RAILWAY TUNNELLING IN HEAVY GROUND

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Railway tunnelling in heavy ground by Charles F. Gripper

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CHARLES F. GRIPPER

RAILWAY TUNNELLING IN HEAVY GROUND



RAILWAY TUNNELLING

IN

HEAVY GROUND.

BY

CHARLES F. GRIPPER,

CIVIL ENGINEER AND CONTRACTOR.



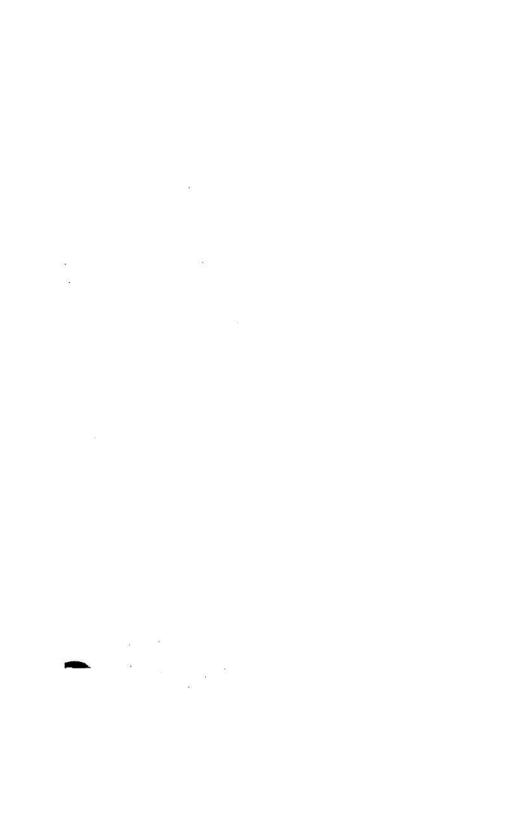
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PREFACE.

This book, or treatise on Tunnelling, is not supposed by the author to contain anything new or unknown to Engineers or Contractors generally, nor does it contain formulæ or positive rules for constructing such works, as none can be laid down, no two Tunnels ever being exactly similar in conditions affecting their construction. The author believes, however, that his practice and experience as a Civil Engineer and Contractor will enable him to give such information to assistant Engineers and Contractors' assistants as will materially help them, and by describing the general methods and requirements to be adopted in commencing and carrying out Tunnel works, place young Engineers, who may not have much experience in this class of work, in a position to understand what is wanted or what is going on, when called upon to commence a Tunnel, or to take charge of and superintend the works of one already commenced; and so that they may not become tools in the hands of the foreman miner or bricklayer, who in many cases have the work let to them by sub-contract, and who will immediately take advantage of inexperience, to the detriment of the work, disgrace to the management, and loss to the chief Contractor and all concerned in the well-being of the line of Railway.

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RAILWAY TUNNELLING

IN

HEAVY GROUND.

CHAPTER I.

LIGHT AND HEAVY GROUND.

Tunnels are works to be sparingly used in the construction of railways: they require great care and honest work in construction, any giving way causing great expense and delay to traffic while undergoing repair.

A Tunnel, well and carefully constructed, will last for many years without repair, so one of the first considerations is to ensure good superintendence of the works while in progress.

There are cases where they must be introduced. In England all the main lines, and most branch lines, may now be considered as made, and the best and easiest routes for them to have been selected, so that any branch or link now to be made will generally have to pass through a rough and difficult country, probably necessitating Tunnelling.

When a cutting attains 70 feet in depth, it is generally advisable to introduce a length of Tunnel. A cutting of this depth, for a double line of rails, with 27 feet width at formation and 1½ to 1 slopes, contains about 1027 cubic yards of excavation per yard forward, which, at 1s. 3d. per cubic yard, would cost