ON THE TRAVERSING OF GEOMETRICAL FIGURES

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649536948

On the Traversing of Geometrical Figures by J. Cook Wilson

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

J. COOK WILSON

ON THE TRAVERSING OF GEOMETRICAL FIGURES

Trieste

On the Traversing

of

Geometrical Figures

By

J. Cook Wilson

Oxford

At the Clarendon Press

1905

Meiner Frau

THE writer thanks the Delegates of the Clarendon Press for undertaking the publication of this venture. He acknowledges also his indebtedness to Professor E. B. Elliott, Mr. E. H. Hayes, and Mr. J. E. Campbell for testing a few statements submitted to them: but for the contents of the book the writer himself is entirely responsible, with the exception of the theorem for which he has to thank Mr. P. K. Tollit.

Contents.

Page

Introduction 1

Part I. Analytical Method.

§ 1. Some definitions 4
§ 2. Some elementary properties of traverses . . 6
§ 3. Number of even points and of odd points in a figure 7
§ 4. Traverses of even-point figures . . . 10
§ 5. A figure with more than two odd points cannot be exhausted by one traverse . . . 12
§ 6. A figure with two odd points only can be exhausted by one traverse 13
§ 7. 'Single paths,' 'Characteristics' and 'Accessories,' 'Single Circuits' 14
§ 8. A figure with two odd points can be reduced to a single path with accessories . . . 15
§ 9. Rules for traversing figures which can be exhausted by a single traverse . . . 16
§ 10. General types of figures with two odd points . 17
§ 11. Definition of 'single lines' 18
§ 12. The number of 'single lines' at a point is constant, but their position may vary 21
§ 13. Every odd point has at least one single line 24
§ 14. Point at which there cannot be more than one single line 24
§ 15. The number of single lines at a point is not a function of the number of odd points . 26

Page

§ 16. Nature of the figure at points at which there is more than one single line 26
§ 17. Maximum of single lines at a point 27
§ 18. An odd point which can be exhausted by a single traverse must have one single line and no more, and conversely 29
§ 19. Any point in the puzzle figure can be exhausted by a single traverse 29
§ 20. Two odd points which can be exhausted by one traverse 30
§ 21. General condition that two odd points should be exhaustible by the same traverse . . 32
§ 22. Positive condition that two odd points should not be exhaustible by the same traverse . 32
§ 23. In any figure two odd points can always be found which can be exhausted by the same traverse 33
§ 24. Relation of the number of odd points in a figure to that of the whole number of single lines in a given resolution 34
§ 25. Maximum number of odd points in an odd-point figure, at each of which there is more than one single line 35
§ 26. Minimum number of pairs of odd points each of which can be exhausted by the same traverse 37
§ 27. Omission from a figure of a path with accessories joining two odd points 42
§ 28. The number of traverses required to exhaust a figure of $2n$ odd points is n 43
§ 29. Resolution of a figure into a minimum of figures traversable in one traverse . . 43
§ 30. Maximum traverses 45
§ 31. Figures in which the number of lines omitted

Page

in one traverse can have the minimum ratio to the whole number of odd points . . 46

§ 32. The maximum traverse of a figure with four odd points 48

Part II. Constructive Method.

§ 33. A figure which can be exhausted in one traverse must either have all its points even, or only two of them odd 49

§ 34. The construction of figures from 'elementary paths' 50

§ 35. An even-point figure can be exhausted in a single traverse 50

§ 36. A figure with two odd points only can be exhausted by one traverse 52

§ 37. The number of odd points in an odd-point figure must be even. 53

§ 38. Construction of figures from elementary odd paths 53

§ 39. The number of traverses required to exhaust a figure of $2n$ odd points is n . . . 54

§ 40. Interpretation of the zero value of n in the foregoing formula 55

§ 41. Maximum of single lines through a point . 55

§ 42. Interpretation of zero values and of the minus sign 57

§ 43. An odd point which can be exhausted by a single traverse must have one single line and no more, and conversely 58

§ 44. Condition that two odd points should be exhausted by the same traverse . . . 59

§ 45. In any figure two points can always be found which are exhaustible by the same traverse 60

Page

§ 46. The minimum number of points in an odd-point figure, at each of which there is only one single line 61
§ 47. The minimum number of pairs of points each of which can be exhausted by the same traverse 64

Part III. Application of the Principle of Duality.

§ 48. Reciprocal figures. Notation 67
§ 49. Relation between the linear traverses of reciprocal figures 68
§ 50. The reciprocal of a linear traverse is an angular traverse 72
§ 51. Traverse of an 'infinite segment' of a straight line. 'Point at infinity' 74
§ 52. Equivalence of finite and infinite linear traverses, and of their angular reciprocals . . . 76
§ 53. Nature of the correspondence between the lines of a figure and the angles of its reciprocal . . 77
§ 54. Some definitions 79
§ 55. 'Denomination' of the lines of an 'angular figure.' Ambiguous case 83
§ 56. Correspondence of linear and angular paths . 86
§ 57. Infinity of lines belonging to the angular figure . 86
§ 58. Omission of angular paths, and denomination of remaining lines of the figure 89
§ 59. Traverse of angular complex circuits . . . 91
§ 60. Traverses which exhaust odd lines, and traverses which exhaust even lines 92
§ 61. The number of odd lines in an odd-line figure is even 93
§ 62. An even-line figure is an angular circuit . . 93
§ 63. Examples of even-line figures, or angular circuits 95