A PRACTICAL THEORY OF VOUSSOIR ARCHES

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649497409

A Practical Theory of Voussoir Arches by William Cain

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

www.triestepublishing.com

WILLIAM CAIN

A PRACTICAL THEORY OF VOUSSOIR ARCHES

Trieste

A

PRACTICAL THEORY

OF

VOUSSOIR ARCHES.

BY

PROF. WILLIAM CAIN, C. E.

NEW YORK:
D. VAN NOSTRAND, PUBLISHER,
23 MURRAY AND 27 WARREN STREET.
1874.

PREFACE.

The following little treatise first appeared in VAN NOSTRAND'S ENGINEERING MAGAZINE, for which it was written. The author hopes that he may be doing a service to American readers in introducing to them Dr. Scheffler's Theory of Arches, the fundamental principles of which are contained in the following pages. Vertical forces alone are considered. Numerous experiments are given in illustration of the theory advanced, both for symmetrical arches as well as for unsymmetrical arches, or arches unsymmetrically loaded. It is believed that the following theory is easily acquired, is rapid in working and agrees with experiment, and therefore can properly be called "A Practical Theory of Voussoir Arches."

WM. CAIN.

A

PRACTICAL THEORY

OF

VOUSSOIR ARCHES.

1. The theory selected, in the following treatise, is that of Dr. Hermann Scheffler, * which will be quoted from literally in places. A sufficient number of experiments with wooden arches, probably to establish this theory, will also be given.

It is necessary to consider *the principle of the least resistance* in order that the thrust, anywhere in an arch, in direction, position and magnitude, may be located.

The Rev. Canon Mosely is the author

* Detailed in his most excellent German work, a French translation of which by M. Victor Fournie is entitled "Traité de la Stabilité des constructions; 1re partie, Theorie des Voutes et des Murs de Soutènement." Paris, 1854.

of this principle, which has been amplified by Dr. Scheffler in his treatise above alluded to. It may be briefly stated thus:

Principle of the least resistance. Let the external forces which act upon a structure, be combined into one resultant, P; and let the resisting forces R′, R″ - - - be each decomposed into components respectively ⊥ and ∥ to the direction of P. Then will the components of R′, R″ - - - - ⊥ to P be the least that will cause equilibrium, consistently with the physical properties of the body or bodies composing the structure. *For* the sum of the components ∥ to P must equal P; but the components ⊥ to P are only brought into play from the peculiar disposition of the resisting surfaces of the structure and there is no need for their further increase after they have caused stability.

As M. Fournie observes: This supposes *first*, "that the *molecular* actions, which constitute the reactions, take place without sensible velocity;" *secondly*, "that the *molecular* actions are developed success-