b*) to indicate the methods used and the type of assistance that the Information Bureau of the Central Board of Irrigation offers.

8. The Classification Décimale of l' Institut International de Bibliographie is founded upon the 'Decimal' system devised by Dr. Melvil Dewey. The classification was first developed in 1873 in consequence of Dr. Dewey's careful study of library organisation all over the United States of America. His "Decimal" system is described briefly as follows :—

9. All knowledge is considered as unity and is divided into ten decimal primary divisions.

Books, whose classification numbers lie between O and 0·9 contain works of a general nature which cannot be allocated to any one of the other 9 classes.

The 9 principal classes are as under :

Philosophy	numbered from	·1
Religion. Theology	,, ,,	·2
Social Sciences. Law	,, ,,	·3
Philology. Languages	,, ,,	·4
Natural Sciences. Mathematics	,, ,,	·5
Applied Sciences. Technology Industries.	,, ,,	·6
Fine Arts	,, ,,	·7
Literature	,, ,,	·8
History. Biography Geography	,, ,,	·9

In practice, the decimal point is omitted, but to aid the eye, a point is inserted between each group of three figures.

10. Any single primary division can be further sub-divided into ten secondary divisions. For example, the primary division ·6 is

sub-divided into 60 various questions on applied science, such as general exhibitions, inventions, patents, etc.

61 Medicine and Surgery.

62 Engineering.

63 Agriculture.

64 Domestic Economy.

65 Technics of Commerce and Transport.

66 Chemical Industry.

67 Manufactures and Manufactured Products.

68 Professions and Trades.

69 Building Construction and Allied Industries.

11. Each of the above secondary divisions can be further sub-divided to an unlimited extent until, for example, the following detailed sub-classification is reached:

621·396·692·1.

A publication bearing this classification number is known to deal with the resistance of lamps when used as *resistances* in the accessory apparatus of wireless sets. It would be interesting to enquire of an Indexer using some alphabetical system, under what catchwords he would index such a paper, and how many cross-references he would require.

12. It is not pretended that Dr. Dewey's first publication of his system had reached this perfection. In fact in his preface to the 12th edition of his Manual Dr. Dewey writes:

"*Tentative Tables.* More and more minute sub-divisions have been specially called for till the 1,000 heads of 1873, with 2,600 index entries in edition I, have increased till they command 43,000 index entries in edition 12."

13. In 1895 the first International Bibliographical Conference examined every known system with any system of pretence to universality for principles upon which an universal system might be founded. As a result of this enquiry the principles advocated by Dr. Dewey were adopted unanimously. This Conference resulted in the foundation of the Institut International de Bibliographie who adopted the 'Decimal Classification' and proceeded to elaborate and extend it with a view to its universal adoption. The Institut International de Bibliographie is now housed in the Palais Mondial at Brussels. The first edition of the Manuel du Repertoire Bibliographique Universel was published in 1899 and contained an exposition of the system, together with some 15,000 index headings. The second edition appeared in 1904 and indicated the considerable expansions which had taken place in the intervening five years in all branches of intellectual activity. The current edition published in 1929 is a volume of 1,500 pages and contains some

100,000 index headings dealing with every conceivable subject, together with numerous supplementary tables, whose numbers, applied to the classification number, admit of further precise description of the paper or book classified.

14. The Manuel du Repertoire Bibliographique Universel is published in French, but translation into English is necessary, before free use can be made of the system by English bibliographers.

While the Institut International de Bibliographie is the supreme authority in regard to "Decimal Classification", each country has its own National Society to control the activities of bibliographers making use of this system. The English authority is the British Society for International Bibliography, which is closely allied to the Scientific Library, South Kensington.

15. It is a matter of regret, that no comprehensive translation of the Manual exists, but certain sectional translations have been made by bibliographical organisations interested in such subjects.

For example, Professor Pollard has translated those sections of the Manual which relate to optics and cognate subjects together with principal subsidiary tables. Complete instructions for the use of the system are included in this volume, and apart from his time spent at the Scientific Library, South Kensington, the author is greatly indebted to Professor Pollard's excellent work* for his present knowledge of the subject.

16. In addition, the Imperial Council of Agricultural Research (who have also adopted the 'Decimal' system for their bibliographical work) have translated the Secondary Division 63 Agriculture together with portions of other sub-divisions required by bibliographers engaged in classifying literature concerning Agriculture.

To facilitate his own work the author has been obliged to translate 532. Hydraulics; 626. Canal Engineering and 627. River Engineering, together with certain subsidiary tables.

17. It is clear that no extensions of the Decimal tables may be brought into existence by individual bibliographers or subsidiary authorities without reference to the Institut International de Bibliographie at Brussels. For example, the Electrical Trade Association, in consultation with the Institut have carried the "Decimal Classification" for information on Electrical Engineering to an amazing degree of minuteness and this classification has been adopted by the supreme authority and published for general use.

So far as the author is aware, no such extensions have been authorised dealing with Hydraulic Engineering and in numerous cases it has been found necessary to sub-divide general heads on the 'Decimal' system. Until such proposed sub-divisions are sanctioned by the Institut

* "The Decimal Bibliographical Classification of the Institut International de Bibliographie." Cambridge University Press, 1926.

international de Bibliographie, the author has used the letters of the alphabet in place of Arabic numerals to indicate that sub-classification so designated is temporary and used only in the Bureau under the author's control.

18. It is now possible to describe more fully the practical details as they exist in the Information Bureau of the Central Board of Irrigation.

The first step is to construct a " Subjects Index ". The first few drawers in the main card Index cabinet are devoted to this Alphabetical Subjects Index whose purpose is to indicate to the enquirer the classification number under which any " notion " is classified, thus :

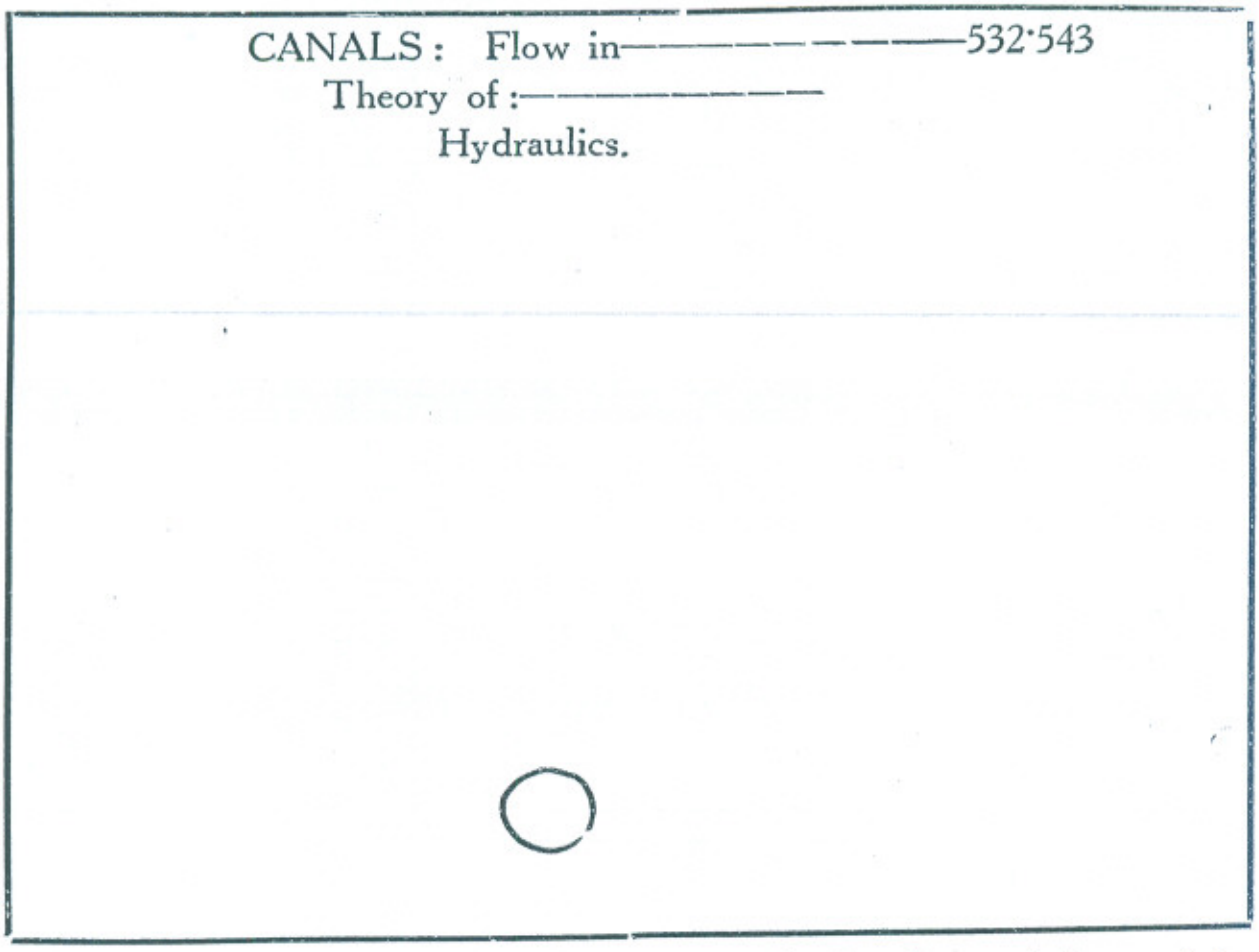


Diagram is full size 5″ × 3″ and the hole for the retaining rod is $\frac{3}{8}$″ diameter.

The number 532·543 is built up as follows :—

5	Pure science.
53	Physics.
532	Hydraulics.
532·5	Hydro-dynamics.
532·54	Flow.
532·543	Flow in open conduits.

It must be emphasised at this point, that the decimal numbers are applied to " notions ", *i.e.*, the idea lying behind the subject, and not to the actual word utilized. For example, the word ' canals ' is capable of many interpretations. One enquirer may desire to be informed as to theory of flow in : another as to the law concerning them : a third as to the technics of their construction. It is for this reason that under the catch-word ' canals ' will be found not one, but several cards with a sub-heading indicating the precise idea lying behind the classification number shown on the card. For example :—

	CANALS : Flow in : Hydraulics.	532·543.
or	CANALS : Law of : Law of waters.	351·79
or	CANALS : Hydraulic Engineering.	626

Once the enquirer has determined the precise number under which the " notions ", upon which he requires information, is classified, he will turn to the Subjects Index and search for bibliographical particulars of publications under the number so determined.

19. A word of warning is here necessary. No bibliographical system is perfect and even the ' Decimal ' system suffers from certain defects in arrangement of subjects in progressive order. Although the classification usually proceeds from the general to the particular and from the particular to the detailed, this is not always so.

Moreover, a book which is classified under 626 " Canal Engineering " obviously will contain a reference to 626·8 " Irrigation ". It behoves the enquirer, therefore, to go through the Subjects Index from the first figure to the number at which he desires to arrive.

20. Examples of Subjects Classification Cards are as below :—

I. I. B. Classification .. 624·1

TERZAGHI, C. :

The Science of foundations.

Amer. Soc. Civ. Engrs.

53 ..

pp. 2,263-93 .. 1927.

C. B. I. Accession No.

I. I. B. Classification .. 624·131.

RAVIER, L.:
Results of experiments on earth.
Pressures.
Comptes Rendus, Paris, Acad. Sci.
190 — (8)
pp. 470-2 .. 1930.

C. B. I. Accession No.
I. I. B. Classification .. 624·15.

TERZAGHI, C.:
Modern conceptions concerning foundation engineering.
Boston Soc. Civ. Engrs.
12.
pp. 397-423. .. 1925.

C. B. I. Accession No.
I. I. B. Classification .. 6241·54.

LOSSIER, H.:
The influence of form upon the supporting power of piles in incompressible or decompressible soils.
Genie Civil, 99 —
pp. 258 .. 1931.

C. B. I. Accession No.
I. I. B. Classification. .. 625·711·5

WOOD, Hon'ble W. G., Chief Engr.
Notes and sketches on Hill Bridle paths.
1914.
F'cap Folio.

C. B. I. Accession No. 238.
I. I. B. Classification. .. 626·811.

CAHTTERTON, Alfred, Director of Industries, Madras.
Irrigation by Pumping.
Supdt. Govt. Press, Madras.
1908.
Demy 8vo.

C. B. I. Accession No. 659.

The first entry on the card, above the upper line is the I. I. B. Classification Number. This permits ready recognition when placed in the Subjects Classification. The second entry, placed immediately below this line is the author's name and particulars.

With a view to rendering information as complete as possible, it is usual to complete the index with an author's catalogue. Duplicate cards are classified under the author's name in a separate "Authors Catalogue". The enquirer is thus able to determine what information is available by a particular author as well as to discover who has written on such and such subject.

21. Often a book deals with several subjects which cannot be classified under one number. In such cases two or more numbers are quoted, joined together by the plus sign. Two or more cards must be prepared with the different numbers placed first in the space reserved for the I. I. B. Classification number.

For instance :

I. I. B. Classification. 532+621·2.

MERRIMAN, Mansfield : Prof. of Civil Engineering in Leigh University.

Treatise on Hydraulics.

John Wiley and Sons, New York.

Chapman and Hall, Ltd., London.

Sixth Edition. 1898.

Revised. Demy 8vo.

C. B. I. Accession No. 608.

I. I. B. Classification. 532·543+518·2.

KUTTER, W. R. :

New Formula for mean velocity of discharge of Rivers and Canals. Translated from articles in the 'Cultur-Ingenieur', by Lowis D'A. Jackson, A.I.C.E.

E. and F. N. Spon, London and New York.

1876.

Demy 8vo.

C. B. I. Accession No. 781/782.

I. I. B. Classification. 627·824+621·646+626 83.

BLIGH, W. G., M.I.C.E., Exec. Engr.
Practical Design of Irrigation Works.
Archibald Constable and Co., Ltd., London.
1907.
Royal 8vo.

C. B. I. Accession No. 648/649.
I. I. B. Classification. 532·53+627·831.

HINDS, Julian:
Side Channel spillways: Hydraulic theory, economic factors and experimental determination of losses.
Am. Soc. Civ. Engrs.
Proc. 51.
pp. 1,350-96. 1925.

C. .B. I. Accession No.
I. I. B. Classification. 626+627+628+532.

BURNELL, G. R., C.E., F.G.S.
Rudiments of Hydraulic Engineering.
Virtue and Co., London.
1868.
New Edition. F'cap 8vo.

C. B. I. Accession No. 601.

Such cards are placed in the Subjects Index in their respective numerical places. The enquirer is thus led to the book in question should he desire information on any one of the subjects indexed.

22. It often happens that a subject having one classification number is considered in its relation to another subject with another classification number. In such cases the two numbers are conjoined by the sign of the : indicating "in its relation to". For example:

I. I. B. Classification. 532·5 : 627·83.

GOLAZ, M:
The dynamics of overflow streams in constant regime.
Bull. Technic. Suisse Rom.
54.-pp. 245-50 & 257·61.

G. B. I. Accession No.

I. I. B. Classification. 532·53*g* : 626·83.

DEKEMA, C. J. R.:
Some experiences with fluming.
South Afr. Soc. Civ. Eng.
pp. 181-200. 1925.

C. B. I. Accession No.
I. I. B. Classification. 626·02 : 693.

BUCKLEY, Robert Burton, Chief Engr., Bengal.
The construction of Masonry by Cement grouting under Water.
T. N. R.
1901·02·15.
F'cap Folio.

C. B. I. Accession No. 405.
I. I. B. Classification. 626·824: 518.

LACEY, G., B. Sc., A.M.I.C.E., Exec. Engr.
Note on the use of "Straight Line" distributary discharge diagrams.
Photo. Mechl. and Litho. Deptt.,
Thomason College, Roorkee.
1927·04·04.
Royal 4to.

C. B. I. Accession No. 474.
I. I. B. Classification. 626·85 : 633·18.

DARLEY, Sir Bernard, Kt., C.I.E., Chief Engr.
Note on rice grown and water required in the United Provinces
1931·05·09.
Typewritten. F'cap Folio.

C. B. I. Accession No. 21.

23. In the above paragraphs the uses of the classification numbers have been described showing how they may be utilized separately, with the + sign, or with a sign of relation. But the Institut International de Bibliographie system of classification does not end there. There are numerous additional auxiliary tables of numbers which expand the classification and further define the publication classified. These are as follows :

I. Sub-divisions of form	..	(0)
II. Sub-divisions of place	..	(2 to 9)
III. Sub-divisions of language	..	2 to 9
IV. Sub-divisions of time	..	" .... "
V. Common analytic sub-divisions	..	00

These common sub-divisions, as they are called, are also designated by numbers, but the numbers are differentiated as shown above, by brackets, the " equal " sign, and the quotation sign.

24. The sub-division of form is designed to indicate the nature of the publication.

All the numbers of the principal classification which concern documents, books, etc., may be employed as common sub-divisions of form by writing the classification number preceded by (0 :).

The commonest sub-division of this type used in the Central Board of Irrigation Bureau is (0 : 083).

The number 083 will be found by reference to the Manual du Repertoire Bibliographique Universel to be assigned to official and Government publications. The sub-division of form indicated above when applied to the classification number of a publication indicates that it is published by Government.

25. Thus the Irrigation Branch papers of the Punjab will be classified as under :

I. I. B. Classification. 626·1 : 532.j 00·5] (0 : 083) (54·5)

REID, A. G., C. M. G., C.E., Exec. Engr.
Apparatus for silt observations on the Sirhind Canal.
Punjab Government Press, Lahore.
Punjab I. B. Papers No. 3.
Reprinted. 1893·05·12.
1913·03·25. F'cap Folio.

C. B. I. Accession No. 243.

I. I. B. Classification. 532. j (0 : 083) (54·5).

KENNEDY, R. G., Exec. Engr.
Prevention of silting in Irrigation Canals.
Punjab I. B. Papers No. 7.
reprint. 1894.
F'cap Folio.

C. B. I. Accession No. 246 and 579.
I. I. B. Classification. 532·522 : 626·83*d*] 00·1 (0 : 083) (54·5).

BENTON, J., Exec. Engr.
Experiments on gauging the supply entering Rajbahas by means of the Head Gates.
Punjab Government Press, Lahore.
Punjab I. B. Papers No. 8. 1913·04·01.
F'cap Folio.

C. B. I. Accession No. $\frac{62}{63}$.
I. I. B. Classification. 624·600·1 (0 : 083) (54·5).

FARRANT, J. T., Supdtg. Engr.
STODDARD, A. A. : Exec. Engr.
Notes on design and loading of arch bridges.
Supdt., Govt. Press, Punjab, Lahore.
Punjab I. B. Papers Class A No. 29.
1926·05·26.
F'cap Folio.

C. B. I. Accession No. 134/135.

26. The above description will indicate the method of use of the sub-divisions noted below :

(01) General theory of....
(02) Treatises of....
(03) Encyclopædias of....
(04) Essays on.....
(05) Periodical publications of....
(06) Societies, Institutions, diverse collections of....
(07) Teaching and study of.....
(08) Polygraphs, works in collections, miscellanies of....
(09) General history of.....

II. Sub-divisions of place.

The sub-divisions of places are used in precisely the same way. The principal divisions are :

(3) Parts of the ancient world.

Parts of the modern world.

(4) ,, Europe.
(5) ,, Asia.
(6) ,, Africa.
(7) ,, North America.
(8) ,, South America.
(9) ,, Oceanica.

The above numbers are, of course, formed decimally and are extended to the right to indicate sub-division of the principal areas thus :—

(5) Asia, (54) India, (54·5) Punjab.

27. A convention has been adopted in the Central Board of Irrigation Bureau to distinguish between the place of publication and the place referred to in the book or writing under classification.

It will be obvious that all the technical papers of the various countries and local Governments should be shelved together for ease of reference. If, therefore, the sub-division of place number follows the sub-division of form indicating "a Government publication," the enquirer will understand that the publication in question is issued by the Government designated.

On the other hand, if the sub-division of place number precedes the sub-division of form indicating a Government publication, that place number refers to the matter of the book or article under classication. For example,

I. I. B. Classification 532. j : 626.83c] 00·4 (54·5) (0 : 083)

WOODS, F. W., Chief Engr.
The problem of silt-control at the Head Works of the Sirhind Canal at Rupar.
Superintendent, Government Press, Punjab, Lahore.
Punjab I. B. Papers No. 21.
1921·05·21.
F'cap Folio.

C. B. I. Accession No. 114/115 & 258.

I. I. B. Classification. 620·1 (002) (006) (54·7) (0 : 083).

MARRYAT, Capt. E. L., R. E. (Compiler).
Specifications, Rates and Notes on Work.
Government Central Press, Bombay.
1916.
Revised. Crown 4to.

C. B. I. Accession No. 793.
I. I. B. Classification. 626·8 (038) (54·5) (0 : 083) (54).

NICHOLSON, H. W., B. Sc., Exec. Engr.
Glossary of terms in use on Punjab Canals.
Government Monotype Press, Simla.
Government of India Technical Paper No. 1.
1920.06.22.
F'cap Folio.

C. B. I. Accession No. 265.
I. I. B. Classification. 624 (003) (77·1) (0 : 083).

CONTRACT Forms and specifications.
Miami Conservancy District, Dayton, Ohio., U. S. A.
Technical Reports 1918·09·00.
Part VI. Demy 8vo.

C. B. I. Accession No. 871.

III. Sub-divisions of language.

It is useful occasionally to indicate if a book is written in a foreign language. No sub-division of form, language, is inserted after the classification number of books in English but books in foreign languages are described in this respect.

The language sign is the=
Thus English=2, German=3, French=4, Italian=5, and Spanish=6.
For example :—

I. I. B. Classification. 518·3=4

d'OCAGNE, Maurice : Inspecteur General des Ponts et Chaus-sees, Professeur A L'Ecole Polytechnique.
Traite de Nomographie.
Gauthier-Villars et Cie
Libraires Du Bureau Des Longitudes, De
L'Ecole Polytechnique, Quai des Grands—
Augustins, 55, Paris.
1921.
10th Edition. Royal 8vo.

C. B. I. Accession No. 1014.

I. I. B. Classification. 413.164 : 44] =2.

KETTRIDGE, J. O. : F. S. A. A., A.C.I.S.,
French-English Dictionary of Technical
Terms and Phrases and a method of
Telegraphic Coding.
George Routledge and Sons, Ltd., London.
Vol. I.
Gresham Ed. Royal 8vo.

C. B. I. Accession No. 838.
I. I. B. Classification. 627·8+626·8] (62) (023)=5.

LUIGGI, Prof. L. :
L'irrigazione in Egitto e le dighe sul Nilo.
L'Universelle-Imprimerie Polyglotte, Villa Umberto I., Roma.
Estratto dagli Annali Della Societa 1913.
Degli Ingegneri E Dagli Architetti 4to.
Italiani Nim. 10-16 Maggio 1913.

C. B. I. Accession No. 734.

IV. Sub-divisions of time.

It is useful at this point to indicate how dates are written under this system of classification.

The year is always written first followed by the number of the month preceded by 0 for the months January to September. This again is followed by the date preceded by a 0 for the first to the ninth.

For examples, see the bottom right-hand corner of the preceding cards illustrated.

All dates are put in inverted commas when inserted in a classification number. Thus :

9 (44) " 1467 " History of France in the year 1467.

As this sub-division of form is never used in the Central Board of Irrigation Bureau, further description appears unnecessary.

V. Sub-divisions of points of view.

This is one of the most important sub-divisions of all. The principal divisions are as under :

. . . 00·1. The speculative point of view. Conception. Aim. Programme. Research and theoretical or experimental studies relative to the creation of an object.

. . . 00·2. The point of view of realisation. Execution. Construction. Constituent elements. Processes.

. . . 00·3. The economic point of view. Industrial production. Commercial output. Cost and selling price.

. . . 00·4. The point of view of service and use. Working. Management and service.

. . . 00.5. The point of view of fittings and apparatus in connection with the use of the object.

. . . 00·6. The point of view of premises and establishments. Details of organisation and service.

. . . 00·7. Special personnel in connection with the object.

They are, of course, further subdivided to the right and these numbers, preceded by the double zero 00, are attached to the main classification numbers.

For example,

I. I. B. Classification. 532. j +626·31+626·800·1+627·1]
(08) (0 : 083) (54.5).

QUINTON, W. G.: A.M.I.C.E., Exec. Engr. (Editor).
Technical Review, 1925.
Superintendent, Government Press, Punjab, Lahore.
Punjab I. B. Papers Class A, No. 28.
1926·02 08.
F'cap Folio.

C. B. I. Accession No. 132/133 and 262.
I. I. B. Classification. 621·311·2 : 627·8 00·2]
(54.5) (0 : 083).

"Punjab Hydro-Electric Scheme". What it is and what it means.
Superintendent, Government Printing, Punjab, Lahore.
1925.
Crown 4to.

C. B. I. Accession No. 881.
I. I. B. Classification. 626·82400·3 (54·5) (0 : 083).

WOODS, F. W.: Chief Engr.
Sale of Water for irrigation at volumetric rates.
Superintendent, Government Press, Punjab, Lahore.
Punjab I. B. Papers No. 24.
1921·02·24.
F'cap Folio.

C. B. I. Accession No. 120/121 and 259.

I. I. B. Classification. 626·1 : 532. j 00·5] (0 : 083) (54·5).

REID, A. G., C.M.G., C.E., Exec. Engr.
Apparatus for silt observations on the Sirhind Canal.
Punjab Government Press, Lahore.
Punjab I. B. Papers No. 3.
Reprinted 1893·05·12.
1913·03·25. F'cap Folio.

C. B. I. Accession No. 243.

28. In addition to the common sub-divisions of points of view there are special sub-divisions applicable to particular groups of the Classification. For example, the group 6 Applied Science has attached to it the following special sub-divisions of form :

(001). Statistical documents.
(002). Inventories. Cost price.
(003). Contracts, conventions and specifications of tenders.
(004). Plans and projects, drawings, estimates and statements.
(005). Instructions for construction.
(006). Working. Employment of material. Preservation and upkeep. Prescriptions relative thereto.
(007). Rules and instructions on service.
(008). Patent specifications.
(009). Reports on the service, trials and working of material. History relative thereto. For example :—

I. I. B. Classification. 624·3 (004)

VERRIERES, A. C., Exec. Engr.
Calculations for an 80′ girder bridge width of roadway 5′.
1911.10·06.
F'cap Folio.

C. B. I. Accession No. 236.
I. I. B. Classification. 624.136(005) (0 : 083) (54.2)

BARLOW, G. T., C. I. E., Supdtg. Engr.
Further experiments in settlement of earth-work.
Superintendent, Government Press, U. P.
1915.05.11.
F'cap Folio.

C. B. I. Accession No. 240.

I. I. B. Classification. 691·3 : 693·5] (006) (061).

DAVEY, Norman, B. Sc., A. M. I. C. E.,

Bonding new concrete to old.

H. M.'s Stationery Office, London.

Department of Scientific and Industrial Research, Building Research Bulletin No. 9.

1930.

Med. 8vo.

C. B. I. Accession No. 830/831.

I. I. B. Classification. 626·83c (009·3) (54·5) (0 : 083).

WOODS, F. W., Chief Engineer.

Remodelling of Head Works of the Lower Jhelum Canal at Rasul.

Superintendent, Government Press, Punjab, Lahore.

Punjab I. B. Papers No. 22.

1921·09·01.

F'cap Folio.

C. B. I. Accession No. 116/117.

These are attached to the classification numbers in precisely the same way as other sub-divisions.

29. The above is, of course, merely the briefest sketch of the system known as the I. I. B. Decimal System of Classification. Although simple in essence there are many pitfalls for the unwary and the full classification of one book, article or periodical may involve considerable thought and time.

Moreover, it is essential that the various classification numbers whether simple, compound or relative, together with the various subdivisions, shall be written in exactly the correct order. As an example of the importance of order 626·8 (73) (05) will convey :—

"a periodical devoted to irrigation in the United States."

626.8 (05) (73) "a periodical, published in the United States devoted to irrigation generally."

Signs also are of importance 016 : 626.8] (05) will convey "Periodical bibliographies on irrigation." 016 : 626.8 (05) " Bibliography of periodicals relating to irrigation."

30. It is also important that a regular order of precedence should be observed amongst the sub-divisions for purposes of placing in the card index cabinet. Rules have been evolved in the C. B. I. Bureau and are believed to be strictly in consonance with the general rules laid down by the Institut International de Bibliographie. They are, however, being submitted for criticism to that authority.

31. It will be noticed that in general wherever two or more numbers appear in the above classification cards, one of these is underlined. This indicates the number under which the book or publication is shelved. Cards bearing only one number do not need to be underlined as the book must be shelved in accordance with that number. It follows, therefore, that all the publications relating to any subject will be found together on the library shelves.

32. The above does not, of course, apply to periodicals or Government reports. These are shelved in their chronological order.

33. The author does not pretend that the above description of the I. I. B. Classification and its uses is in any way exhaustive, but it is hoped that the description is sufficiently lucid to indicate the possibilities of the decimal system which has been developed by the Institut International de Bibliographie of Brussels.

34. It will be obvious that a volume such as the Proceedings of an Engineering Society would require a very large series of classification numbers fully to describe the contents, and that the standard card would not have room for the multiplicity of authors' names and the long string of bibliographical details.

The difficulty is overcome in the manner, illustrated by the following examples :

I. I. B. Classification. 62 (062) (42·1)

PROCEEDINGS of the Institution of Civil Engineers.

Ccl. Inst. C. E., London.

Vol. 231. 1931.

Part I. Demy 8vo.

C. B. I. Accession No.

The classification number indicates

62 The subject is Engineering.

(062) In the form of Proceedings of an unofficial Society.

(42·1) Domiciled in London.

This is known as the " preliminary classification."

Each volume of Proceedings is then examined for papers of interest to the Central Board of Irrigation and separate cards are prepared for *each* such paper, and are placed in the Author's Catalogue and the Classification. This is termed the detailed classification.

35. The same process is followed in regard to periodicals. Having regard to the number of papers to be found in Proceedings and the number of articles in periodicals of interest to hydraulic engineers, the magnitude of the task will be appreciated.

Very fair progress has been attained. The preliminary classification of all publications in the library is almost complete together with the detailed classification of the Proceedings of the Bombay, Punjab and Burma Engineering Congresses, for the volumes in the library.

A start is to be made shortly on the Proceedings of the Institute of Civil Engineers which is bound to yield a vast amount of useful information which has hitherto been untraceable by engineers engaged in the practice of their profession.

36. An illustration of the actual use to which the Bureau of the Board can be put, may be of interest.

An enquiry as to literature on " Irrigation Outlets" is received. A reference to the subjects index shows that "Irrigation Outlets" are classified under the number 626.83e. The library-clerk took 50 minutes to prepare the bibliography on this subject, which will be found as the appendix to this paper.

37. This bibliography is necessarily far from complete, as the detailed classification of proceedings and periodicals has only just begun, but it will be appreciated that the information already available is considerable, and will increase with each month that passes.

In conclusion, the author desires to express his acknowledgments to the authorities of the South Kensington Scientific Library, the Imperial Council of Agricultural Research at Westminster and Professor A. F. C. Pollard, A.R.C.S., A.M.I.E.E., F. Inst. P. of the Imperial College of Science and Technology.

626·83e.

Bibliography of Publications on "Irrigation Outlets."

VISVESVARAYA, M., B. A., L. C. E., A.M.I. C. E., Exec. Engr.
On Self-Acting Module for Regulating Irrigation.
Irrigation Conference, Simla, 1904.
Vol. 1.—Papers
No. 21 1905.
pp. 72-74.

WILKINS, C. F., Exec. Engineer.
A new Module
Engineering Conference, Simla, 1913.
Vol. I.—Papers
No. 11. 1915.
pp. 170-183

VARMA, B. P., Exec. Engineer.
Canal Outlets.
Punjab Engineering Congress, Lahore, 1917.
Vol. V.—Proceedings
No. 6. 1917.
pp. 101-137g.

JOSHI, G. S., B. E. Asst. Engr. P. W. D. A Self-Acting Module.
Bombay Engineering Congress, Bombay, 1919.
Vol. VII—Proceedings
No. 10.—Paper No. XLII. 1919,
pp.

LINDLEY, E. S.:
The application of modules in Irrigation.
Punjab Engineering Congress, Lahore, 1923.
Vol. XI.—Proceedings
No. 5. 1923.
pp. 43-74r.

BEDFORD, J. D. H., I. S. E.
Note on outlets and adjustable proportional modules.
Punjab Engineering Congress, Lahore, 1927.
Vol. XV.—Proceedings.
No. 4.—Paper No. 109. 1927.
pp. 33-36f.

GIBB, A. S., A. M. I. C. E., Exec. Engr.
Gibb's Module.
Punjab Government Press, Lahore.
Punjab I. B. Papers
No. 13-A (Class A.)
1929.07.19.

PARKER, P., Experimental Officer
Blaker, C. E., Covenanted Engineer.
Result of tests of Mr. Kennedy's Gauge Outlets.
Punjab Government Press, Lahore.
Punjab I. B. Papers
No. 12.
1913.04 11.

INGLIS, Claude C., B.A., B.A.I., M.I.C.E., Superintending Engineer, Irrigation Development and Research Circle, Poona.

Joglekar, D. V., Assistant Engineer.
Moduling operations on Distributary No. 8, Nira Left Bank Canal, and application of the results to other distributaries.
Superintendent, Government Printing and Stationery, Bombay.
Bombay P. W. D. Technical Paper No. 25. 1928.04.28.

KIRPATRICK, W., Exec. Engr.
A note on the design, application and construction of masonry semi-modules as used on the Jamrao Canal.
Superintendent, Government Printing and Stationery, Poona.
Bombay P. W. D. Technical Paper No. 12.
1925.

BERESFORD, J. S., Exec. Engr.

Proposed standard designs with estimate and specification for masonry outlets for distributaries, divided into seven classes.
Secretariat Press, Nagpur.

Reprinted 1903.09.07.

RAJ BANSI LAL, Rai Sahib, P.E.S.
Experiments on Lateral constriction outlets (1920-21).
Irrigation Branch, Punjab, Technical Paper No. 30-A. pp. 3.
1923.07.14.

INGLIS, Claude C., B. A., B.A.I., M.I.C.E., Executive Engineer.
Note on the design of distributaries and their outlets in the Bombay, Deccan.

Superintendent, Government Printing and Stationery, Bombay.

Bombay P. W. D. Technical Paper No. 19.
Reprinted. 1928.

KHOSLA, Ajudhia Nath, I.S.E.
Interlocked adjustable module io precast reinforced concrete units.

Punjab Engineering Congress, Lahore, 1927.
Vol. XV.—Proceedings.
No. 3.—Paper No. 108. 1927.
pp. 15-32.

INGLIS, Claude C., B. A., B.A.I., M. I. C. E. Superintending Engineer, Bombay.
Note on standing wave pipe outlets.

Superintendent, Government Printing and Stationery, Bombay.
Bombay P. W. D. Technical Paper No. 23. 1928.04.14.

KENNEDY, R. G., late Chief Engineer.
On the distribution of water for irrigation by measurement.
Ballantyne Press, Edinburgh.

Punjab I. B. Paper No. 12.
1906.06.00.

CRUMP, E. S., Exec. Engineer.

Moduling of Irrigation Channels.

Superintendent, Government Press, Punjab, Lahore.

Punjab I. B. Papers No. 26 (Class A). 1929.06.13.

INGLIS, Claude C., B.A., B.A.I., Exec. Engineer.

Modules and semi-modules for irrigation.

Bombay Engineering Congress, Bombay, 1921.

Vol. IX.—Proceedings

No. VIII.—Paper No. VIII.

pp.

SHARMA, K. R., Assistant Engineer.

A theoretical design of a new type of outlet for irrigation channels.

Punjab Engineering Congress, Lahore, 1931.

Vol. XIX.—Proceedings

No. 4—Paper No. 146. 1931

pp. 105—113*k*.

COLYER, C. A., A.M.I.C.E., M.I.E., I.S.E.

Notes on designing adjustable proportional modules. Being a *Supplement* to I. B. Papers (Class A) No. 26, 1925.

Superintendent, Government Press, Punjab, Lahore.

Punjab I. B. Papers No. 26-A (Class A.) 1925.09.28.

INGLIS, Claude C., B.A., B.A.I., M.I.C.E., Superintending Engineer, Bombay.

Joglekar, D.V., B.E., Asst. Engineer.

Note on experiments carried out at the hydraulic testing station at Distributary No. 5, Mutha Right Bank Canal, near Poona, with a Lindley Type Standing Wave Flume.

Superintendent, Government Printing and Stationery, Bombay.

Exec. Bombay P. W. D. Technical Paper No. 22. 1928.02.14.

DISCUSSION.

Mr. A.M.R. Montagu in introducing his paper remarked that after the heavy artillery of the last two papers, discussions on which the members had listened to that morning, his own little contribution to the Punjab Engineering Congress had shrunk to very small proportions.

The object of his little paper was not to add to the members' knowledge of any particular engineering subject but to indicate to the members of the Congress that knowledge could be recorded and indexed and made more readily available than was the bulk of the engineering knowledge published for members of their profession. When he came yesterday morning a certain very senior officer, under whom he had the privilege of serving for many years, remarked that he had just finished reading his little paper but was afraid that the paper would evoke no discussion, as nobody knew anything about the subject.

The speaker further said that the paper was handed out to the members only that morning and he might say that he had not seen it himself since it left his hands in typescript four months back. But when he looked at it yesterday he fully expected to find it as full of errors as other Congress papers generally are but he found to his great delight that it was singularly free from errors with the exception of one on page 6. The diagram of the index card illustrated there, was intended to be a sketch and was not to scale. His thanks were due to the official concerned for his excellent work.

The speaker had only one remark to add to what had already appeared in the paper, *viz.*, that the system therein described was valuable for recording information or any other kind of collection. He had already developed a decimal system for certain organizations for the recording of their cases. The other day he had been approached by a record office and suggested to them that they should record their plans on this system and in two or three cases where this system had been introduced, satisfactory results had been experienced. He had hoped that occasion would arise for the increased adoption of the decimal system in India because the more general became its use, the more complete will the subjects indexed become, and the more generally will it be understood. It was clear that if they completed a subjects index, covering the whole range of subjects with which Engineers had concern then that index will be the same, no matter whether the office was in Madras, Calcutta or in the north. So far as the speaker was aware there was no other library in India which used the international system, although there were several libraries and organizations which used the Dewey decimal system that was not so complete as the international system. He could only express his regret that they had thought it fit to adopt a purely American method instead of the international system

Lastly, the speaker did not think that there would be any discussion but if there was anything which was not clear to the members, he would be glad to answer any question that might arise.

The President thanked Mr. Montagu who had given them this paper.