

**A TREATISE ON  
PERFECT RAILWAY  
SIGNALING**

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A Treatise on Perfect Railway Signaling by Henry W. Spang

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**HENRY W. SPANG**

**A TREATISE ON  
PERFECT RAILWAY  
SIGNALING**



A  
TREATISE  
ON  
PERFECT RAILWAY SIGNALING

DESCRIBING THE DEVELOPMENT OF THE ELECTRIC  
TELEGRAPH AND BLOCK SIGNALING SYSTEMS

THEIR DAMAGE AND DERANGEMENT DURING  
THUNDERSTORMS

AND EXPLAINING THE REQUIREMENTS FOR  
RELIABLE SIGNALING

BY  
HENRY W. SPANG

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ILLUSTRATED

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1902

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HENRY W. SPANG

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## PREFACE.

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THIS work is the outcome of years of observation and investigation made by me of the paths selected and effects produced by lightning discharges, from which the proper requirements for effecting absolute protection of electrical circuits, etc., have been determined. The frequent impairment during thunderstorms of electric signaling and other circuits along railroads is well known among railroad men, who recognize the necessity of a proper solution of the lightning protection feature before perfection can be attained in railway signaling.

Special attention has been given to the effects produced upon the automatic block systems using the track circuit, and proper improvements have been developed which will not only eliminate the annoying lightning effects attending such systems, but also greatly increase the reliability and efficiency of the track circuit for signaling purposes.

It will be observed that considerable space is devoted to a description of all the phenomena attending lightning discharges. This has been done for the reason that correct information thereon is greatly desired by railway men, who recognize its important bearing upon railway signaling.

HENRY W. SPANG.

NEW YORK, November, 1902.

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100



# CONTENTS

---

Introduction .....	5
What is Electricity.....	6
Electrical Actions and Properties .....	7
Electrical Progress .....	10
Development of the Electric Telegraph .....	11
The Earth as an Electric Conductor.....	13
American Railway Telegraphs .....	14
Atmospheric Disturbance of Telegraph and Signaling Circuits.....	15
Observations of Franklin .....	18
Lightning Discharges Cannot be Prevented.....	21
Why Lightning Protection Requirements are Generally Unknown.....	23
Blunders of Scientists .....	26
Formation of Thunderstorms .....	29
The Great Electrification of the Earth .....	31
Lightning Discharges .....	32
Lightning Photography .....	34
Electrical Action of Lightning Discharges .....	37
Attraction for Underground Pipes and Railway Tracks.....	42
Attraction for Wire Fences, etc. ....	45
Attraction for Overhead Electrical Circuits .....	46
Electrical Actions Between Metallic Conductors.....	49
Summary of Lightning Discharge Actions .....	53
Improper Employment of Lightning Protection Devices .....	55
Development of Manual Block Signaling .....	56
Development of Automatic Block Signaling .....	60
Automatic Electric Block Systems .....	62
Locomotive Cab Signaling .....	67
Mileage of Block Signal Systems.....	70
Perfect Railway Signaling .....	71

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# PERFECT RAILWAY SIGNALING.

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## Introduction.

**I**T is a well established fact that electricity must be employed to facilitate the movement and secure the safety of railway traffic, and there is no branch of the electrical science in which simplicity, reliability and accuracy are more essential than with automatic and other railway signaling.

Our aim has been to overcome certain objectionable features which have been and are still inherent in all such systems, and thereby secure perfection, as far as is possible with human ingenuity.

From the first introduction, every electric railway signaling system has been subjected to derangement during thunderstorms, giving rise to improper signals, causing collisions and delay of traffic.

Quite a number of systems with ingenious devices have been tried only to be quickly discarded owing to the disastrous effects of such disturbances. With the employment of the rails as electric conductors for automatic signaling purposes, the annoying effects of induced electricity during thunderstorms have greatly increased.

The true actions of lightning discharges and the proper requirements for effecting absolute protection therefrom are comparatively unknown.

In view of the great importance of the subject and the amount of nonsense that has been promulgated thereon, the author has deemed it advisable to fully treat it in all its phases and to present such an array of indisputable facts, that even the layman can properly understand all the phenomena of lightning discharges.

The brief review of electrical progress and the development of the electric telegraph and railway signaling is given for the purpose of showing that the rapid advances made in the electrical science in the last century, have been confined solely to such research as could be determined in the laboratory; while in the matter of the lightning discharge and protection therefrom, which have required an investigation of natural phenomena, not to be obtained in a laboratory, no important discovery or improvement has been made since the days of Franklin.