AUTOMATIC BLOCK SIGNALS AND SIGNAL CIRCUITS; AMERICAN PRACTICE IN THE INSTALLATION AND MAINTENANCE OF SIGNALS ELECTRICALLY CONTROLLED, AND OPERATED BY ELECTRIC OR OTHER POWER, WITH DESCRIPTIONS OF THE ACCESSORIESNOW REGARDED AS STANDARD

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RALPH SCOTT

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BY

RALPH SCOTT

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To My

BELOVED BROTHER

HUGH EMMOTT SCOTT

PREFACE.

THE evolution of a mechanical art results in the simplification of its apparatus. The less the number of subsidiary devices employed, and consequently the greater the number of their independent functions, the higher the state of this art. Signaling accessories, although of rapid development, have not as yet undergone the usage test that is the prerequisite to standardization and the elimination of impracticable differentiated structures. In surveying the heterogeneous types of construction employed in the signal equipment of a representative railroad system, the difficulty of selection and representation, with respect to relative significance, becomes apparent.

In a book of this character, it is extremely difficult to intelligibly exhibit continuous circuits of any great complication, owing to the restricted space available for illustrations, insets not having been resorted to. The history of signaling is not touched upon, as it is irrelevant to the character of the present work. Railroad terms have also been omitted, as they are meaningless to the average reader.

All-electric interlocking, a natural development of the older mechanical and electro-pneumatic interlocking, is given the attention that its importance merits. Electric railway signals are described as fully as seems advisable, since they are in a transitory state of rapid progress. Electro-gas and three-position signals, representing the highest development of the art in America, have been treated not only from an electrical standpoint, but also from a structural point of view.

This book is intended for the signal and railway engineer, the electrician, and the layman; and it is modestly hoped that it will appeal to all in any way concerned with signaling.

The old argument of normal danger *vs.* normal clear is not taken up; nevertheless, data on both these systems of indication is given throughout the book, the reader being left to his own conclusions as to their relative merits.

The writer wishes to acknowledge several courtesies received from the signal companies whose products have of necessity been described, and also to Messrs. H. S. Balliet, J. C. Jones, B. H. Mann, M. E. Smith, W. W. Slater, and A. J. Wilson.

Criticisms are respectfully invited.

R. S.

WILKESBARRE, PA.

CONTENTS.

AUTOMATIC BLOCK SIGNALS.

CHAPTER I.

PRELIMINARY CONSIDERATIONS.

A block is a length of railroad track of defined limits, the use of which by trains is under the control of one or more block signals.

A **block signal** is a fixed arrangement controlling the use of a block.

An **automatic block signal** is one automatically operated by electrical or other energy, this agency being controlled by the passage of trains along the track, or by conditions which interfere with such movement.

A **block system** is a series of consecutive blocks controlled by block signals.

A **home signal** shows the condition of the block directly in front of a moving train; and a **distant signal** the condition of the second block in front, or the block in the rear of the home block.

An **advance signal** shows the condition of a block in conjunction with the home signal of that block. It is placed in advance of the home signal.

In Fig. 1 two signals, having home and distant semaphores, blades, or boards, are shown, with the track protected by each; train movement being in the direction of the arrows. The entire home block, consisting of two sections of the first signal, is represented; and one section of the home block of signal 2, which latter is also the first section of the distant block of signal 1.

A block is usually made about one mile long, although a large amount of traffic, the presence of an interlocking plant, numerous switches, or the necessity of slow-speed movements may