

Southern Pacific Company

(PACIFIC SYSTEM)

RULES AND REGULATIONS

OPERATING DEPARTMENT

Revised Edition June 15, 1903

No. 1120

THIS BOOK

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(PACIFIC SYSTEM)

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On *Langhles* Division
July 27th 1903

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SOUTHERN PACIFIC COMPANY

RULES AND REGULATIONS

DEPARTMENT OF EMPLOYEES

OPERATING DEPARTMENT

SOUTHERN PACIFIC COMPANY

(Pacific System)

RULES AND REGULATIONS

FOR THE

GOVERNMENT OF EMPLOYÉS

OF THE

OPERATING DEPARTMENT

REVISED EDITION

June 15, 1903

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SOUTHERN PACIFIC COMPANY

(Pacific System)

RULES AND REGULATIONS

FOR THE

GOVERNMENT OF EMPLOYÉES OF THE OPERATING DEPARTMENT

REVISED EDITION

To Take Effect June 15, 1903, at 12:01 A. M.

The rules herein set forth govern the railroads operated by the Southern Pacific Company (Pacific System), and shall take effect June 15, 1903, superseding all previous rules and instructions inconsistent therewith.

Special instructions may be issued by proper authority.

JAS. AGLER,
Manager Pacific System.

R. KOEHLER,
Manager Lines in Oregon.

APPROVED:

J. KRUTTSCHNITT.

General Manager.

GENERAL RULES.

A. Employes whose duties are prescribed by these rules must provide themselves with a copy.

B. Employes must be conversant with and obey the rules and special instructions. If in doubt as to their meaning they must apply to proper authority for an explanation.

C. Employes must pass the required examinations.

D. Persons employed in any service on trains are subject to the rules and special instructions.

E. Employes must render every assistance in their power in carrying out the rules and special instructions.

F. Any violation of the rules or special instructions must be reported.

G. The use of intoxicants by employes while on duty is prohibited. Their habitual use, or the frequenting of places where they are sold, is sufficient cause for dismissal.

H. The use of tobacco by employes when on duty in or about passenger stations, or on passenger cars, is prohibited.

J. Employes on duty must wear the prescribed badge and uniform and be neat in appearance.

K. Persons authorized to transact business at stations or on trains must be orderly and avoid annoyance to passengers.

L. In case of danger to the Company's property employes must unite to protect it.

GENERAL NOTICE.

To enter or remain in the service is an assurance of willingness to obey the rules.

Obedience to the rules is essential to the safety of passengers and employes, and to the protection of property.

The service demands the faithful, intelligent and courteous discharge of duty.

To obtain promotion capacity must be shown for greater responsibility.

Employes, in accepting employment, assume its risks.

DEFINITIONS.

TRAIN.—An engine, or more than one engine coupled, with or without cars, displaying **MARKERS**.

REGULAR TRAIN.—A train represented on the Time-table. It may consist of Sections.

SECTION.—One of two or more trains running on the same schedule displaying signals or for which signals are displayed.

EXTRA TRAIN.—A train not represented on the Time-table. It may be designated as—

Extra—For any extra train, except work extra;

Work Extra—For work train extra.

SUPERIOR TRAIN.—A train having precedence over other trains.

A train may be made superior to another train by **RIGHT**, **CLASS** or **DIRECTION**.

RIGHT is conferred by train order; **CLASS** and **DIRECTION** by Time-table.

RIGHT is superior to **CLASS** or **DIRECTION**. **DIRECTION** is superior as between trains of the same class.

TRAIN OF SUPERIOR RIGHT.—A train given precedence by train order.

TRAIN OF SUPERIOR CLASS.—A train given precedence by Time-table.

TRAIN OF SUPERIOR DIRECTION.—A train given precedence in the direction specified in the Time-table as between trains of the same class.

TIME-TABLE.—The authority for the movement of regular trains subject to the rules. It contains the classified schedules of trains with special instructions relating thereto.

SCHEDULE.—That part of a Time-table which prescribes the class, direction, number and movement of a regular train.

MAIN TRACK.—A principal track upon which trains are operated by Time-table, train orders or by block signals.

SINGLE TRACK.—A main track upon which trains are operated in both directions.

DOUBLE TRACK.—Two main tracks, upon one of which the current of traffic is in a specified direction, and upon the other in the opposite direction.

CURRENT OF TRAFFIC.—The direction in which trains will move on a main track, under the Rules.

STATION.—A place designated on the Time-table by name, at which a train may stop for traffic; or to enter or leave the main track; or from which fixed signals are operated.

SIDING.—A track auxiliary to the main track for meeting or passing trains, limited to the distance between two adjoining telegraph stations.

FIXED SIGNAL.—A signal of fixed location indicating a condition affecting the movement of a train.

YARD.—A system of tracks within defined limits provided for the making up of trains, storing of cars and other purposes, over which movements not authorized by Time-table, or by train order, may be made, subject to prescribed signals and regulations.

YARD ENGINE.—An engine assigned to yard service and working within yard limits.

PILOT.—A person assigned to a train when the engine-man or conductor, or both, are not fully acquainted with the physical characteristics, or running rules of the road, or portion of the road, over which the train is to be moved.

NOTE TO DEFINITION OF FIXED SIGNAL.—The definition of a "Fixed Signal" covers such signals as slow boards, stop boards, yard limits, switch, train order, block, interlocking, semaphore, disc, ball or other means for indicating stop, caution or proceed.

TRAIN RULES.

STANDARD TIME.

1. Standard Time obtained from Lick Observatory will be telegraphed to all points from designated offices at noon, daily.

2. Watches that have been examined and certified to by a designated inspector must be used by conductors and enginemen. The certificate in prescribed form must be renewed and filed with the Superintendent every 90 days.

Form of Certificate.

CERTIFICATE OF WATCH INSPECTOR.

This is to certify that on.....190....
the watch of
employed as.....
on the..... Division,
was examined by me. It is correct and reliable, and
in my judgment will, with proper care, run within a
variation of thirty seconds per week.

Name of Maker.....
Brand.....
Number of Movement.....
Open or Hunting Case.....
Metal of Case.....
Stem or Key Winding.....
Signed,
.....

Inspector.

Address

3. Watches of conductors and enginemen must be compared, before starting on each trip, with a clock designated as a Standard Clock. The time when watches are compared must be registered on a prescribed form.

NOTE.—Conductors and enginemen whose duties prevent them from having access to a standard clock must compare daily with, and regulate their watches by those of conductors and enginemen who have standard time and have registered as above provided.

TIME TABLES.

4. Each Time-table, from the moment it takes effect, supersedes the preceding Time-table. A train of the preceding Time-table shall retain its train orders and take the schedule of the train of the same number on the new Time-table.

A train of the new Time-table which has not the same number on the preceding Time-table shall not run on any division until it is due to start from its initial station on that division, after the Time-table takes effect.

5. Not more than two times are given for a train at any station; where one is given, it is, unless otherwise indicated, the leaving time; where two they are the arriving and the leaving time.

Unless otherwise indicated, the time applies to the switch where an inferior train enters the siding; where there is no siding it applies to the place from which fixed signals are operated; where there is neither siding nor fixed signal, it applies to the place where traffic is received or discharged.

Schedule meeting or passing points are indicated by figures in full-faced type.

Both the arriving and leaving time of a train are in full-faced type when both are meeting or passing times, or when one or more trains are to meet or pass it between those times.

When a train takes a siding, extending between two adjoining telegraph stations, to be passed by one or more trains, the time at each end of the siding will be shown in full-faced type.

Where there are one or more trains to meet or pass a train between two times, or more than one train to meet a train at any station, attention is called to it by a heavy dash beneath the figures.

6. The following signs when placed before the figures of the schedule indicate:

Time-table defined.

Time-table figures.

Signs and characters.

"s"—Regular stop:

"f"—Flag stop to receive or discharge passengers or freight:

"m"—Stop for meals:

"l"—Leave:

"a"—Arrive.

SIGNAL RULES.

7. Employes whose duties may require them to give signals, must provide themselves with the proper appliances, keep them in good order and ready for immediate use.

8. Flags of the prescribed color must be used by day, and lamps of the prescribed color by night.

9. Night signals are to be displayed from sunset to sunrise. When weather or other conditions obscure day signals, night signals must be used in addition.

Visible Signals.

10. COLOR SIGNALS.

COLOR.	INDICATION.
(a) Red.	Stop.
(b) Green.	Proceed, and for other uses prescribed by the rules.
(c) Yellow.	Proceed with caution, and for other uses prescribed by the rules.
(d) Green and white	Flag stop. See Rule 28.
(e) Blue.	See Rule 26.

11. A fusee on or near the track burning red must not be passed until burned out. When burning green it is a caution signal.

12. HAND, FLAG AND LAMP SIGNALS.

MANNER OF USING.	INDICATION.
(a) Swung across the track.	} Stop.
(b) Raised and lowered vertically.	
(c) Swung vertically in a circle across the track, when the train is standing.	} Back.
(d) Swung vertically in a circle at arm's length across the track, when the train is running.	
(e) Swung horizontally in a circle, when the train is standing.	} Apply air brakes.
(f) Held at arm's length above the head, when train is standing.	
	} Release air brakes.

13. Any object waved violently by any one on or near the track is a signal to stop.

Audible Signals.

14. ENGINE STEAM WHISTLE SIGNALS.

NOTE.—The signals prescribed are illustrated by "o" for short sounds; "—" for longer sounds. The sound of the whistle should be distinct, with intensity and duration proportionate to the distance signal is to be conveyed.

SOUND.	INDICATION.
(a) o	Stop. Apply brakes. Release brakes.
(b) —	
(c) — o o o	Flagman, go back and protect rear of train.
(d) — — — — —	Flagman, return from west.
(e) — — — — —	Flagman, return from east.
(f) — — — — —	When running, train parted; to be repeated until answered by the signal prescribed by Rule 12 (d). Answer to 12 (d).
(g) o o	Answer to any signal not otherwise provided for.
(h) o o o	When train is standing, back. Answer to 12 (c) and 16 (c).
(j) o o o o	Call for signals.
(k) — o o	To call the attention of trains of the same or inferior class to signals displayed for a following section.
(l) — — — o o	Approaching public crossings at grade.
(m) — — — — —	Approaching stations, junctions and railroad crossings at grade.

A succession of short sounds of the whistle is an alarm for persons or cattle on the track, and calls the attention of trainmen to danger ahead.

15. The explosion of one torpedo is a signal to stop; the explosion of two not more than 200 feet apart is a signal to reduce speed, and look out for a stop signal.

Torpedoes

16. AIR-WHISTLE OR BELL-CORD SIGNALS.

SOUND.	INDICATION.
(a) Two.	When train is standing, start.
(b) Two.	When train is running, stop at once.
(c) Three.	When train is standing, back the train.
(d) Three.	When train is running, stop at next station.
(e) Four.	When train is standing, apply or release air brakes.
(f) Four.	When train is running, reduce speed.
(g) Five.	When train is standing, call in flagman.
(h) Five.	When train is running, increase speed.

NOTE.—When a passenger train approaches a station at which it is to stop for an opposing train, the conductor must give one short blast of the air-whistle immediately after passing the station whistling-post, which the engine-man must acknowledge by two short blasts of the steam-whistle.

TRAIN SIGNALS.

17. The head-light will be displayed to the front of every train by night, but must be concealed when a train turns out to meet another and has stopped clear of main track, or is standing to meet trains at the end of double track or at junctions.

Head lights.

NOTE.—In case there is more than one train to take the siding, the engine-man of the first train must not cover his head-light until all trains are on the siding and the switches set for the main track.

When an engine heads in on cars on a siding to clear the main track for an opposing train, thereby obscuring the head-light, or if buildings or other obstructions intervene, a flagman must be sent ahead to stop the opposing train until the main track is clear.

18. Yard engines will display the head-light to the front and rear by night. When not provided with a head-light at the rear, two white lights must be displayed. Yard engines will not display markers.

Markers.

19. The following signals will be displayed, one on each side of the rear of every train, as markers, to indicate the rear of the train: By day, a green flag. By night, a green light to the front and side and a red light to the rear, except when the train turns out to be passed by another and is clear of main track, when a green light must be displayed to the front, side and to rear.

Green signals.

20. All sections of a train, except the last, will display two green flags and, in addition, two green lights by night, in the places provided for that purpose on the front of the engine.

White signals.

21. Extra trains will display two white flags and, in addition, two white lights by night, in the places provided for that purpose on the front of the engine.

22. When two or more engines are coupled to a train, the leading engine only shall display the signals as prescribed by Rules 20 and 21.

23. One flag or light displayed where in Rules 19, 20 and 21 two are prescribed will indicate the same as two; but the proper display of all train signals is required.

24. When cars are pushed by an engine (except when shifting or making up trains in yards) a white light must be displayed on the front of the leading car by night.

communicating signal.

25. Each car on a passenger train must be connected with the engine by a communicating signal appliance.

26. A blue flag by day and a blue light by night, displayed at one or both ends of an engine, car or train, indicates that workmen are under or about it. When thus protected it must not be coupled to or moved. Workmen will display the blue signals and the same workmen are alone authorized to remove them. Other cars must not be placed on the same track so as to intercept the view of the blue signals, without first notifying the workmen. Blue signal.

Use of Signals.

27. A signal imperfectly displayed, or the absence of a signal at a place where a signal is usually shown, must be regarded as a stop signal, and the fact reported to the Superintendent.

28. The combined green and white signal is to be used to stop a train only at the flag stations indicated on the schedule of that train. When it is necessary to stop a train at a point that is not a flag station for that train, a red signal must be used. Signal at flag stations.

29. When a signal (except a fixed signal) is given to stop a train, it must be acknowledged as prescribed by Rule 14 (g). Answering signals.

30. The engine-bell must be rung when an engine is about to move. Bell.

31. The engine-bell must be rung on approaching every public road crossing at grade, and until it is passed; and the whistle must be sounded at all whistling-posts.

32. The unnecessary use of either the whistle or the bell is prohibited. They will be used only as prescribed by rule or law, or to prevent accident.

33. Watchmen stationed at public road and street crossings must use red signals only when necessary to stop trains. Watchmen's signal.

CLASSIFICATION OF TRAINS.

81. Trains of the first class are superior to those of the second; trains of the second class are superior to those of the third; and so on. Extra trains are inferior to regular trains.

All trains in the direction specified in the Timetable are superior to trains of the same class in the opposite direction.

NOTE.—All trains running from San Francisco will be called "east-bound," and will be designated by even numbers.

All trains running towards San Francisco will be called "west-bound," and will be designated by odd numbers.

82. Regular trains twelve hours behind their schedule time lose both right and class, and can thereafter proceed only by train order.

MOVEMENT OF TRAINS.

83. A train must not leave its initial station on any division, or a junction, or pass from double to single track, until it has been ascertained whether all trains due which are superior, or of the same class, have arrived or left.

84. A train leaving its initial station on each division, or leaving a junction, when a train of the same class in the same direction is overdue, will proceed on its schedule, and the overdue train will run as prescribed by Rule 91.

85. A train must not start until the proper signal is given.

86. An inferior train must keep out of the way of a superior train.

87. A train failing to clear the main track by the time required by rule, must be protected as prescribed by Rule 99.

88. At meeting points between trains of the same class the inferior train must clear the main track before the leaving time of the superior train, and must pull into siding when practicable. If necessary to back in, the train must first be protected, as prescribed by Rule 99, unless otherwise provided.

Clearance and taking siding.

89. At meeting points between trains of different classes the inferior train must take the siding and clear the superior train at least five minutes, and must pull into the siding when practicable. If necessary to back in, the train must first be protected, as prescribed by Rule 99, unless otherwise provided.

An inferior train must keep at least five minutes off the time of a superior train in the same direction.

90. Trains must stop at schedule meeting or passing stations if the train to be met or passed is of the same class, unless the switches are right and the track clear. Trains should stop clear of the switch used by the train to be met or passed in going on the siding.

Meeting and passing.

When the expected train of the same class is not found at the schedule meeting or passing station, the superior train must approach all sidings prepared to stop, until the expected train is met or passed.

91. Unless some form of block signals is used, trains in the same direction must keep at least five minutes apart, except in closing up at stations.

Spacing trains.

92. A train must not arrive at a station in advance of its schedule arriving time.

Arriving and leaving.

A train must not leave a station in advance of its schedule leaving time.

93. A regular train which is delayed, and falls back on the time of another train of the same class, will proceed on its own schedule.

Delayed train.

Designation of trains.

12-hour rule.

Right of track.

Passing disabled train.

94. A train which overtakes a superior train or a train of the same class, so disabled that it can not proceed will pass it, if practicable, and if necessary will assume the schedule and take the train orders of the disabled train, proceed to the next open telegraph office, and there report to the Superintendent. The disabled train will assume the schedule and take the train orders of the last train with which it has exchanged, and will, when able, proceed to and report from the next open telegraph office.

Displaying signals.

95. A train must not display signals for a following section, nor an extra train be run, without orders from the Superintendent.

96. When signals displayed for a section are taken down at any point before that section arrives, the conductor will, if there be no other provision, arrange with the operator, or if there be no operator, with the switchtender, or in the absence of both, with a flagman left there for the purpose, to notify all opposing trains of the same or inferior class leaving such point that the section for which the signals were displayed has not arrived.

Work trains.

97. Work extras will be assigned working limits.

Stops at crossings and draw-bridges.

98. Trains must approach the end of double track, junctions, railroad crossings at grade, and draw-bridges, prepared to stop, unless the switches and signals are right and the track is clear. Where required by law, trains must stop.

Protecting by flags and torpedoes.

99. When a train stops or is delayed under circumstances in which it may be overtaken by another train, the flagman must go back immediately with stop signals a sufficient distance to insure full protection. When recalled he may return to his train, first placing two torpedoes on the rail when the conditions require it.

The front of the train must be protected in the same way when necessary, by the fireman.

100. When the flagman goes back to protect the rear of his train, the head brakeman or porter must, in the case of passenger trains, and the next brakeman in the case of other trains, take his place on the train.

101. If a train should part while in motion, trainmen must, if possible, prevent damage to the detached portions. The signals prescribed by Rules 12 (d) and 14 (f) must be given, and the front portion of the train kept in motion until the detached portion is stopped.

The front portion will then go back, to recover the detached portion, running with caution and following a flagman. The detached portion must not be moved or passed until the front portion comes back.

102. When cars are pushed by an engine (except when shifting and making up trains in yards), a flagman must take a conspicuous position on the front of the leading car and signal the engineman in case of need.

103. Messages or orders respecting the movement of trains or the condition of track or bridges must be in writing.

104. Switches must be left in proper position after having been used. Conductors are responsible for the position of the switches used by them and their trainmen, except where switch-tenders are stationed.

A switch must not be left open for a following train unless in charge of a trainman of such train.

105. Both conductors and enginemen are responsible for the safety of their trains and, under conditions not provided for by the rules must take every precaution for their protection.

106. In all cases of doubt or uncertainty the safe course must be taken and no risks run.

Train parting.

Flagging when pushing train.

Orders in writing.

Position of switches.

Safety of train—responsibility.

RULES FOR MOVEMENT BY TRAIN ORDERS.

Special orders.

201. For movements not provided for by Timetable, train orders will be issued by authority and over the signature of the Superintendent. They must contain neither information nor instructions not essential to such movements.

They must be brief and clear; in the prescribed forms when applicable; and without erasure, alteration or interlineation.

Orders in duplicate.

202. Each train order must be given in the same words to all persons or trains addressed.

Numbers.

203. Train orders will be numbered consecutively each day, beginning with No. 1 at midnight.

Address of orders.

204. Train orders must be addressed to those who are to execute them, naming the place at which each is to receive his copy. Those for a train must be addressed to the conductor and engineman, and also to anyone who acts as its pilot. A copy for each person addressed must be supplied by the operator.

Dispatcher's record.

205. Each train order must be written in full in a book provided for the purpose at the office of the Superintendent; and with it recorded the names of those who have signed for the order; the time and the signals which show when and from what offices the order was repeated and the responses transmitted; and the train dispatcher's initials. These records must be made at once, and never from memory or memoranda.

Designation of trains in orders.

206. Regular trains will be designated in train orders by their numbers, as "No. 10," or "2d No. 10" adding engine numbers if desired; extra trains by engine numbers, as "Extra 798," with the direction when necessary, as "East" or "West." Other numbers and time will be stated in figures only.

207. To transmit a train order, the signal "31" or the signal "19" must be given to each office addressed, the number of copies being stated, if more or less than three—thus, "31 copy 5," or "19 copy 2."

Signals "31" and "19."

208. A train order to be sent to two or more offices must be transmitted simultaneously to as many of them as practicable. The several addresses must be in the order of superiority of trains, each office taking its proper address. When not sent simultaneously to all, the order must be sent first to the superior train.

Simultaneous transmission.

209. Operators receiving train orders must write them in manifold during transmission and if they can not at one writing make the requisite number of copies, must trace others from one of the copies first made.

Manifold copies.

210. When a "31" train order has been transmitted, operators must (unless otherwise directed) repeat it at once from the manifold copy in the succession in which the several offices have been addressed, and then write the time of repetition on the order. Each operator receiving the order should observe whether the others repeat correctly.

Repeating

Those to whom the order is addressed, except enginemen, must then sign it, and the operator will send their signatures preceded by the number of the order to the Superintendent. The response "complete," and the time, with the initials of the Superintendent, will then be given by the train dispatcher. Each operator receiving this response will then write on each copy the word "complete," the time, and his last name in full, and then deliver a copy to each person addressed except enginemen; the copy for each engineman must be delivered to him personally by the conductor.

Reading orders aloud.

NOTE.—As an additional precaution, the conductor must in all cases read the order to at least one of his brakemen, and the engineman must read his copy to the fireman.

211. When a "19" train order has been transmitted, operators must (unless otherwise directed) repeat it at once from the manifold copy, in the succession in which the several offices have been addressed. Each operator receiving the order should observe whether the others repeat correctly. When the order has been repeated correctly by an operator, the response "complete," and the time, with the initials of the superintendent will be given by the train dispatcher. The operator receiving this response will then write on each copy the word "complete," the time, and his last name in full, and personally deliver a copy to each person addressed without taking his signature.

212. A train order may, when so directed by the train dispatcher, be acknowledged without repeating, by the operator responding:

"X: (Number of Train Order.) to (Train Number.),"

with the operator's initials and office signal. The operator must then write on the order his initials and the time.

213. "Complete" must not be given to a train order for delivery to an inferior train until the order has been repeated or the "X" response sent by the operator who receives the order for the superior train.

214. When a train order has been repeated or "X" response sent, and before "complete" has been given, the order must be treated as a holding order for the train addressed, but must not be otherwise acted on until "complete" has been given.

If the line fails before an office has repeated an order or has sent the "X" response, the order at that office is of no effect and must be there treated as if it had not been sent.

215. The operator who receives and delivers a train order must preserve the lowest copy.

216. For train orders delivered by the train dispatcher the requirements as to the record and delivery are the same as at other offices.

Such orders shall be first written in manifold so as to leave an impression in the record book from which transmission shall be made.

217. A train order to be delivered to a train at a point not a telegraph station, or at one at which the telegraph office is closed, must be addressed to

"C. and E. — (at —), care of —," and forwarded and delivered by the conductor or other person in whose care it is addressed. When form 31 is used "complete" will be given upon the signature of the person by whom the order is to be delivered, who must be supplied with copies for the conductor and engineman addressed, and a copy upon which he shall take the conductor's signature. This copy he must deliver to the first operator accessible, who must preserve it, and at once transmit the signature of the conductor to the train dispatcher.

Orders so delivered must be acted on as if "complete" had been given in the usual way.

For orders which are sent in the manner herein provided, to a train the superiority of which is thereby restricted, "complete" must not be given to an inferior train until the signature of the conductor of the superior train has been sent to the Superintendent.

218. When a train is named in a train order, all its sections are included unless particular sections are specified, and each section included must have copies addressed and delivered to it.

219. Unless otherwise directed, an operator must not repeat or give the "X" response to a train order for a train the engine of which has passed his train order signal, until he has ascertained that the conductor and engineman have been notified that he has orders for them.

Orders at Supt's. office.

Orders at non-telegraph stations.

Orders for each section.

Notice to Condr. and Engineman.

"X" response.

"Complete" to superior train first.

Treated as holding order.

Line failure

Operator's copy.

Orders in effect until fulfilled, etc.

220. Train orders once in effect continue so until fulfilled, superseded or annulled. Any part of an order specifying a particular movement may be either superseded or annulled.

Orders held by or issued for a regular train become void when such train loses both right and class as prescribed by Rules 4 and 82, or is annulled.

Fixed signals.

221. A fixed signal must be used at each train-order office, which shall indicate "stop" when there is an operator on duty, except when changed to "proceed" to allow a train to pass after getting train orders, or for which there are no orders. A train must not pass the signal while "stop" is indicated. The signal must be returned to "stop" as soon as a train has passed. It must be fastened at "proceed" only when no operator is on duty.

Operators must have the proper appliances for hand signaling ready for immediate use if the fixed signal should fail to work properly. If a signal is not displayed at a night office, trains which have not been notified must stop and ascertain the cause, and report the facts to the Superintendent from the next open telegraph office.

Where the semaphore is used, the 'arm indicates "stop" when horizontal, and "proceed" when in an inclined position.

NOTE.—Should this rule at any time operate to hold a train for which there are no orders, it will be the duty of the Operator to give such train a clearance card, on receipt of which it may proceed.

Reporting trains.

222. Operators will promptly record and report to the Superintendent the time of departure of all trains and the direction of extra trains. They will record the time of arrival of trains and report it when so directed.

223. The following signs and abbreviations may be used:

Initials for signature of the Superintendent. Such office and other signals as are arranged by the Superintendent.

C & E—for Conductor and Engineman.

X—Train will be held until order is made "complete."

Com—for Complete.

O S—Train Report.

No—for Number.

Eng—for Engine.

Sec—for Section.

Psgr—for Passenger.

Frt—for Freight.

Mins—for Minutes.

Jct—for Junction.

Dispr—for Train Dispatcher.

Opr—for Operator.

31 or 19—To clear the line for Train Orders, and for operators to ask for Train Orders.

• The usual abbreviations for the names of the months and stations.

FORMS OF TRAIN ORDERS.

Form A. Fixing Meeting Points for Opposing Trains.

- (1.) — will meet — at —.
 (2.) — will meet — at — — at — (and so on).

EXAMPLES.

(1.) *No. 1 will meet No. 2 at Bombay.*

No. 3 will meet 2d No. 4 at Siam.

No. 5 will meet Extra 95 at Hong Kong.

Extra 652 North will meet Extra 231 South at Yokohama.

(2.) *No. 1 will meet No. 2 at Bombay, 2d No. 4 at Siam and Extra 95 at Hong Kong.*

Trains receiving these orders will run with respect to each other to the designated points and there meet in the manner provided by the Rules.

Form B. Directing a Train to Pass or Run Ahead of Another Train.

- (1.) — will pass — at —.
 (2.) — will pass — when overtaken.
 (3.) — will run ahead of — — to —.
 (4.) — will pass — at — and run ahead of — — to —.

EXAMPLES.

(1.) *No. 1 will pass No. 3 at Khartoum.*

(2.) *No. 6 will pass No. 4 when overtaken.*

(3.) *Extra 594 will run ahead of No. 6 Bengal to Madras.*

(4.) *No. 1 will pass No. 3 at Khartoum and run ahead of No. 7 Madras to Bengal.*

When under (1) a train is to pass another both trains will run according to Rule to the designated point and there arrange for the rear train to pass promptly.

Under (2), both trains will run according to Rule until the second named train is overtaken and then arrange for the rear train to pass promptly.

Under (3), the second named train must not exceed the speed of the first named train between the points designated.

Form C. Giving a Train the Right Over an Opposing Train.

— has right over — — to —.

EXAMPLES.

(1.) *No. 1 has right over No. 2 Mecca to Mirbat.*

(2.) *Extra 37 has right over No. 3 Natal to Ratlam.*

This order gives the train first named the right over the other train between the points named.

If the trains meet at either of the designated points, the first named train must take the siding, unless the order otherwise prescribes.

Under (1), if the second named train reaches the point last named before the other arrives it may proceed, keeping clear of the opposing train as many minutes as such train was before required to clear it under the Rules.

If the second named train, before meeting, reaches a point within or beyond the limits named in the order, the conductor must stop the other train where it is met and inform it of his arrival.

Under (2), the regular train must not go beyond the point last named until the extra train has arrived.

When the extra train has reached the point last named the order is fulfilled.

The following modification of this form of order will be applicable for giving a work extra the right over all trains in case of emergency.

(3.) *Work extra* — has right over all trains between — and — from — m to — m.

EXAMPLE.

Work extra 275 has right over all trains between Stockholm and Edinburg from 7 p. m. to 12 midnight.

This gives the work extra the exclusive right between the points designated between the times named.

Form D. Giving Regular Trains the Right Over a Given Train.

Regular trains have right over — between — and —.

EXAMPLE.

Regular trains have right over No. 1 between Moscow and Berlin.

This order gives to regular trains receiving it the right over the train named in the order, and the latter must clear the schedule times of all regular trains, as if it were an extra.

Form E. Time Orders.

- (1.) — will run — late — to —.
 (2.) — will run — late — to — and — late — to — etc.
 (3.) — will wait at — until — for —.

EXAMPLES.

- (1.) *No. 1 will run 20 min. late Joppa to Mainz.*
 (2) *No. 1 will run 20 min. late Joppa to Mainz and 15 min. late Mainz to Muscat, etc.*
 (3.) *No. 1 will wait at Muscat until 10 a. m. for No. 2.*

(1) and (2) make the schedule time of the train named, between the stations mentioned, as much later as stated in the order, and any other train receiving the order is required to run with respect to this later time, as before required to run with respect to the regular schedule time. The time in the order should be such as can be easily added to the schedule time.

Under (3) the train first named must not pass the designated station before the time given, unless the other train has arrived. The train last named is required to run with respect to the time specified, as before required to run with respect to the regular schedule time of the train first named.

Form F. For Sections.

— will display signals — to — for —.

EXAMPLES.

- Eng. 20 will display signals and run as 1st. No. 1 London to Paris.*
No. 1 will display signals London to Dover for Eng. 85.
2d No. 1 will display signals London to Dover for Eng. 90.

This form may be modified as follows:

- Engs. 70 85 and 90 will run as 1st 2d and 3d No. 1.*
Engs. 70 85 and 90 will run as 1st 2d and 3d No. 1 London to Dover.

Under these examples the engine last named will not display signals.

For annulling a section.

Eng. 85 is annulled as 2d No. 1 from Chatham.

If there are other sections following add:

Following sections will change numbers accordingly.

The character of a train for which signals are displayed may be stated. Each section affected by the order must have copies, and must arrange signals accordingly.

Form G. Extra Trains.

(1.) Eng. — will run extra — to —.

(2.) Eng. — will run extra — to — and return to —.

EXAMPLES.

(1.) *Eng. 99 will run extra Berber to Gaza.*

(2.) *Eng. 99 will run extra Berber to Gaza and return to Cabul.*

A train receiving this order is not required to protect itself against opposing extra trains, unless directed by order to do so, but must keep clear of all regular trains, as required by Rule.

(3.) Eng. — will run extra leaving — on — as follows with right over all trains.

Leave —.

Leave —.

Arrive —.

EXAMPLE.

(3.) *Eng. 77 will run extra leaving Turin on Thursday, Feb. 17th, as follows with right over all trains.*

Leave Turin 11:30 p. m.

Leave Pekin 12:25 a. m.

Leave Canton 1:47 a. m.

Arrive Rome 2:22 a. m.

This order may be varied by specifying the kind of extra and the particular trains over which the extra shall or shall not have the right. Trains over which the extra is thus given the right must clear the time of the extra five minutes.

Form H. Work Extra.

(1.) Work extra — will work — until — between — and —.

EXAMPLES.

(1.) *Work extra 292 will work 7 a. m. until 6 p. m. between Berne and Turin.*

The working limits should be as short as practicable, to be changed as the progress of the work may require. The above may be combined, thus:

(a.) *Work extra 292 will run Berne to Turin and work 7 a. m. until 6 p. m. between Turin and Rome.*

When an order has been given to "work" between designated points, no other extra shall be authorized to run over that part of the track without provision for passing the work extra.

When it is anticipated that a work extra may be where it cannot be reached for orders, it may be directed to report for orders at a given time and place, or an order may be given that it shall clear the track for (or protect itself after a certain hour against) a designated extra by adding to (1) the following words:

(b.) *And will keep clear of (or protect against) extra 223 south between Antwerp and Brussels after 2:10 p. m.*

In this case, extra 223 must not pass the northernmost point before 2:10 P. M., at which time the work extra must be out of the way, or protected (as the order may require) between those points.

When the movement of an extra over the working limits cannot be anticipated by these or other orders to the work extra, an order must be given to such extra, to protect itself against the work extra, in the following form:

(c.) Extra 76 will protect against work extra 95 between Lyons and Paris.

This may be added to the order to run extra.

A work extra when met or overtaken by an extra must allow it to pass.

When it is desirable that a work extra shall at all times protect itself while on working limits, it may be done by adding to (1) the following words:

(d.) Protecting itself.

A train receiving this order must, whether standing or moving, protect itself within the working limits in both directions in the manner prescribed by Rule 99.

Whenever an extra is given orders to run over working limits it must at the same time be given a copy of the order sent to the work extra.

To enable a work extra to work upon the time of a regular train, the following form may be used:

(e.) Work extra 292 will protect against No. 55 between Berne and Turin.

A train receiving this order will work upon the time of the train mentioned in the order, and protect itself against it as prescribed by Rule 99.

The regular train receiving this order must run, expecting to find the work extra protecting itself within the limits named.

Form J. Holding Order.

Hold — at —.

EXAMPLES.

(1.) Hold No. 2 at Berlin.

(2.) Hold all eastbound trains at Berlin.

This order will be addressed to the operator and acknowledged in the usual manner. It must be respected by conductors and engineers of trains thereby directed to be held as if addressed to them.

When a train has been so held it must not proceed until the order to hold is annulled, or an order given to the operator in the form:

"— may go."

Form J will only be used when necessary to hold trains until orders can be given, or in case of emergency.

Form K. Annuling a Regular Train.

(1.) — of — is annulled — to —.

(2.) — due to leave — — is annulled — to —.

EXAMPLES.

(1.) No. 1 of Feb. 29th is annulled Alaska to Halifax.

(2.) No. 3 due to leave Naples Saturday, Feb. 29th is annulled Alaska to Halifax.

The train annulled loses both right and class between the stations named and must not be restored under its original number between those stations.

Form L. Annuling an Order.

"Order No. — is annulled."

If an order which is to be annulled has not been delivered to a train, the annulling order will

be addressed to the operator, who will destroy all copies of the order annulled but his own, and write on that:

Annulled by Order No. —.

EXAMPLE.

Order No. 10 is annulled.

An order which has been annulled must not be reissued under its original number.

In the address of an order annulling another order, the train first named must be that to which right was given by the order annulled, and when the order is not transmitted simultaneously to all concerned, it must be first sent to the point at which that train is to receive it and the required response made, before the order is sent for other trains.

Form M. Annulling Part of an Order.

That part of Order No. — reading — is annulled.

EXAMPLE.

That part of Order No. 10 reading No. 1 will meet No. 2 at Sparta is annulled.

In the address of an order annulling a part of an order, the train first named must be that to which right was given by the part annulled, and when the order is not transmitted simultaneously to all concerned, it must be first sent to the point at which that train is to receive it, and the required response made, before the order is sent for other trains.

Form P. Superseding an Order or a Part of an Order.

This order will be given by adding to prescribed forms, the words "instead of —."

- (1.) — will meet — at — instead of —.
- (2.) — has right over — — to — instead of —.
- (3.) — will display signals for — — to — instead of —.

EXAMPLES.

(1.) No. 1 will meet No. 2 at Hong Kong instead of Bombay.

(2.) No. 1 has right over No. 2 Mecca to Medina instead of Mirbat.

(3.) No. 1 will display signals for Eng. 85 Astrakhan to Teheran instead of Cabul.

An order which has been superseded must not be reissued under its original number.

Standard Train Order Blank for 19 Order.

FORM 19		FORM 19
(Name.)		COMPANY.
TRAIN ORDER No. 10		
March 27 1903		
To	At	
X (Initials)	Opr.;	1 45 A M
Conductor and Engineman must each have a copy of this order.		
Made complete time 2 16 P M. Black Opr.		

SPEED TABLE

Speed per Hour	Time of Performance.						Speed per Hour	Time of Performance.					
	¼ Mile		½ Mile		1 Mile			¼ Mile		½ Mile		1 Mile	
	M.	S.	M.	S.	M.	S.		M.	S.	M.	S.	M.	S.
1	15	0	30	0	60	0	31	0	29	0	58	1	56
2	7	30	15	0	30	0	32	0	28	0	56	1	52
3	4	0	10	0	20	0	33	0	27	0	54	1	49
4	3	45	7	30	15	0	34	0	26	0	53	1	45
5	3	0	6	0	12	0	35	0	25	0	51	1	42
6	2	30	5	0	10	0	36	0	25	0	50	1	40
7	2	8	4	17	8	34	37	0	24	0	48	1	37
8	1	52	3	45	7	30	38	0	23	0	47	1	34
9	1	40	3	20	6	40	39	0	23	0	46	1	32
10	1	30	3	0	6	0	40	0	22	0	45	1	30
11	1	21	2	43	5	27	41	0	21	0	43	1	27
12	1	15	2	30	5	0	42	0	21	0	42	1	25
13	1	9	2	18	4	37	43	0	20	0	41	1	23
14	1	4	2	8	4	17	44	0	20	0	40	1	21
15	1	0	2	0	4	0	45	0	20	0	40	1	20
16	0	56	1	52	3	45	46	0	19	0	39	1	18
17	0	52	1	46	3	31	47	0	19	0	38	1	16
18	0	50	1	40	3	20	48	0	18	0	37	1	15
19	0	47	1	34	3	9	49	0	18	0	36	1	13
20	0	45	1	30	3	0	50	0	18	0	36	1	12
21	0	42	1	25	2	51	51	0	17	0	35	1	10
22	0	40	1	21	2	43	52	0	17	0	34	1	9
23	0	39	1	18	2	36	53	0	17	0	34	1	7
24	0	37	1	15	2	30	54	0	16	0	33	1	6
25	0	36	1	12	2	24	55	0	16	0	32	1	5
26	0	34	1	9	2	18	56	0	16	0	32	1	4
27	0	33	1	6	2	13	57	0	15	0	31	1	3
28	0	32	1	4	2	8	58	0	15	0	31	1	2
29	0	31	1	2	2	4	59	0	15	0	30	1	1
30	0	30	1	0	2	0	60	0	15	0	30	1	0



DIAGRAMS

— OF —

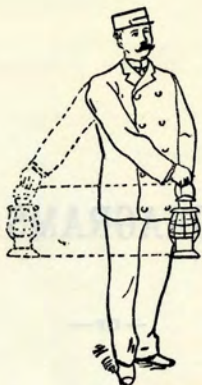
HAND, FLAG AND LAMP

SIGNALS.




NOTE.

The hand, or a flag, moved in the same manner as the lamp, as illustrated in the following diagrams, conveys the same meaning.



STOP—Swung across the track.

See Rule 12 (a).



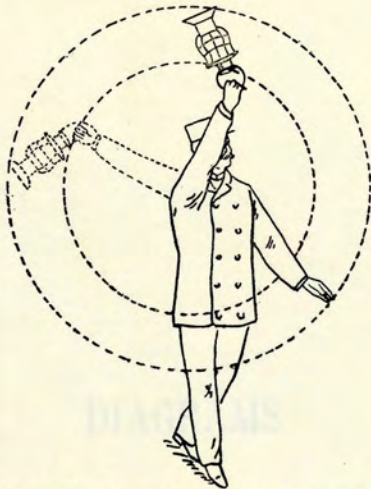
PROCEED—Raised and lowered vertically.

See Rule 12 (b).



BACK—Swung vertically in a circle across the track.

See Rules 12 (c) and 14 (h).



TRAIN HAS PARTED—Swung vertically in a circle at arm's length across the track.

See Rules 12 (d) and 14 (f).



APPLY AIR BRAKES—Swung horizontally in a circle.

See Rule 12 (e).

RELEASE AIR BRAKES—Held at arm's length above the head.

See Rule 12 (f).



Diagram illustrating the use of the signal board.



Diagram illustrating the use of the signal light.

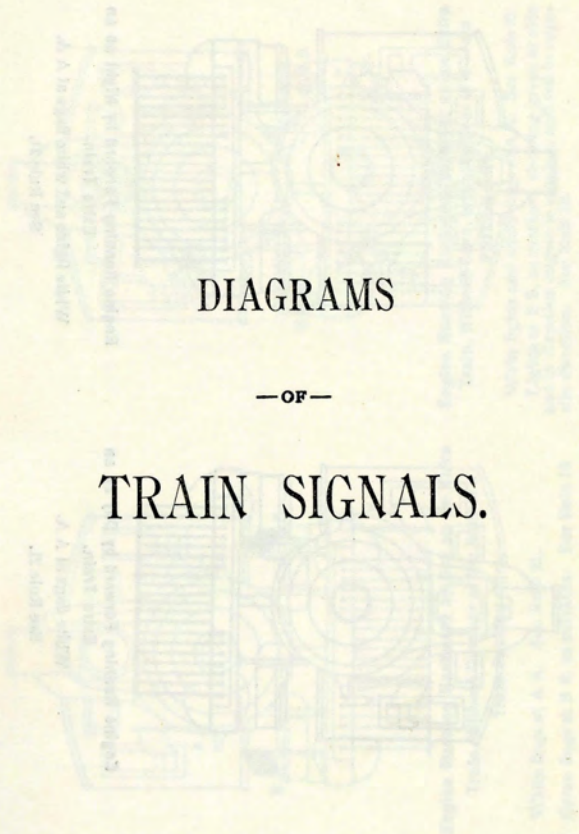


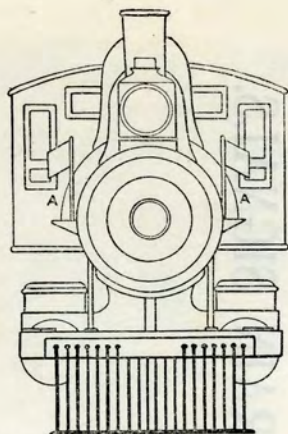
Diagram illustrating the use of the signal board.

DIAGRAMS

—OF—

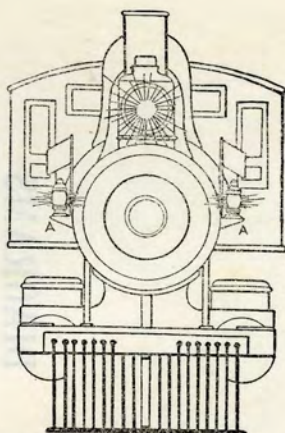
TRAIN SIGNALS.





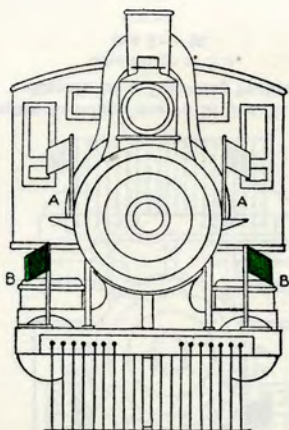
Engine Running Forward by Day as an Extra Train.

White flags at A A.
See Rule 21.



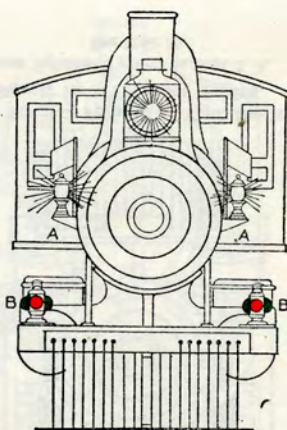
Engine Running Forward by Night as an Extra Train.

White lights and white flags at A A.
See Rule 21.



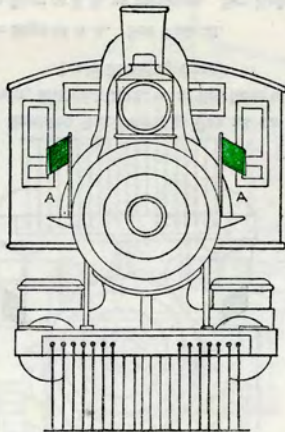
Engine Running Backward by Day as an Extra Train, Without Cars, or at the Rear of a Train Pushing Cars.

White flags at A A. See Rule 21.
Green flags at B B, as markers. See Rule 19.



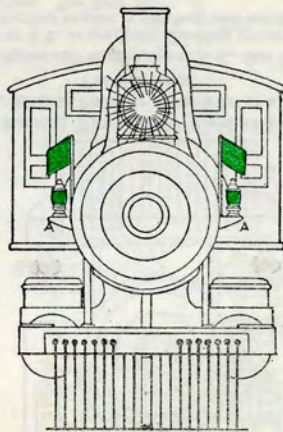
Engine Running Backward by Night as an Extra Train, Without Cars, or at the Rear of a Train Pushing Cars.

White lights and white flags at A A. See Rule 21.
Lights at B B, as markers, showing green at side and in direction engine is moving, and red in opposite direction. See Rule 19.



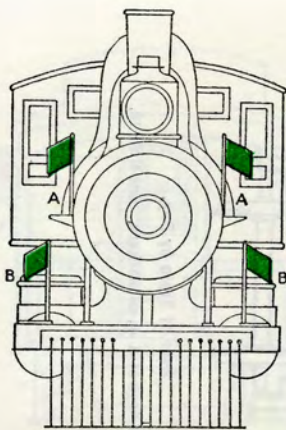
Engine Running Forward by Day Displaying Signals for a Following Section.

Green flags at A A.
See Rule 20.



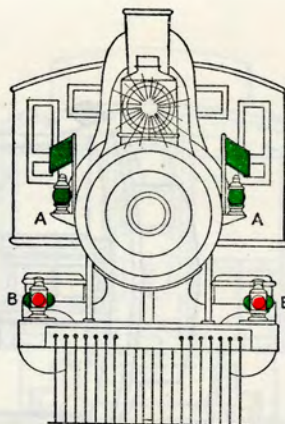
Engine Running Forward at Night Displaying Signals for a Following Section.

Green lights and green flags at A A.
See Rule 20.



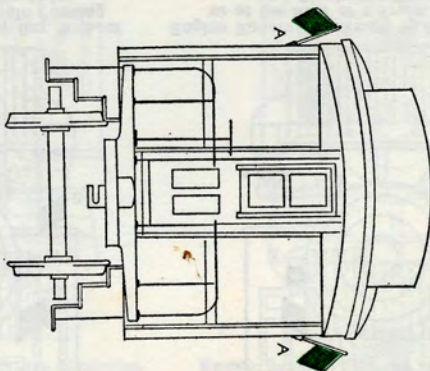
Engine Running Backward by Day, Without Cars, or at the Rear of a Train Pushing Cars, and Displaying Signals for a Following Section.

Green flags at A A. See Rule 20.
Green flags at B B, as markers. See Rule 19.

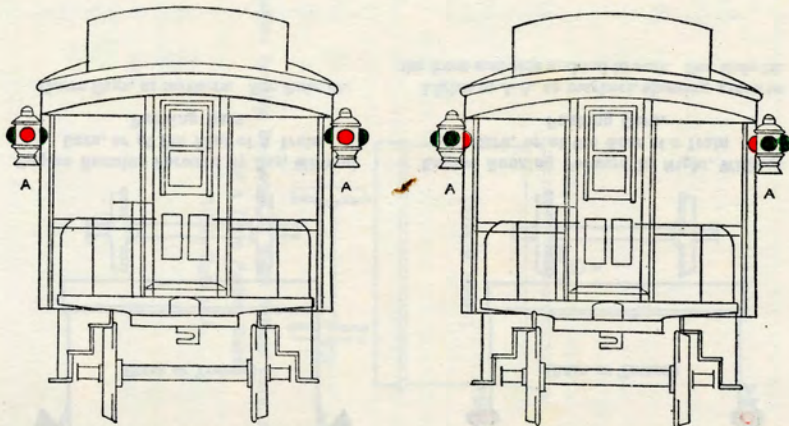


Engine Running Backward by Night, Without Cars, or at the Rear of a Train Pushing Cars, and Displaying Signals for a Following Section.

Green lights and green flags at A A. See Rule 20.
Lights at B B, as markers, showing green at side and in direction engine is moving and red in opposite direction. See Rule 19.

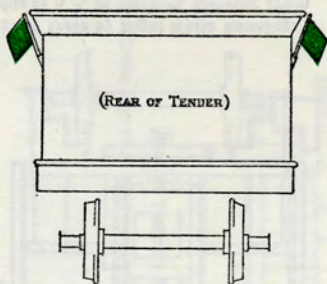


Rear of Train by Day.
Green flags at A, as markers. See Rule 19.



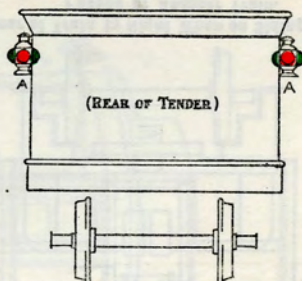
Rear of Train by Night While Running.
Lights at A, as markers, showing green toward engine and side and red to rear. See Rule 19.

Rear of Train by Night When on Siding to be Passed by Another Train.
Lights at A, as markers, showing green toward engine, side and to rear. See Rule 19.



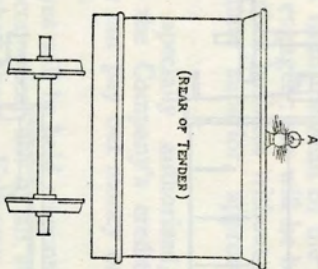
Engine Running Forward by Day, Without Cars, or at the Rear of a Train Pushing Cars.

Green flags, as markers. See Rule 19.

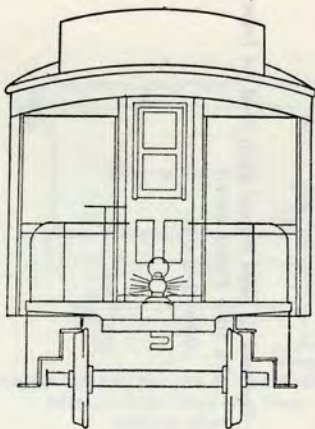


Engine Running Forward by Night, Without Cars, or at the Rear of a Train Pushing Cars.

Lights at A A, as markers, showing green to the front and side and red to rear. See Rule 19.



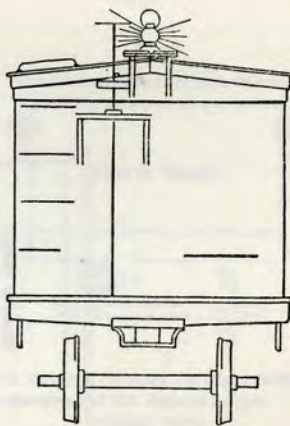
Engine Running Backward by Night Without Cars, or at the Front of a Train Pulling Cars.
White light at A.



Passenger Cars Being Pushed by an Engine
by Night.

White light on front of leading car.

See Rule 24.



Freight Cars Being Pushed by an Engine
by Night.

White light on front of leading car.

See Rule 24.

GENERAL REGULATIONS FOR EMPLOYEES.

300. All employees must devote themselves exclusively to the Company's service, attending to their duties during prescribed hours, residing wherever required, and obeying promptly instructions of executive and general officers, and those of heads of departments, in matters pertaining to their respective branches of the service.

Exclusive service required.

301. No employee, whatever may be his rank, will be allowed to absent himself from duty without permission from the head of the department in which he is engaged; nor will he be permitted to engage in other business without the consent of his immediate superior, approved by the Manager.

Absence.

302. Unless specially authorized, employees must not use the Company's credit and must neither receive nor pay out money on the Company's account.

Company's credit.

303. Employees will be held responsible for the prudent and economical use of all supplies and material furnished them. Economy, order and cleanliness are enjoined in the care and use of property, tools, material, etc.

Use of company's property.

304. Minors must not be employed in train or yard service and if employed in other service it must be with the written consent of parents or guardians.

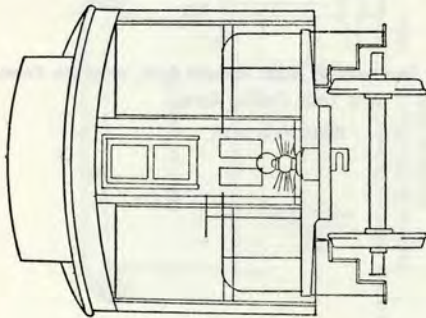
Minors.

305. No person whose sense of hearing, sight, or color perception is defective will be employed in any branch of the service where signals are used.

Sight and hearing.

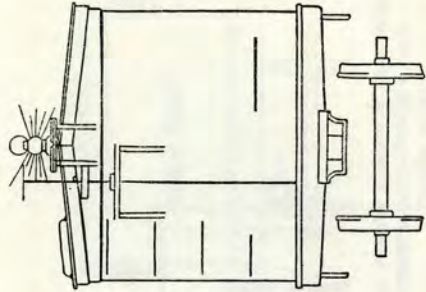
306. Every employe is required to exercise the utmost caution to avoid injury to himself or to others, especially in the switching or other movement of trains.

Warning.



Passenger Cars Being Pushed by an Engine
by Night.

White light on front of leading car.
See Rule 24.



Freight Cars Being Pushed by an Engine
by Night.

White light on front of leading car.
See Rule 24.

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Absence.

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Company's credit.

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Use of company's property.

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Minors.

305. No person whose sense of hearing, sight, or color perception is defective will be employed in any branch of the service where signals are used.

Sight and hearing.

306. Every employe is required to exercise the utmost caution to avoid injury to himself or to others, especially in the switching or other movement of trains.

Warning.

Employes are warned not to attempt to get on the front or rear of an engine, or on the end of a car as it approaches them, or to jump on or off trains or engines in rapid motion, or to go between cars in motion to uncouple them, to open, close or arrange knuckles of couplers; these and all similar imprudent acts are forbidden.

Care in coupling.

307. Enginemen must exercise great care in handling their engines while yardmen or others are making couplings, and must give close attention to signals. Trainmen and yardmen must report to the Superintendent any enginemen who disregard this order.

Avoid misunderstanding of signals.

308. It is dangerous to assume that signals given to the engineman or fireman have been seen, or, if seen, that they will be obeyed, when obedience to those signals on the part of the engineman or fireman is essential to the safety of an employe in the performance of his duty. He must know that the signal has been seen, understood and obeyed before placing himself in a dangerous position. Otherwise he assumes all risk of danger arising from any misunderstanding or disregard of signals.

Reporting defects.

309. Yardmen, trainmen and other employes are directed to report to the Superintendent any defects in the construction of the yard tracks whereby an accident might happen to men in the discharge of their duties.

Safety and comfort of passengers.

310. Conductors must give particular attention to the safety and comfort of their passengers, to the heating, lighting and ventilation of cars, and to the supply of water in the tanks.

Brakemen and train porters must assist ladies, children and infirm persons in getting on and off the cars; in their absence conductors will perform this duty.

311. On approaching a station at which the train stops, the conductor or brakeman must pass through each car, except the sleeping cars, stop twice, and announce each time distinctly, with closed doors, the name of the station. At junction stations the names of the principal stations where connecting trains stop must be announced. If any stop be made before the station announced is reached, notice must be given to passengers in each car. Train conductors will see that employes of sleeping or parlor cars advise their passengers when they are to leave the train.

Announcing stations.

At junctions, where trains leave in different directions, the conductor of each train must cause to be announced distinctly in each passenger car before starting, the direction in which the train is to go, and the principal stations on the route.

312. Conductors will prevent unnecessary noise about passenger trains, particularly at night, and must not allow employes to enter or pass through sleeping cars, except when necessary in the discharge of their duties. Care must be used in switching so as to disturb passengers as little as possible.

Preventing noise about passenger trains.

313. No gunpowder, dynamite, nitro-glycerine or similar explosive will be transported in any car attached to a passenger train.

Explosives.

314. News agents must wear the designated badge and present a neat personal appearance. Conductors will be held responsible for the proper conduct of news agents while on trains. If they find any objectionable matter offered, it will be their duty to suppress its sale.

News agents.

News agents will not be permitted on chartered trains.

315. Conductors must not allow beggars, gamblers or unauthorized peddlers to practice their

vocations on trains, or advertising matter to be disturbed.

Free travel.

316. No person will be allowed to ride free except as specially provided. Conductors must collect fare from all persons traveling without a ticket, being allowed no discretion.

Ejecting passengers.

317. Circumstances under which passengers may be ejected from trains are fully covered below :

The law provides that a railroad company may demand the fare of passengers, either at starting or at any subsequent time. A passenger who refuses to pay his fare, or to conform to any lawful regulation of the carrier, may be ejected from the vehicle by the carrier. But this must be done with as little violence as possible, and at a usual stopping place or near some dwelling-house. A passenger upon a railroad train who has not paid his fare before entering the train, if he has been afforded an opportunity to do so, must upon demand pay such train rate in addition to the regular ticket rate as may be provided by the rules of the Passenger Department. A railroad company has a lien upon the luggage of a passenger for the payment of such fare as it is entitled to from him.

In case a person is by reason of any infirmity unable to travel or find his way from the point where he is put off to a dwelling house or town, or if the weather be so inclement as to render it unsafe or inhuman to eject a person at a point other than a station, then such person should be ejected from the train at a station where suitable accommodations can be procured for his safety and comfort.

Drunken or disorderly persons, or others whose conduct and appearance is such as is calculated to operate as a serious annoyance to other passengers, or a passenger who is guilty of gross misconduct, either by insulting or assaulting other

passengers or train employes, who uses vile or profane language in the car, or who threatens to assault other passengers or train employes, may lawfully be expelled from the train at any usual stopping place, or near a dwelling-house or station, provided the place be not such as to cause want or injury; this may be done whether fare has been paid or not.

Should a passenger be found holding a ticket to a station at which train is not scheduled to stop, conductor must notify such passenger to get off short of destination and wait for proper train.

318. No person will be permitted to ride on an engine, or in baggage, mail or express cars (except employes in the discharge of their duties) without a written order from the Superintendent.

Riding on engine, etc.

319. Conductors and enginemen must consult bulletin boards daily, and always before leaving terminal stations.

Bulletin boards.

320. Conductors and trainmen are required to be with their trains at least thirty minutes before the time of departure. Passenger trainmen will remain by their trains at terminals to answer inquiries and assist passengers until the train is emptied.

Presence of crews.

321. Conductors of all trains, and enginemen of light engines, immediately before starting from initial stations and upon arrival at terminals, must go in person to the telegraph office to inquire if any special orders are awaiting them, and at junctions or terminal stations must enter in train register, and at non-register stations must telegraph to the Superintendent's office the time of their arrival or departure; and, if their train be an extra, the direction in which it is going, the signals carried, the number of the engine, and all other information called for by the register.

Inquiring for orders—registering.

Looking
out for sig-
nals.

322. Conductors and brakemen of all trains when meeting or passing, or when leaving or approaching a station, must be on the look out for signals, and be prepared to do anything required for safety or dispatch.

Station sig-
nals.

323. Enginemen on approaching stations must sound one long blast of the whistle—as per Rule 14 (*m*)—which must be answered by the operator, if the station be a telegraph station, by a change of his fixed signal from the horizontal to the inclined position by day, and from a red to a green light by night, if he has no orders for the train. Should the whistle not be answered in the proper manner by the operator the engineman must then sound four short blasts of the whistle as a call for signals. In either case the operator's signal must be acknowledged as per Rule 14 (*g*).

Junctions—
crossings—
draw-
bridges.

324. All trains must come to a full stop before crossing drawbridges, or the track of another railway at grade, and before entering upon the track of another railway, or division unless the drawbridges, crossings or junction switches are protected by interlocking signals and derailing switches. After sounding one long blast of the whistle they shall not proceed until the proper signal is set, as per rules governing each case. When the signal at any crossing or junction can not be seen, the engineman will send the fireman ahead, and shall not proceed until the way is known to be clear.

Preference
at cross-
ings.

325. When two trains of the same class approach a crossing at the same time, the one nearest the crossing shall be given the preference.. If of different class, the superior train shall be given the preference, but the crossing signal having been once set, shall not be changed until the train to which the signal is given has passed, or proper

signals have been sent out a sufficient distance to avoid accident.

326. Enginemen are required to control their trains with the air brakes approaching drawbridges, railroad crossings at grade, junction switches, meeting points or limits of established yards, and if unable to do so must signal the brakemen to apply the brakes. Brakemen are required to be at the brake-wheels on approaching such places, ready to apply the brakes by hand in case the air brakes fail.

Controlling
speed of
trains.

327. Extra trains must approach all stations, side tracks, water tanks and fuel stations with train under full control, expecting to find trains at such points. Speed must be reduced, so that under no circumstances shall it be possible for them to strike any train that may be within the station switches, or that may be taking fuel or water. In such cases the responsibility for accident rests upon the approaching train.

Care in ap-
proaching
stations and
water
tanks.

328. When freight trains are run in two or more sections the sections must be kept five minutes apart, except at meeting points, where the following section may close up, but always with great care and with train under perfect control. When fog, darkness, dangerous places or other circumstances render it necessary, the forward train, as an extra precaution, will send out a flagman, but it must be distinctly understood that this does not relieve the following train from responsibility in case of collision. By control is meant ability to stop within range of vision.

Freight
trains in
sections.

329. Station agents and operators must keep trains the proper time limit apart with their fixed signals. (See rule 91.)

Spacing
trains.

330. In case of accident, conductors of passenger trains may command the services of any train, engine or employe available.

331. In case of unusual storm or high water, trains must be brought to a stop and a man sent to examine bridges, trestles, culverts and other points liable to damage, before passing over.

Accidents.

332. All accidents must be reported by wire from the nearest telegraph station to the Superintendent, and a written report must be forwarded to him on the proper form as soon as possible. In making such reports the facts must be fully stated. Care must be taken to secure the names and addresses of all witnesses of any accident involving injury to persons or property; written statements being obtained whenever possible.

Notice to other trains.

333. If a conductor discovers any defect in track, bridges or culverts, which might cause an accident, he must not rely wholly upon the telegraph to notify other trains, but must leave a flagman.

Duty of all to report defects or obstructions.

334. It is the duty of every employe, regardless of department, to report defects in road or bridges, or obstructions of any kind, to the Superintendent, and, if possible, to the nearest section or bridge foreman. When necessary, flags and torpedoes must be left to notify approaching trains; and when there is any reason to believe that the safety of the track or of any structure is endangered by flood, fire or other causes, any employe, before attempting its use, must make a personal inspection, using all precautions in the interest of life and property.

Whistling.

335. Irregular trains and regular trains behind time, must sound the whistle repeatedly in obscure places to warn section and bridgemen. The same precaution must be used in fogs and snow storms.

336. At points where trains meet or pass, the employe attending the switch will, after locking it to the main track, take position on opposite side of track from the switch-stand, and remain there until the expected train has passed. Except to prevent accident, switches must never be turned when an engine or car is on slide rail.

Position of switches.

At stations where yardmasters are employed they will be held responsible for the proper position of switches. All main line switches in yards must invariably be set and locked for main track. Inside switches may be left as used.

At stations where yardmasters are not employed, agents will be held responsible for the proper security and position of switches, which must be set for the main track and locked; they must know personally, at least ten minutes before regular trains are due, and before leaving the station at night, that switches are secure.

337. Yard engines working within the limits of any established yard may use the main track day and night, keeping out of the way of all regular trains; but they must not occupy the main track on the time of a due or delayed train except under proper protection.

Yard engines.

338. In case an engine is run over any portion of the road unaccompanied by a conductor, the engineman must perform the duties and make the reports required of a conductor, in addition to his own.

Engineman as conductor.

339. Running or flying switches must not be made except where it would cause great delay to do the work in any other manner; and whenever they are made, the train must first be stopped and before the engine is again started the switch and also the brakes on the cars to be set out, must be tested, and great care used.

Flying switches.

Running or flying switches must not in any case be made at or over any public road or street crossing.

Work
trains.

340. Work extras must not use main track without special orders. They must be kept ten (10) minutes out of the way of *all scheduled trains*, but will have the right to work whenever freight trains are thirty (30) minutes late, by protecting themselves as provided in Rule 99. Conductors of work trains must notify the dispatcher's office the night previous of the limits within which they desire to work the following day. If it should become necessary to go outside of such limit, it must be done with flag to next telegraph office, where orders must be obtained.

Cutting off
engine
while run-
ning.

341. Cutting off the engine, with or without part of the cars in the train, before a train has stopped at a station, and allowing the remainder of train to follow is forbidden. Every train must be brought to a full stop before the engine is uncoupled.

Filling out
trains.

342. Conductors and enginemen are required to fill out their trains to the full capacity of their engines. Enginemen must not refuse to take the assigned number of cars in their trains, but must use their best efforts to haul them. Should enginemen think that the capacity of their engines is overestimated, their proper course is to report the matter to the Superintendent.

Use of
brakes.

343. When trains are equipped with air brakes, enginemen will be held responsible for the rate of speed; but when trains are not so equipped, or when the air brake fails to work, conductors must see that speed is controlled by brakemen using hand brakes. When hand brakes are used

they should not be applied so as to cause the wheels of cars to slide, nor kept on so long as to heat the wheels; to avoid this the applied brakes should be frequently changed from one car to another.

344. When starting from stations, brakemen must watch closely to see that brakes are fully released, and will immediately signal enginemen to stop if wheels are found sliding.

Flat wheels.

Each brakeman will be held responsible for any wheels slid flat under the part of the train in his charge.

Conductors in reporting flat wheels will give name of brakeman in charge.

345. On all grades, when stopping on the main line or on a siding, when cutting an engine off a train at stations to do work, or at any stops of unusual length, the air must be released and a sufficient number of hand brakes set to hold the train. Both conductors and enginemen will be held responsible for failure to comply with this rule.

Setting
hand
brakes.

346. In placing cars on sidings, care must be taken to leave the streets and highways, in daily use by the public, unobstructed their entire width. When trains obstruct road crossings they must be cut to open a passage or roadway, if there be any persons who desire to cross. Agents must see that this is done and report any failure to the Superintendent. In no case must a train be backed over a public crossing or highway, unless there is a man on rear car to see that the way is clear; nor must a car be cut loose and allowed to run over a public crossing or highway, unless there is a man on the car. At night the man referred to must display a light.

Crossings
must not be
obstructed.

347. Conductors and enginemen are forbidden

Going to
meals.

to go to meals, or delay their trains from any cause, without permission from the Superintendent. If permission be received, the conductor must report for orders when ready to go.

Freight trains carrying passengers.

348. Freight trains will not carry passengers, except as designated in the Time-tables. When a freight train is composed of two or more sections, the rear section must do the local work, and if designated to take passengers, is the only one on which they will be carried. Employes with passes, traveling on business of the Company, may, however, be carried on all freight trains between stations at which such trains stop. Persons accompanying livestock or other freight requiring a man in charge, may be carried on same train with it, when provided with proper transportation. Freight conductors will allow none but the freight crew to ride on freight cars, and when persons in charge of stock are attending to their duties, notice must be given in time to enable them to reach the caboose before the train starts.

Conductors responsible for brakemen.

349. Conductors will be held responsible for the faithful performance of duty by their brakemen. They must require the doors of all freight cars in their trains to be closed, whether cars be loaded or empty, and must in all cases, when ascending or descending grades, station themselves where they can see that brakemen are at their proper places on top of train.

Securing cars on sidings.

350. When leaving cars on side tracks, conductors must see that the hand brakes are set, and that cars are properly secured against running or being blown out on main track; also, that they are far enough from the main track to clear all passing trains. If a car without a brake be set out, conductor must block the wheels securely and notify the agent.

351. Conductors must enter the initials and numbers of all cars in their train book in the order in which they stand in the train. They will receive from the yardmaster or agent all way-bills, and must check them with the cars, to see that they have a way-bill for each car. No loaded car must be taken without a way-bill except by special order in each case. At the end of their run, or at stations where they leave cars or freight, they must give the way-bills to the yardmaster or agent.

Entering cars in train-book.

352. In making up trains, except when otherwise ordered by the Superintendent, cars for the same destination must be kept together, those for the most distant station in the rear of the train (except as per rules governing placing of live stock and inflammable freight), and so on, working ahead in station order, with the way cars ahead of all. Conductors picking up cars must place them with others for the same destination.

Making up trains.

353. Conductors, and enginemen acting as conductors, must report promptly by wire to the Superintendent all delays and irregularities of any kind, giving full particulars, including engine and car numbers and initials. Enginemen must make a similar written report of delays to Master Mechanic.

Reporting delays.

354. Freight conductors must fill out registering tickets in the prescribed form, leaving one at every telegraph station not provided with train register, stating whether carrying signals or not. Operators must report such tickets to the Superintendent promptly. Passenger conductors will fill out a registering ticket, giving the number and kinds of cars in their train before leaving terminals.

Registering and reporting trains.

355. Care must be taken to use cars judiciously,

Economy in
use of cars.

never forwarding one with less than 5000 pounds, and loading small lots on passing trains. Exceptions may be made in case of perishable freight, when passing trains have no room. At junction points, if cars contain less than 10,000 pounds, the freight should be consolidated with other lots, and forwarded without unreasonable delay. Conductors must not take cars containing less than 5000 pounds from way stations if room can be found for the freight in cars already in their train.

Loading
foreign
cars.

356. Foreign cars must not be loaded with local freight without permission from the Superintendent, except in routing the car homeward, and then only when it is impracticable to secure a through load to or beyond the terminal where the car was received from connecting line, without unreasonable delay.

Proper load-
ing of cars.

357. Agents must see that cars are properly loaded, and in case they find them overloaded, or improperly loaded, will at once notify the shipper and have the excess weight taken off or the load properly secured. In case of delay on the part of the shipper, the fact should be reported at once to the Superintendent.

In case of long material, requiring two cars, the brake-wheel and staff may be removed if necessary, but must be carefully secured to and forwarded with the car. Whenever it is possible to do so, flat cars to be loaded double must be switched so that the brake-wheels will be on the outer ends.

Oils, etc.

358. Kerosene, coal oil, naphtha, benzine or any other substance of an inflammable or explosive nature, must not be loaded or unloaded through freight houses, except in daytime. Lights must not, under any circumstances, be allowed near such packages, and consignees should be requested to remove such freight promptly.

359. Whenever Company material in carloads is received at any station, for which there is no disposition, agent will report to the Superintendent at once by wire, giving contents and any other information he may have, so that it may be arranged to have the cars unloaded promptly.

Company
freight.

360. Agents will give particular attention to the loading and unloading of livestock, render all necessary assistance, see that cars are in proper condition, and doors securely fastened before leaving the station. Such cars must be placed in the rear of trains.

361. The attention of agents and conductors is called to the law regulating transportation of live stock, which imposes a heavy penalty in case of confinement of stock on interstate trips for a longer period than twenty-eight consecutive hours without unloading for rest, water and feeding for a period of at least five consecutive hours; and on trips wholly within any state or territory for a period of not longer than thirty-six consecutive hours without being unloaded as above for a period of at least ten consecutive hours. Agents must see that way-bills for live stock show date and hour at which it was loaded.

Live stock
law.

362. In loading hay, straw or other inflammable or explosive freight, good cars must be selected, and all openings must be closed and securely fastened. Cars loaded with such freight must be placed in the rear of trains, as near the caboose as possible (in preference to stock), and never ahead, near the engine.

Inflammable
freight.

363. Dead engines, or disabled engines with one or both side rods taken down, should not be hauled in fast freight trains when it is possible to avoid it. Under no circumstances must such engines be hauled at a speed exceeding one mile in three and a half minutes.

Dead en-
gines.

"Bad order" cars.

364. Conductors must see that the words "bad order" and the date are written with chalk on both sides of disabled cars, that defective parts are marked with a cross, and report to the Superintendent by wire, giving initials and numbers, and if loaded, contents and destination, and where set out.

Reporting disabled cars.

365. Agents, where car repairers are not employed, must report all disabled cars at their station, giving initials and numbers, and if loaded, contents and destination, stating what is needed to make repairs, and by what train set out. Waybills for disabled cars must be kept separate from others to prevent cars being taken away by mistake before repairs are made.

Derailed cars.

366. When cars are derailed they must not be turned over, thrown down embankments, broken up or otherwise damaged unnecessarily, merely to get them out of the way. Every effort must be made by trainmen or wrecking crew to put them on the track with as little damage as possible.

Cars on sidings.

367. Station agents, and operators where there are no agents, are required to see that doors of all loaded cars on sidetracks are closed and securely fastened, that brakes are set and cars far enough from the main tracks not to endanger passing trains, and when necessary to secure perfect safety that wheels of all cars are properly blocked.

Weighing cars.

368. In weighing cars they must in all cases be uncoupled at both ends. When the weight of an empty car varies 200 pounds from the weight marked on the car, agents will report same at once to the Freight Auditor on blank form provided for that purpose.

369. Enginemen must allow no one to handle their engines except their firemen, in their presence, and then only by consent of the Master Mechanic; the responsibility, however, remaining with the engineman.

Handling engines.

370. Enginemen and firemen must not, at the same time, absent themselves from the engine while on duty.

371. Great care must be taken to prevent killing live stock, bringing the train to a full stop if necessary. If any stock be killed, or struck, the engineman must report it in writing, on the prescribed form.

Killing stock.

372. Enginemen must use every precaution to prevent setting fires along the line. They must carefully and frequently inspect netting or other apparatus provided for arresting sparks, and see that it is in good order. They must not throw out any burning waste, clinkers, or other material along the line. Dampers of ashpans must in all cases be closed while engines are crossing bridges and passing wood-yards.

Setting fires.

373. Enginemen and firemen must not throw any fuel from the tender while in motion. If any be found unfit for use, it should be thrown off at engine house yard at end of run. Wood must not be piled on tenders so as to be likely to fall off.

Throwing fuel from tender.

374. Before starting from a station, the engine and fire must receive the necessary attention, so that both the engineman and fireman, after starting, may be at liberty to attend to any signals which may be given.

Attention to signals.

375. Yardmasters will have charge of and direct the movements of all trains and engines at their stations. They will receive instructions

Duty of yard masters.

from the Superintendent, and must obey proper orders of station agents.

376. Train baggagemen are under the immediate charge of the conductors of their respective trains, and must obey them accordingly.

They are required to be at their cars at initial stations in ample time to finish work required of them before leaving time.

377. Unless ordered by conductor to perform other duties, baggagemen must remain in their cars while on duty, and must not leave cars on the road, or at the end of their run, until all baggage has been received from or delivered to the station agent or station baggageman.

378. Baggagemen must not receive for transportation any articles not checked, except Company's supplies with proper way-bills, unless specially instructed by the General Baggage Agent or the Superintendent.

379. Employes are forbidden to forward letters or packages containing money, whether registered or not, in baggage cars; and train baggagemen must refuse to receive such letters or packages for transportation as "railway business." Any train baggageman who discovers after he has left a station that a money letter or package has been given him, with other mail for transportation, must forward it to the Superintendent of the Division with explanation.

380. It is permitted to carry by train mail, between all points on lines operated by this Company:

1. All letters and packages of letters to and from its officers, agents, and employes, when relating to the business of the Company.

2. All letters and packages of letters to its officers, agents, and employes from connecting railroad lines, when relating to the joint business of the companies, or to the business of this Company.

3. All letters and packages of letters from its officers, agents, and employes to connecting railroad lines, when relating to the joint business of the companies, to the business of this Company, or to the business of such connecting company.

4. Letters and packets of letters between the local representatives of Railroad Associations of which this Company is a member, and employes, regarding the business of this Company, when the same may be received from or delivered to such parties by this Company, its agents or employes.

5. Printed railway advertising matter, folders, circulars, tariffs, printed blanks, way-bills, and kindred matter, when relating to business in which this Company is interested.

6. All other matter relating or pertaining to Company business may be carried by train mail if accompanied by no communication or other matter giving it the character of personal correspondence, without reference to its origin or destination.

381. It is prohibited to carry by train mail:

1. Letters that do not pertain strictly to the business of this Company, to joint business with a connecting railroad line, or to the business of such connecting line.

2. Letters relating to the personal affairs of employes.

3. Letters (except when contained in Government stamped envelopes) addressed to and relating to the business of other companies, corporations or individuals operating car lines (either passenger or freight), hotels, restaurants or any other class of business connected or not connected with this Company.

All such prohibited matter must be promptly stamped and forwarded by United States mail.

Correspondence for general, commercial, and traveling agents of this Company, when located at points on foreign lines, must be sent through the United States mail.

The foregoing prohibitions have no application to any except first-class mail matter, that is, letters in sealed envelopes or packages.

For every violation of the law, the Company is liable to a fine of one hundred dollars; in addition to which the employe committing the offense is liable to a personal penalty of fifty dollars.

U. S. mail.

382. Whenever the duties of employes require them to handle United States mail, care must be used to see that it is safely and promptly handled and correctly delivered as per marks on sacks or pouches. When the latter are without marks, or improperly marked, to show destination, they must not be received. If, however, they are in this Company's charge before the error is discovered, they must be turned over to the nearest postmaster, and the facts reported to the Superintendent by wire.

383. Freight, baggage or other articles must not be allowed to remain on depot platforms where they may cause accident or inconvenience to passengers or employes, receive damage from the weather or be stolen. United States mail pouches must not be left unprotected upon the platforms, nor in the waiting rooms or other exposed places at stations.

384. Agents and operators report to, and receive their instructions from, the Superintendent, in all operating department matters.

385. Agents and operators must keep the public out of their offices, transacting their business over the counter. They must prevent lounging or disorderly conduct about their premises. They must make themselves familiar with the business interests of the people amongst whom they are stationed, and keep the Superintendent informed of the probable effect on business, of changes actual or proposed in train service. They must acquaint him with the views and requests of patrons of the Company, and with such local news as may seem important.

386. Agents must familiarize themselves with the current Time-tables, and must not sell tickets to stations at which trains do not stop, or for trains that do not carry passengers.

Protecting freight, baggage, mail, etc.

Agents and operators.

Selling tickets.

387. Operators must familiarize themselves with and obey the Telegraph Company's rules.

Station agents who act as agents of an Express or other company, must give precedence to the business of the Railroad Company.

388. Agents will be held responsible for accidents to persons, freight or other property, occurring through defective appliances that they have failed to report.

389. Agents are required to make daily inspection of yards, platforms, offices and buildings, and to co-operate with roadmasters in maintaining the station premises in a neat and tidy condition.

390. Office hours at stations will be fixed by the Superintendent and must be strictly observed. Day operators must keep the location of their residences posted up inside bill-boxes at stations where there are no night operators, so that trainmen may know where they can be found.

391. (Omitted.)

392. All who have authority to employ men are required to keep their force down to conform to the amount of business done. This they are expected to do without waiting for a special order.

393. All property found on the road must be promptly forwarded to the Superintendent, or notice be given him at once of its having been found.

394. The use of the telegraph must be restricted to urgent business or where an immediate answer is necessary. Telegrams should be brief.

395. When a person is discharged from any department or division of the Company's service, he must not be re-employed without the written approval of the Manager.

Telegraph Co. rules.

Preference to railroad business.

Agents responsible.

Inspection and care of premises.

Office hours.

Force.

Lost property.

Use of wire.

Re-employment.

Testimonials and gratuities.

396. Employes are forbidden to offer testimonials to their superiors, either directly or indirectly; and those in authority must not accept presents or testimonials. The acceptance of gratuities or rewards from passengers or patrons of the Company is also forbidden.

Disloyalty.

The institution of any suit or legal proceeding against the Company, or any act of hostility or willful disregard of its interest, being inconsistent with the relationship of employer and employe, will be deemed a relinquishment of the service and immediately terminates the employment without further notice or discharge, and all privileges incident to the employment shall forthwith cease.

Surrendering property.

397. Employes, on leaving the Company's service (or at any time when required to do so by proper authority), must deliver up in good order any property entrusted to their care.

SPECIAL RULES FOR TRACKMEN, BRIDGEMEN AND WATCHMEN.

400. All employes in the Maintenance of Way Department must do all in their power to prevent accidents, even though in so doing they may occasionally have to perform some one else's duty.

401. Trackmen and bridgemen must make themselves familiar with the meaning of signals of all kinds, and regulations relating thereto. They must report to the Roadmaster or Division Foreman of Bridges and Buildings any and all violations of the rules that come to their notice, giving full particulars in order that the responsibility may be ascertained and a repetition prevented.

Failure of trainmen to respect signals must be promptly and invariably reported, giving train or engine number and signals disregarded.

402. Roadmasters must see that all gangs are always supplied with proper signal flags, lanterns, etc., and that they are thoroughly instructed as to their use.

Signals.

Signals to be used by section and bridge men are red and yellow flags by day, red and yellow lights by night, and torpedoes. When any work is being done on track or bridges which makes it unsafe for trains to pass, or when for any reason it is necessary to stop a train, a man must be stationed with a red flag by day or a red light by night ninety rails or fifteen telegraph poles from the point at which the train must stop. Torpedoes must be placed on the rail as soon as the flagman arrives at the required distance, and they must not be removed until the flagman's signal is answered by the engineer.

A yellow flag by day or a yellow light by night is a signal to run slowly and look out for defective track.

All track-walkers, bridge and tunnel watchmen, pumpers and fuel keepers between stations when on duty, will display a yellow flag by day and a yellow light by night the instant a train passes, and will keep such signal displayed for five minutes, when the signal shall be changed to clear.

These signals are not intended to stop trains, unless swung across the track; they are simply used as an extra precaution and notice that the time required between trains has not expired, and do not relieve trainmen from any responsibility or the proper observance of any other rule.

Where the location of watchmen, pumpers, or fuel keepers, is permanent, a semaphore signal will be provided.

Track foremen will observe the location of trains carefully, and where they find trains running closer than the rules allow, or where trains ahead are not making proper speed, it will be their duty to caution these trains, and, if necessary, flag them. It will also be their duty to see that all employes under their supervision comply with this rule.

This rule may be added to or amended to meet certain conditions, by special instruction from the Superintendent.

Watches.

403. Each foreman must provide himself with a reliable watch, must compare it with the clock in the telegraph office at his station, daily if possible, and must know that he has correct time.

Responsibility.

404. All foremen will be held responsible for the proper condition of the track and structures under their charge.

Looking out for trains.

405. All men at work on the track or bridges must bear in mind that, in operating the road under telegraphic orders, a train may pass at any moment. They must keep a sharp lookout for

trains from either direction, and must not assume that a train may not come for any certain time, nor act on the assurance of any person to that effect, but will at all times protect themselves with proper signals, as per Rules 402, 407 and 408. Roadmasters and bridge foremen will be held responsible for the proper understanding and strict observance of these rules by themselves and those under them. Foremen must know that their gangs are always supplied with the proper signal flags, lanterns, torpedoes, etc., and are thoroughly instructed as to their use.

406. Every employe whose duties require him to use or obstruct the track, must keep a copy of these rules and the proper Time-table on his person or handcar while on duty, and must produce them when required to do so by the Roadmaster, Bridge Superintendent or other person in authority.

Rules and time-tables.

407. Track foremen must pass over their sections at least once every week, inspecting closely. Each foreman must pass over in person or send one of his men over the section or sections under his charge during storms, when the road is liable to be damaged, at least once every day during the continuance of such storms; and he must pass, or send one of his men, over the track under his charge, when no damage thereto is threatened by storms or unusual circumstances, at such intervals of time as may be specified by the Roadmaster or other proper authority. Each track foreman or trackman going over the track as above, must take with him a track wrench, four torpedoes, two red flags, and (when likely to be needed), two red lamps, and must carefully examine the track to see if it is safe for the passage of trains. If any place is found unsafe, he must at once fix red signals on both sides at a distance of ninety

Track inspection.

(90) rails (or fifteen telegraph poles). The flagstick must be firmly driven into the ground in such position that the flag or lamps may be plainly seen from an approaching engine, and a torpedo fixed on the rail on the engineman's side. If a train is expected before he can get help to repair the track, he must place himself on the side of the expected train and give signals to stop. If the train is not expected before he can get help, he may, after he is satisfied that the flags or lamps and torpedoes are properly fixed, go for assistance.

Special watchmen must be provided with proper signal lamps, flags and torpedoes, and must be instructed how to use them.

408. At all times when work is going on which renders it necessary for trains to reduce speed, a yellow flag must be set at side of track at least ninety rails or fifteen telegraph poles from the work, on engineman's side, in each direction, as a caution to approaching trains to run slowly. After severe rains or a thaw, a handcar or velocipede car must be sent over the road before the passage of regular trains, for the purpose of ascertaining if track is safe.

409. Foremen must so regulate their work as not to interfere with the passage of trains on their schedules, but they will have the right to work whenever trains are thirty (30) minutes late, protecting themselves in both directions with prescribed signals.

On approach of such delayed trains they must be allowed to pass with the least possible delay.

410. When track at or on bridges, trestles or cattle guards is out of line or surface, bridge superintendents or bridge foremen must be notified, and if the defect renders the track unsafe, track

Position of
danger sig-
nals.

Time to
make re-
pairs.

Track or
bridges.

foremen must make such temporary repairs as they can, protecting the point with slow or danger signals, as may be necessary.

411. Except in emergencies, trackmen, bridgemen, or other repairers, must not work between another gang of men and the flagmen, or signals set by such other men in accordance with Rules 402, 407 and 408. When, however, it is necessary for any gang to work, or to occupy the track in such position, they shall at once place a flagman between themselves and the other gang, and as far as possible from such other gang. When one gang of trackmen, bridgemen, or other repairers passes another gang at work, it shall be the duty of the foreman of such passing gang to ascertain what signals are out, and govern himself accordingly.

412. In no case, except when the track is unsafe, is any work which will obstruct the passage of trains to be done during a fog or snow storm.

If, during a fog or snow storm, the track is found unsafe, a torpedo must be fixed on the rails on the engineman's side, and a man stationed on each side of the unsafe place with a red light at a distance not less than provided for in Rules 402, 407 and 408.

If short-handed, red lights must be hung in plain sight and torpedoes used, as provided for in Rule 402.

413. All foremen must observe closely all trains that pass, to see if any signals are carried by them to show that another train is following, as a section of the passing train, or if any notices are thrown off. See Rules 20 and 21.

414. During heavy storms, whether by day or night, whereby the track or any portion of the Company's property, becomes liable to sudden

Signals for
two gangs.

Work dur-
ing fog or
snow storm.

Observing
signals.

On duty dur-
ing storms.

damage, foremen and trackmen must be on duty; and at such times they are required to go over their sections to make sure that the track is safe, taking danger signals with them. The points most liable to damage must be first visited.

Handcars
and push-
cars.

415. Handcars and pushcars not in actual use must be taken off the track and placed well clear of trains. They must not be placed on or near road crossings, nor left standing on side tracks. If out of sight they must be locked.

416. Loaded push cars must be protected in both directions by danger signals. They must never be used in fogs or at night unless absolutely necessary.

417. Hand cars must be run with great caution at all times, and particularly at night and in fogs. Frequent stops to listen for approaching trains must be made, and flagmen must be sent ahead around all curves as an additional precaution. If in foggy weather the destination of the men is within a mile either way of the section house, they should walk to work; the car must not be used.

418. Hand cars must be examined at least once a week for loose bolts and defects. They must be kept in good order, bearings and machinery well greased, and must never be used when to do so involves risk of accident.

Hand cars and other Company property must not be used except on Company's business.

Foremen to
work with
their men.

419. Foremen must work with their men personally, unless, on account of their having a large number of men under them, they are excused from this duty by the Roadmaster or Bridge Superintendent.

Removing
obstruc-
tions

420. The track must be kept clear; and it is the duty of foremen to turn out promptly with all their men and remove any obstruction, whenever

notified by trainmen or others, even though the obstruction may not be on their sections. If notified of broken rails on an adjoining section they must at once make track safe for trains.

Anything that interferes with the safe passage of trains at full speed is an obstruction.

421. When assisting a train delayed by accident, foremen will act under orders of conductor or other person in charge of train, until the arrival of the Roadmaster or foreman of wrecking car. After his arrival the foreman of the wrecking car will have full charge of the removal of the wreck.

Train acci-
dents.

Foremen must appoint the necessary watchmen at wrecks, who must remain on duty until the goods are removed or until they are relieved from this duty by order of the Superintendent. In carrying out this rule trackmen are authorized to leave their sections and bridgemen the limits of their jurisdiction, without special orders.

422. Such material as broken rails, axles, or other debris, which may be of use in determining the cause of accidents, must be preserved.

423. Track foremen must examine cuts and tunnels as they pass along, to see whether there is anything likely to fall on the track.

Cuts, tun-
nels and
trestles.

They must report to the Roadmaster if any of the waterways or ditches are too small, and such points must be watched during severe rain or snow storms.

Culverts must be examined frequently and kept clear.

They must keep the earth cleared away from the sills of trestle bents and piers or abutments of wooden bridges, and must also see that all grass, weeds and other combustible material is cleared away from all wooden structures.

Protection
against fire.

During dry weather no fires must be started unless they can be kept under control.

424. Grass, weeds, old ties and rubbish on right of way must be burned at such times as the Roadmaster may direct, always using the greatest care to prevent the fire from spreading to adjoining fields, farm fences, or bridges, and under no circumstances must any fire be left burning after working hours.

Section men must use every effort to extinguish fires off the right of way, even though no responsibility attaches to the Company.

Water supply.

425. Foremen must look after water stations, and see that the supply is kept up and promptly report any failure or defect by telegraph to the Superintendent or Roadmaster.

Stock killed or injured.

426. Track foremen will be governed by State and Territorial laws, as printed in appendix to Rules of Maintenance of Way Department, in disposing of animals killed or injured by trains or otherwise on the Company's right of way or other grounds. They must promptly slaughter all animals fatally injured. When not inconsistent with the laws, they must notify the owner of the stock, and if he does not take charge of the animals within reasonable time they will bury the carcasses, or sell the meat and hides to the best advantage, send the money received therefor to the Treasurer, and inform the owner of the stock accordingly.

Foremen must investigate every case of injury to stock and make a full report to the Superintendent and Roadmaster on the blank forms provided for that purpose. They will be held responsible for any damage that may be caused by their neglect to keep fences and cattle-guards in proper repair.

427. All articles of clothing, or anything that may belong to passengers or trainmen, found on the track, must be sent to the Superintendent, with a report stating when and where found, and the day each article was sent to him. Articles found.

Any freight that has fallen from cars must be sent to the nearest station at which there is an agent or telegraph operator, and a receipt taken therefor.

If it is too heavy for hand car the Superintendent must be notified by wire.

428. Trackmen must pay particular attention to the telegraph lines. In case the wires are found broken or on the ground, crossed, or in any way obstructed, they must be repaired in a temporary manner immediately; the nearest telegraph station must be informed of damage and nature of repairs made, and, where repairs cannot be made by them, notice must at once be given to the nearest telegraph office. They must inform themselves of location of the division wire on poles or cross-arms, and, when all the wires are down or broken, the division wire must be repaired first. Telegraph lines.

429. All cars loaded with track material of any kind must be unloaded without delay, as soon as it is known to be on any siding and intended for that station, unless distinctly ordered otherwise. Track material.

430. All accidents, no matter how trivial, must be reported on proper form. Those of a serious nature must be reported immediately to the Superintendent by wire, and afterwards reported on the proper form. Reporting accidents.

GENERAL DESCRIPTION OF SIGNALS

USED IN CONNECTION WITH

Automatic and Manual Block Systems and Interlocking
Switch and Signal Plants,

—AND—

Rules and Instructions Governing the Movement of
Trains Controlled by Such Signals.

—

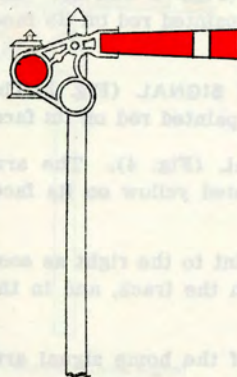
DESCRIPTIONS AND MEANINGS OF SIGNALS.

1. Signals may be either one of two types, the semaphore or disc.

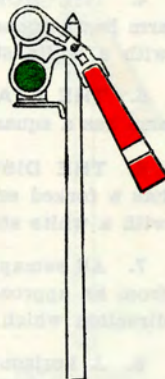
2. SEMAPHORE SIGNALS.

3. These signals are of the semaphore pattern, consisting of a post having one or more movable arms. (Figs. 1, 2, 3 and 4.)

One Arm Home Signal.



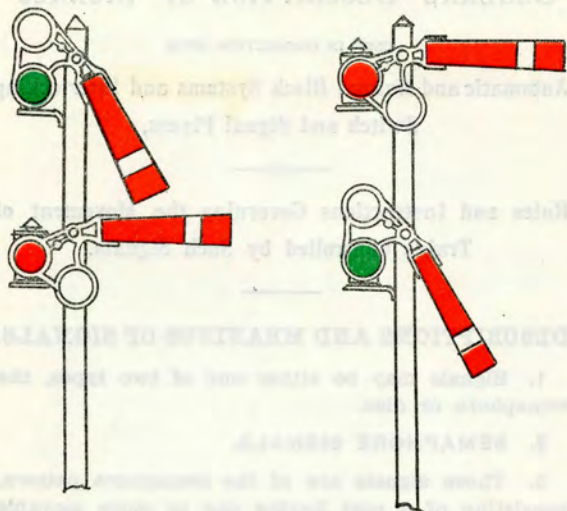
Danger—STOP.



Safety—PROCEED.

Fig. 1.

Two Arm Home Signal.



Main Route.
CLEAR—Proceed.

Fig. 2.

Diverging Route.
CLEAR—Proceed.

4. THE HOME SIGNAL (Figs. 1 and 2). The arm has a square end and is painted red on its face, with a white stripe.

5. THE STATION HOME SIGNAL (Fig. 3). The arm has a square end and is painted red on its face.

6. THE DISTANT SIGNAL (Fig. 4). The arm has a forked end and is painted yellow on its face, with a white stripe.

7. All semaphore arms point to the right as seen from an approaching train on the track, and in the direction which they govern.

8. A horizontal position of the home signal arm indicates **DANGER; STOP**.

Station Home Signal.

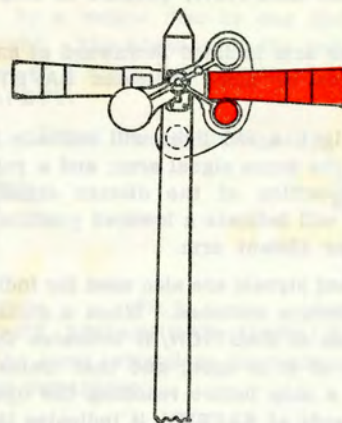
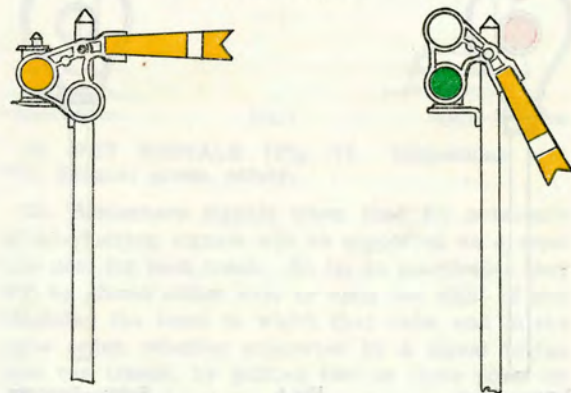


Fig. 3.

Distant Signal.



Caution—Home Signal
at DANGER

Fig. 4.

Safety—Proceed.
Home Signal at SAFETY.

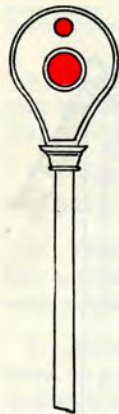
9. A horizontal position of the distant signal arm indicates CAUTION; prepare to stop at home signal.

10. Either arm inclined downward at an angle of sixty degrees or more indicates SAFETY; PROCEED.

11. At night, a red light will indicate horizontal position of the home signal arm; and a yellow light, horizontal position of the distant signal arm; a green light will indicate a lowered position of either the home or distant arm.

12. Distant signals are also used for indicating position of obscure switches. When a distant switch signal stands at CAUTION, it indicates that switch in advance of it is open, and that trains must be brought to a stop before reaching the open switch. When it stands at SAFETY, it indicates that switch in advance of it is closed, and that trains may proceed.

Disc Signal.



Danger—STOP.



Safety—PROCEED

Fig. 5.

13. DISC SIGNALS (Fig. 5.)

14. These signals indicate DANGER by displaying a red disc by day and a red light by night; or CAUTION, by a yellow disc by day and a yellow light by night. The absence of the red or yellow disc by day, or a green light displayed at night, indicates SAFETY.

Dwarf Semaphore Signal.



Danger—STOP.



Safety—PROCEED.

Fig. 6.

15. DWARF SEMAPHORE SIGNALS (Fig. 6). Will give the same indications by position and light as the large semaphore.

Pot Signal.



Danger—STOP.



Safety—PROCEED.

Fig. 7.

16. POT SIGNALS (Fig. 7). Indications are: Red, danger; green, safety.

17. Semaphore signals when used for automatic or interlocking signals will be supported on a separate post for each track. So far as practicable they will be placed either over or upon the right of and adjoining the track to which they refer and in the same order, whether supported by a signal bridge over the tracks, by putting two or more posts on one mast with brackets, or by using separate masts from the ground.

BLOCK SIGNALING.**DEFINITIONS.**

18. **BLOCK**—A length of track of defined limits, the use of which by trains is controlled by Block Signals.
19. **BLOCK STATION**—A place from which Block Signals are operated.
20. **BLOCK SIGNAL**—A fixed signal controlling the use of a Block.
21. **HOME BLOCK SIGNAL**—A fixed signal at the entrance of a Block, to control trains in entering and using said block.
22. **DISTANT BLOCK SIGNAL**—A fixed signal of distinctive character, used in connection with a Home Signal to regulate the approach thereto.
23. **ADVANCE BLOCK SIGNAL**—A fixed signal placed in advance of a Home Signal to subdivide the block between the Home Block Signal and the Advance Block Signal.
24. **STATION SIGNAL**—A fixed signal at each Telegraph or Telephone office used for train orders, under Standard Rule 221, and as a Block Signal under the rules relating to Manual Block Signaling.
25. **BLOCK SYSTEM**—A series of consecutive blocks controlled by Block Signals.
26. **AUTOMATIC BLOCK SYSTEM**—A Block System in which the signals are operated by electric, pneumatic or other agency actuated by a train, or by certain conditions affecting the use of a block.
27. **MANUAL BLOCK SYSTEM**—A Block System in which the signals are operated manually, upon information by telegraph or telephone.

28. CONTROLLED MANUAL BLOCK SYSTEM—

A Block System in which the signals are operated manually, and so constructed as to require the co-operation of the signalmen at both ends of the block to display a CLEAR signal.

29. **ABSOLUTE BLOCK SYSTEM**—One in which only one train at a time is permitted to occupy the block.

30. **PERMISSIVE BLOCK SYSTEM**—One in which two or more trains may occupy a block at once.

AUTOMATIC BLOCK SYSTEM.

31. Automatic Block Signals are those controlled by track circuits and control the use of the blocks, but unless otherwise provided, do not affect the movements of trains under the time table or train rules, nor dispense with the use or the observance of other signals whenever and wherever they may be required.

32. All main track switches are connected with the signals of the blocks in which they are located, and will cause those signals to stand at DANGER unless the switch is set for the main track, in which case, if there is no train on the main track in that block, or other obstructions, the signals will return to CLEAR, otherwise they will remain at DANGER.

33. Block Signals may be put to DANGER by: 1st—A train in the block; 2d—An open switch in the main track; 3d—A car outside of the clearance point at siding; 4th—A broken rail; 5th—An open drawbridge.

34. All Automatic Signals will be numbered with odd numbers governing east-bound tracks, those with even numbers governing west-bound tracks.

35. AN OVERLAP is an electrically controlled section of track adjoining a block. The extremity of an Overlap is indicated by a post, upon which are shown in black figures the numbers of the signals controlled by the Overlap.

36. Where a distant signal is in use to indicate the position of a Home Signal there is no Overlap.

37. Trainmen are reminded that although the Distant Signal indicates the position of the Home Signal, the Home Signal may assume the DANGER position after the Distant Signal has given the CLEAR indication, and while the train is between the Distant and Home Signal. For this reason trainmen must be on the alert, prepared to bring the train to a stop if the Home Signal indicates DANGER, and be governed by Rule 40.

AUTOMATIC BLOCK SYSTEM RULES.

38. All trains must approach signals under full control, prepared to stop before entering the block.

39. If the Home Signal is at SAFETY before a train enters a block and changes to DANGER after train enters the block, it indicates that the block is unoccupied and that the train may maintain its usual speed.

40. If the Home Signal is at DANGER before a train enters the block, or is at SAFETY and does not change to DANGER when the train enters the block, the train must stop and send a flagman in advance immediately, wait the full time indicated by special rules on the time card after the flagman has started, and then proceed under full control, not exceeding six miles per hour, until the train passes out of the block.

41. As soon as the engineman knows that it will be necessary to make the stop he must give the sig-

nal to the flagman, as per Rule No. 14 (c), and the train must be protected in accordance with Rule No. 99 (Standard Rules).

42. When necessary to flag through a block, by reason of signal being at DANGER, the train should be stopped before reaching the Block Signal. Should this be impossible, the engineer will at once (after the flagman has started ahead) back his engine off the block limits. This will give the signal a chance to CLEAR, should the obstruction be removed before the expiration of the wait required by the rules.

43. Should a train immediately preceding a passenger train find it necessary to flag through a block, the flagman should be instructed to notify the following passenger train that the train ahead is flagging through the block. This will permit the passenger train to proceed cautiously, looking out for the train ahead or other obstruction, without sending a flagman in advance, and thus save delay.

44. When following trains or sections are entering the portion of road controlled by Block Signals each train or section will allow the preceding train or section five minutes to clear the block. If the block is not clear at the expiration of five minutes, the train will proceed under full control, expecting to find the block occupied by the preceding train. Trains passing from a block to the portion of the road not controlled by Block Signals will be governed by Rule No. 91 (Standard Rules).

45. Conductors and enginemen must report to the superintendent from the first open telegraph station any signal not working properly. The signal must be observed by the enginemen when the train enters and by the trainmen when the rear of the train passes out of the block. If the signal does not change from SAFETY to DANGER on entering the block it must be reported by telegraph to the superintendent, giving number of signal.

46. Indicators in connection with electric signal circuits are placed at all switches not protected by semaphores, to indicate to trains on sidings or spurs the approach of trains on the main track. Conductors and enginemen of trains taking sidings must personally examine these indicators before throwing the switch to go on main track, and report as per Rule 45, when they are not working properly. The indicators should show **RED** when the main track is occupied by a train on the block, and **WHITE** when it is **CLEAR**, but it will turn to **RED** when the switch is opened.

Trains using a siding will be governed by Rules 39 and 40.

47. If the number of a signal is covered by a yellow board it indicates that the signal is out of service and the trains may proceed cautiously, taking all needful precautions to avoid accidents.

48. Enginemen must not allow either fire-box or front end cinders to be dropped on the tracks that are governed by Automatic or Interlocking Signals.

49. On single track when a train enters an Overlap it sets the signal at **DANGER** at the opposite end of the adjoining block, which signal is held at **DANGER** until the train has passed out of the adjoining block. When a train leaves such a block through the Overlap the signal at the opposite end of that block is held at **DANGER** until the train passes out of the Overlap.

50. The crews of trains which have stopped or broken down in an Overlap must bear in mind that while standing in it they are not only holding at **DANGER** the signals of the block in which they stand, but also the signal at the farther end of the adjoining block, and they should therefore make every effort to pass out of the Overlap.

51. Should the train be so disabled that it cannot be moved a flagman should be sent at once to meet the expected train. If no train is met he must continue to the farthest signal held by the Overlap, so as to notify approaching trains and thus save unnecessary delay.

MANUAL BLOCK SYSTEM.

RULES.

52. Between points indicated by special rules on time card, Station Signals are used as Block Signals as well as train order signals, and all rules applying to **STATION SIGNALS** will apply to **BLOCK SIGNALS** when used in that capacity.

53. The Manual Block System is independent of general rules governing train movements and the movements directed by special telegraphic orders, and must not be confused with them, nor does it in any way relieve trainmen from flagging at all times according to general rules.

54. The responsibility for operating the Telegraph or Telephone Block System is placed on the operators at the block stations.

55. The normal indication of all Home Block Signals is **STOP**, and of Distant Signals, **CAUTION**.

56. A Home Block Signal must not be changed from the normal indication to the **PROCEED** indication for an approaching train, until in sight of the engineer, except at Block Stations where there are Distant Signals, in which case the Home Signal must be cleared sufficiently in advance to allow the Distant Signal to be cleared when in sight of the engineer.

57. On single track only one arm and light of a Home Block Signal must display the **PROCEED** indication at one time.

58. A Home Block Signal must be restored to the STOP indication after having been changed for a train as soon as the rear car carrying the markers has passed the signal, if the train stops; and if it does not stop, as soon as the markers are 300 feet beyond the signal.

59. A Distant Signal must not be restored to the CAUTION indication until after the rear car carrying the markers has passed the signal.

60. Operators are provided with Train Register Sheets, on which they will register (commencing at midnight daily) the leaving time of all trains at the Block Station in the rear, the arriving time at their own station, and the arriving time at the Block Station in advance.

61. If an operator holds any "31" orders for a train he must first execute said orders before ascertaining if the block is clear.

62. At offices where Block Signal instruments are used the following bell signal code will be observed:

(1) (Long stroke.) Answer telephone call. Answer by (2).

(2) All right. Yes. (Acknowledgment of signals as herein provided.)

(3) Is block clear? Answer by (5 or 3-1).

(4) Train has entered block. Answer by (2).

(5) Block is not clear. Answer by (2).

(6) Has a train entered this block? Answer by (2) or (2-1).

(1-2) Clear. Train has passed.

(2-1) No. Answer by (2).

(2-4) Has train cleared block? Answer by (5) or (3-1).

(3-1) Block is clear. (It must not be used until the track is known to be clear.)

(1-2-3) Train has gone on siding or crossed over to opposite track. Line is clear and switches closed. Answer by (2).

(5-5-5) Obstructions. Stop all trains approaching this station. Answer by repeating.

(2-2-2) Previous signal given in error. Answer by (2).

(6-6-6) Testing. Answer by repeating.

63. To admit a train to a block the signalman must examine the block record and if the block is CLEAR will give (3) to the next Block Station in advance. The signalman receiving this signal, if the block is CLEAR, must display the STOP signal to opposing trains and reply (3-1). If the block is not CLEAR, he must reply (5). The signalman at the entrance to the block must then display the proper signal indication to the train to be admitted.

64. Trains must be run under the ABSOLUTE BLOCK SYSTEM, except as provided in rules governing the use of CAUTIONARY and PERMISSIVE BLOCK SYSTEM.

65. When a train enters a block the signalman will report it to the signalman in advance, and when the rear of a train has passed the Block Signal and the markers are seen, the signalman will display the signal in STOP position, and when the train has passed 300 feet within the block, report to the signalman in the rear that the train is clear of that block.

66. Should a train pass a Block Signal without markers the operator must notify the operator at the Block Station on each side of him, and not report the block CLEAR until the operator in advance has notified him that the train is complete.

67. Should a train pass a Block Station in two or more parts the operator must notify the operator in advance, who, on receipt of this notice, must stop any opposing train. He must, if the block is clear, display a **CLEAR** signal and give the engineman a **TRAIN PARTED** signal, as per Rule 12 (d) (Standard Rules).

68. The engineman of a train that has parted, on approaching a Block Station must sound the whistle for **TRAIN PARTED**.

69. An engineman receiving a **TRAIN PARTED** signal from a signalman must answer by the signal for **TRAIN PARTED**.

70. If necessary while it is closely approaching or passing a Block Station to stop a train for which a **CLEAR** signal has been displayed or a **PERMISSIVE CARD** issued, the operator will give hand signals in addition to displaying the **STOP** signal, and will give the conductor the reason for the change.

71. Operator must not accept any orders for a train after engine has once passed the Block Signal until he has stopped the train and communicated with the conductor.

72. A signalman having orders for a train shall display the Block Signal at **STOP**. The signalman may allow a train so stopped to proceed under Block Signal rules, after having delivered train orders or **CLEARANCE CARD**.

73. If two or more trains coupled together are run to a Block Station as one train and there separated, each must then be regarded as a separate train.

74. Should a car or portion of train run away the signalman must notify the Block Station in the direction the car or portion of train is moving, who

will stop all trains moving in the direction opposite to the runaway.

75. A signalman informed of any obstruction in the block will notify the signalman at the other end of the block. The **CLEAR** signal must not be given until the obstruction is removed.

76. Lights in Block Stations shall be so placed that they cannot be seen from approaching trains.

77. Lights shall be used upon Block Signals from sunset until sunrise, and whenever signal indications cannot be clearly seen without them.

78. Signalmen must have the proper appliances for hand signaling ready for immediate use. These must be used when the proper indication cannot be given by a fixed signal.

79. Hand signals must not be used when the fixed signals are in proper working order. When hand signals are authorized they must be given from such a point and in such a way that there can be no misunderstanding on the part of the enginemen or trainmen as to the signals displayed, or as to the train or engine for which they are given.

80. If any train or engine disregards a **STOP** signal, the fact, with the number of train or engine shall be reported to the superintendent.

81. Block Stations may be closed by permission of Superintendent after the signalman at the next open Block Station on each side is notified and the notice acknowledged. Except as provided by special instructions or by special rule on time table, all trains must be notified by "31" order when Block Stations are closed.

82. When a Block Station is closed the arm or arms of the Block Signal must be placed in position giving the **CLEAR** indication, and at night the lights

extinguished, indicating that the Block Station is, for the time being, out of service. Block wires must be arranged to work through closed station, and block operator on either side will consider block extended with no change of rules.

83. When block office is reopened **STOP** signals must be displayed at once, offices on either side and train dispatcher notified, positions of trains ascertained, and, if any are in block, a register of same must be made on train sheet.

84. Bells must be rung deliberately and distinctly. All signals must be answered immediately.

85. When trains meet at a Block Signal Station, on a single track, operator must display **STOP** signals in both directions until train to take siding is clear of the main track.

86. A train finding a Block Signal displayed at **STOP** must stop before reaching it. Where trains are required to stop to do work or to allow opposing trains on passing tracks to depart, or to take water or fuel, they may pass the Home Block Signal displayed at **STOP**, but not to exceed a distance of 1000 feet without receiving a **CLEARANCE** or **CAUTION** or **PERMISSIVE CARD**.

87. Trains of inferior rights must take siding a sufficient time in advance to avoid blocking first-class and important trains following them.

88. At Block Stations where there are two running tracks a train must not cross over without permission of signalman, and protecting trains, as per Rule 99 (Standard Rules).

89. In leaving double track for single track, or in leaving a branch line to enter main line, a train must not pass clearance post until it has received a **CLEAR** signal, or its equivalent, and has right of track as well.

90. When double track is used as single track, operators will be governed by rules applying to single track.

91. Enginemen and trainmen must not accept **CLEAR** hand signals as against fixed signals until they are fully informed of the situation. Where fixed signals are in operation **CLEAR** hand signals must not be given or accepted against them.

92. If a train is held by a Block Signal to exceed five minutes the conductor must ascertain the cause.

93. A train having cleared a block must not back into nor within 300 feet of such block without permission of the signalman.

94. Trains should not take siding at stations where there are no Block Signal operators, unless so directed by regular telegraphic train order; issuance of the latter to be confined to cases of emergency only.

95. At a Block Station where a signalman is absent or incapacitated, so that instructions cannot be obtained, a train shall wait ten minutes, and then proceed with caution to the next Block Station, where the conductor must report accordingly to the superintendent.

96. At Block Stations not equipped with a **STATION SIGNAL**, and where conductors and enginemen are required to get a **SPECIAL ORDER** or **CLEARANCE CARD**, such **ORDER** or **CLEARANCE CARD** must have indorsed across its face the words **BLOCK CLEAR** by the block signalman.

97. If the track is obstructed between Block Stations, notice shall be given to the nearest block signalman.

98. When approaching a Block Station the engineman and fireman will announce to each other the indication of the signals.

CAUTIONARY BLOCK.

99. No train must be permitted to enter a block unless it is **CLEAR**, except as provided below:

100. By special order of superintendent.

101. If from failure of the Block Signal apparatus or other cause a signalman is unable to communicate with the next Block Station, he will stop train moving in that direction. Should no cause for detaining the train be known, it may then be permitted to proceed, under time table rules, using Caution Card.

102. When it is necessary for one train to follow another into a block, as provided above, the signalman will issue Caution Card Form B.

(Form—B.)

CAUTION CARD.

.....Block Station, 190,M.
To enginemen, Train No. on track.
Bell circuits and telegraph line have failed. You may proceed atM with caution, expecting to find track obstructed.

....., Signalman.

Enginemen receiving this card properly filled out and signed by the signalman may proceed with the train under control, prepared to stop short of any obstruction in the block.

....., Superintendent.

PERMISSIVE BLOCK.

103. **PERMISSIVE CARDS** may be issued by operators to allow two or more trains proceeding in the same direction to occupy the block at one time, or to allow two trains proceeding in opposite directions to meet at a non-block signal station with (31) orders to do so.

104. When two trains are to meet at a non-block Signal Station, dispatchers will authorize the operators at the first Telegraph Block Station on either side of the meeting point to issue **PERMISSIVE CARD**, and in addition will issue a '31' order to each train, showing at what point it is to meet the opposing train.

(Form —C.)

PERMISSIVE CARD No.

.....Block Station....., 190
Conductor and engineman No.....

USE **PERMISSIVE BLOCK** from..... to.....
expecting to find Train No. that entered at
.....M.

Or given to meet Train No. at
....., Operator.

Made O K at	By	Operator
.....

The above card must be issued as provided in rules for **PERMISSIVE BLOCK**; show the name in full of the issuing station, correctly dated and properly filled out in triplicate, one copy to be delivered to the engineman, one to the conductor and one filed by the signalman.

105. No train must be permitted to enter a block while it is occupied by a passenger train proceeding in the same direction.

106. Conductors and enginemen entering a block under a **CAUTION** or **PERMISSIVE CARD**, must be prepared to stop in case of any obstruction in the block, and will be held responsible in case of collision.

107. At Block Stations where there is a telegraph office conductors and enginemen, after having been stopped by the Block Signal, may, on receiving **PERMISSIVE CARDS** and **CLEARANCE CARDS**, properly filled out and signed by operator, if the block is still occupied, proceed under control, after waiting the customary ten minutes.

108. At Block Stations at which there is no telegraph office Block Signalmen may issue **PERMISSIVE CARDS** to following trains, and conductors and enginemen may proceed in accordance with above rules, without receiving a **CLEARANCE CARD**.

109. Work trains within Manual Block system limits must be handled under telegraphic orders Form H., Sub-division (d), requiring such train to protect itself against all others. In case work train is within limits of a block, operators may issue **PERMISSIVE CARDS**, Form C., permitting trains to enter the block. Such work trains must clear a block within the limits of which they may be working ten minutes before schedule time at which a regular passenger train is due to enter such block, but may follow a train five minutes after its departure into the limits of a block in which it will work but not run through. Such work trains may, under flag, work against freight trains or extra passenger trains, until driven in.

INTERLOCKING SIGNALS.

110. Interlocking signals are those controlled by a towerman and are placed at draw-bridges, junctions, railroad crossings, stations and other points as required.

111. When there is more than one arm on the **HOME SIGNAL POST** (Fig. 2) the higher arm governs the movement of trains along the main track or high speed route. The next arm below governs the movement of trains into the first diverging track to right or left beyond the signal. In all cases the lowest arm governs the movement of trains into all diverging tracks to right or left, not provided for by other signals.

112. At a junction the arms will be arbitrarily assigned by special rules on the time-tables to the routes they govern.

113. When two or more **POT SIGNALS** stand in a line one above the other they will govern the movement of trains as provided above for **HOME SIGNALS**.

114. Interlocking signals, unless otherwise provided, do not affect the rights of trains under the time-table or train rules, and do not dispense with the use or the observance of other signals, whenever or wherever they may be required.

115. All trains must approach interlocking plants under such control that they can stop within the limit of vision, if signals are against them.

INTERLOCKING SIGNAL RULES.

116. Run quite up to a signal, but **NEVER** beyond it, when at **DANGER**.

117. When a signal shows **DANGER** trains must come to a full stop.

118. If, after accepting a **CLEAR** signal it is changed to a **STOP** signal before it is reached, the stop shall be made at once. Such occurrences shall be reported to the superintendent.

119. When interlocking signals controlling the movement of trains over certain portions of the track become temporarily inoperative, trains may be moved by hand signals given by towerman or other competent authority. The signals for this purpose to be given only by a green flag or light, but the hand signals so given are good only for the movement of trains to the next signal. In such cases enginemen will proceed with great care, looking out for all sources of danger. When hand signals are given as above for trains to pass fixed signals at **DANGER**, in cases where such signals govern the movement of trains over railroad crossings and drawbridges, the conductor or person in charge of engine or train must send a man ahead to such crossings or drawbridges before passing of same with his train.

120. The engineman of train which has parted on approaching an interlocking signal must sound the whistle signal for **TRAIN PARTED**.

121. An engineman receiving a **TRAIN PARTED** signal from a signalman must answer by the signal for **TRAIN PARTED**. When the train has been recoupled the signalman must be notified.

122. After a signal is given for a movement in one direction, a movement must not be made in the opposite direction without receiving permission by the proper signal.

123. Trains or cars must not be left standing over the detector bars or circuits at switches or derails, as they will prevent the operation of the switches and signals.

124. No flying switches must be made where movements are controlled by interlocking mechanism.

125. All train and enginemen must obey promptly the signals and orders of towermen at points which

are interlocked, all movements at such points being under the control of the towerman.

126. At interlockings provided with a whistle signal on the tower, a loud blast of the whistle will indicate that all trains or engines, that may be moving within the interlocking limits will come to an immediate **STOP**, and not again move until they receive a proper signal.

127. Sand must not be used or water allowed to run within the limits of an interlocking plant.

128. The absence of a fixed signal where one should be seen (due to no light at night, or other cause), or a signal partially or improperly displayed, must always be regarded as a **STOP** signal and obeyed as such.

129. Movements to or from side-tracks, or along main tracks against the normal direction of traffic, must be made at a speed not exceeding ten miles an hour.

130. At all interlockings where there is a signalman on duty **A SIGNAL MUST BE GIVEN FOR EACH TRAIN MOVEMENT MADE**. No train or engine must act on a signal given for a preceding train, nor having passed over a route in one direction must it return over the same route without receiving the proper signal to do so.

RULES FOR SIGNALMEN AT INTERLOCKING PLANTS.

131. The normal indication of Home Signals is **STOP**, Route is not Clear: of Distant Signals, **CAUTION**, Home Signal is at **STOP**.

132. Levers or other operating appliances must be used only by those charged with the duty, and as directed by the rules.

133. All signals must be kept normally in the horizontal position, and must not be cleared for an approaching train until such train is within a mile of the tower. When it is necessary for the leverman to be absent from the tower, signals must be left as directed by special order.

134. At interlocking plants where there is a train order signal or block signal operated by the signalman, such signals must not be cleared until after the interlocking signals governing the same route have first been cleared.

135. **NO SIGNAL** must be given until it is known that the route is **CLEAR**.

136. Immediately after operating a signal lever the signal must be observed to note whether the arm has assumed the proper position.

137. Passenger trains must be given precedence over freight trains, but after clearing a signal for an approaching train, it must not be changed except as per Rule 138, until the first part of the train for which it was cleared has passed beyond the farthest switch governed by the signal, when it must be returned to the normal indication. A **DISTANT SIGNAL** shall be restored to the normal indication as soon as the first part of the train for which it was cleared has passed beyond the first **HOME SIGNAL** governed by the **DISTANT SIGNAL**.

138. Signals may be taken away from a train at any time, provided that anything is discovered that might endanger the safety of the train, and every effort must be made to avoid an accident.

139. When it is necessary to flag a train through the limits of an interlocking, the hand signal must be given from the lever room and from a point where there can be no misunderstanding as to which train is to be moved. The signals for this purpose to be given only by a green flag or light.

140. When a route is signaled in one direction only, and a movement is necessary in the opposite direction over that route, the signal lever governing the route must be unlatched to insure that route is set. Said lever must then be put in the normal position and the train flagged through the limits of the interlocking.

141. When a switch or derail is out of order so that it cannot be operated and locked from the machine, the signal or signals that protect such defective part must be kept at danger. When a movement is to be made over the route or routes affected, the defective switch or derail must be spiked for the desired route, and the signal lever or levers governing the route must be unlatched to insure that the route is set; the train must then be flagged through the limits of the interlocking. In such a case trains that are to make movements over conflicting routes must be brought to a **STOP** before the Home Signal is cleared for them.

142. If a signal arm fails to assume the horizontal position when the operating lever is put in the normal position, no switch or derail must be moved or conflicting signal cleared until the arm of the defective signal has been put in the horizontal position. Said defective signal must not be operated for a train until it is known to be in working order.

143. When a signal is out of order the arm must be kept in a horizontal position. Before flagging a train past such signal its lever must be unlatched to insure the route is set.

144. When there is a defect in the machine or locking, making it possible to clear a signal with a switch, derail or lock in the wrong position, or a conflicting signal clear, the signal or signals affected must be kept in the horizontal position, and a train

must not be flagged past such signal or signals until the leverman is sure that the route is set.

145. In case a signal light is extinguished, said signal must be kept at **DANGER**, and a train that has been stopped from such cause must be flagged through the limits of the interlocking. The lamp must be relighted at the first opportunity.

146. A switch, derail or detector bar must never be moved when a train covers it, and a switch or derail must never be moved when a train is closely approaching it, unless the moving of such a switch will lessen the liability of damage to life and property, as per Rule 138.

147. Levers must be handled with a steady movement. Levermen will be held responsible for any damage occasioned by rough handling. If a lever moves unusually hard, or with unusual ease, the cause must be at once investigated. An attempt to force a lever must never be made.

148. At interlocking plants where only one towerman is employed and at which opposing signals on one line are allowed to be cleared, such signals must not be cleared during the hours the towerman is on duty.

149. Signals must be observed frequently during the night to ascertain whether the lights are properly displayed.

150. During freezing weather the levers must be moved frequently to prevent the connections from freezing in.

151. Lights in all signals must be displayed from one hour before sunset to one hour after sunrise, whether there are night trains or not, and when from fog or other cause day signals cannot be seen clearly.

152. Lights must not be placed in the tower where they can be seen from an approaching train.

153. During the day if an arm is removed from a post, the trains that are affected by said signal must be stopped by a flagman, placed in advance of the signal affected, and must be flagged through the limits of the interlocking, in accordance with the instructions from the leverman.

154. At night if the red glass in a stop signal is broken, the signal arm must be kept in a horizontal position, and a red lantern must be substituted for the regular lamp. A train that has been stopped at such signal must be flagged through the limits of the interlocking.

155. At night, if the yellow glass in a caution signal is broken, the signal must be kept in the cautionary position, and a yellow lantern must be substituted for the regular lamp.

156. In case of an accident or damage to any part of the apparatus the proper officer must be notified immediately, by wire if possible, giving the character and extent of damage, if any.

157. Enginemen running their trains past a stop signal, or using or wasting water within the home signal limits of the interlocking, must be reported to the proper officer.

158. Levermen on duty must not leave the tower except in case of absolute necessity.

159. Unauthorized persons must not be permitted in the tower.

160. Whenever it is safe to do so, the switches must be operated upon the request of section men or inspectors.

RULES FOR DAILY MAINTENANCE AT INTERLOCKINGS.

161. The plant must be inspected daily.

162. All pins in crank stands, compensators, detector bars, and all bolts and nuts must be kept tight. Cotters must be kept in place and properly spread. Crank, compensator and other foundations must be kept rigid, and all boxing must be kept in repair.

163. All wire and pipe line connections must be kept in proper adjustment.

164. Glasses and lenses must be inspected daily. They must be kept in a clean condition. If any are cracked or broken, they must be replaced at once.

165. Switches and deralls must be inspected daily while in operation, to see that the points fit up and are properly locked.

166. Home Signal arms for the STOP position, and Caution Signal arms for the CAUTION position, must stand at right angles to the post, and each must stand at an angle of 30 degrees or less to the post when clear. The arms must be washed whenever the color of same becomes obscured by dirt, and painted when necessary.

167. Any part of the apparatus becoming so worn as to endanger the safe working of the plant must be renewed at once.

168. All moving parts of the plant must be kept oiled and free from grit. Care must be taken not to use too much oil, and all the old oil must be removed before re-oiling.

169. The tower must be kept in a neat and orderly condition, and tools and hand signals must be ready for immediate use.

170. Lamps must be cleaned and filled daily, and must be lighted at least ten minutes before being taken from the lamp room, in order that the flame may be regulated.

171. Any damage to the plant must be immediately investigated, and the tracks and switches in a desired route must be put in a safe condition before allowing trains to pass.

172. In case of accident or derailment, the towerman or party in charge shall take precaution to prevent any unnecessary damage to the ground apparatus or connections.

173. Tampering with the machine locking will not be allowed. Any defects in the locking must be reported to the proper officer immediately.

174. A report of the condition of the plant, including any trouble with the lamps, must be sent daily to the proper officer, or at the end of each week, as may be ordered. A Tool and Material Report must be sent to the proper officer at the end of each month.

CROSSING GATES AND SIGNALS.

175. Enginemen will observe carefully when passing a crossing equipped with an automatic bell, to see if the bell is ringing, and will report to the Superintendent by wire from the next telegraph office when any bell is found not ringing.

176. Enginemen passing crossings equipped with crossing gates will take care to see if they are lowered into proper position for closing the crossing before the engine reaches them, and will report at end of run to Superintendent any gate found not properly closed.

RULES

For the Use of the

WESTINGHOUSE AUTOMATIC AIR BRAKE

GENERAL INSTRUCTIONS.

The Air-brake system in use on these lines is that known as the Automatic or "Quick-action" brake.

It should always be kept in mind that this brake cannot be changed to, and used as, "straight air." Owing to the addition of the quick-action valve, a four-way cock cannot be placed in the triple; consequently nothing but the automatic can be used with this style Triple Valve.

1. In making up trains, all couplings must be united so that the brakes will apply throughout the entire train. The cocks in the brake pipe must be opened, except that on the rear of the last car, which must be closed.

In coupling hose, place the coupling shoulders near the stop pin firmly together, then roll the heads in place as if they turned on a pivot, firmly pressing the heads toward each other, until both heads strike the stop pins.

2. In detaching engines or cars, the coupling must invariably be parted by hand. The stop cocks in brake

pipes must always be closed before separating the couplings, to prevent application of brakes. Before detaching the engine, or any cars, the brakes should be fully released on the whole train, except on heavy grades. The air should be fully released from cars to be set out from trains on sidings and hand brakes used.

3. When air hose is not coupled between cars, it must in every case be coupled to the dummy couplings provided on all passenger cars for that purpose, to prevent injury to the hose, or admission of dirt to train pipe. This is very important and must not be neglected.

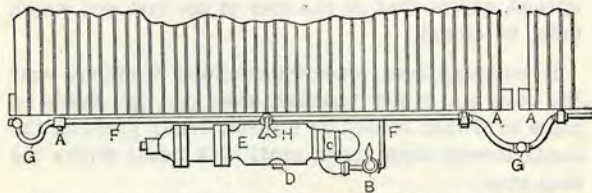
4. If the brakes become set, when engine is not attached to train, or brakes should "stick" in train, they can be released on passenger cars by opening the air-release cock in each auxiliary-reservoir; and on freight cars by opening release cock (*h*) in auxiliary-reservoir (see cut).

5. The following cuts show the different positions for handle of Triple Valve, when brakes are being used "Automatic" or "Cut-out."

PERPENDICULAR POSITION, HANDLE UP.

"AUTOMATIC."

The new style air-brake for freight cars—"Automatic."

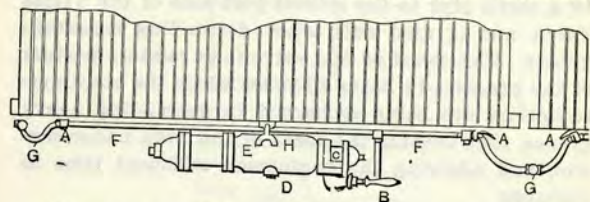


EXPLANATION.—*A*, stop-cocks in main-brake pipe; *B*, cut out cock handle; *C*, triple valve; *D*, drain plug in auxiliary-reservoir; *E*, auxiliary-reservoir; *F*, main-brake pipe; *G*, hose and couplings; *H*, release valve in auxiliary-reservoir.

HORIZONTAL POSITION, HANDLE LEVEL.

"CUT-OUT."

The new style air-brake for freight cars—"Cut-out."

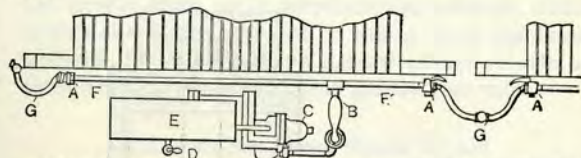


EXPLANATION.—*A*, stop-cocks in main-brake pipe; *B*, cut-out cock handle; *C*, triple valve; *D*, drain plug in auxiliary-reservoir; *E*, auxiliary-reservoir; *F*, main-brake pipe; *G*, hose and couplings; *H*, release valve in auxiliary-reservoir.

PERPENDICULAR POSITION, HANDLE UP.

"CUT-OUT."

The new style air-brake for passenger cars—"Cut-out."

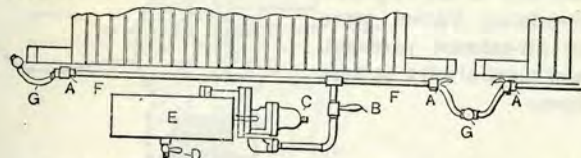


EXPLANATION.—*A*, stop-cocks in main-brake pipe; *B*, cut-out cock handle; *C*, triple valve; *D*, release cock in auxiliary-reservoir; *E*, auxiliary-reservoir; *F*, main-brake pipe; *G*, hose and couplings.

HORIZONTAL POSITION, HANDLE LEVEL.

"AUTOMATIC."

The new style air-brake for passenger cars—"Automatic."



EXPLANATION.—*A*, stop-cocks in main-brake pipe; *B*, cut-out cock handle; *C*, triple valve; *D*, release cock in auxiliary-reservoir; *E*, auxiliary-reservoir; *F*, main-brake pipe; *G*, hose and couplings.

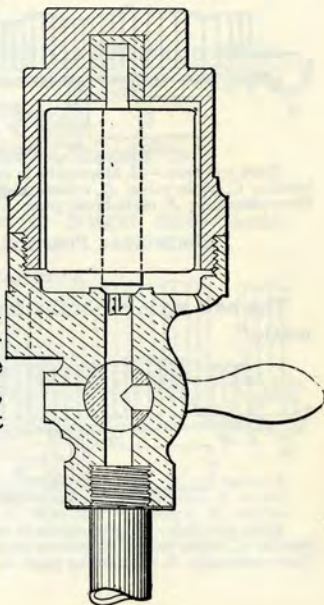
PRESSURE-RETAINING VALVES.

6. This valve is attached to each car and connected by a small pipe to the release port side of the Triple Valve, and is used only when descending mountain grades. The object of this valve is to retain a portion of the pressure in brake cylinder while the auxiliary-reservoirs are being recharged in descending heavy grades, thus keeping the speed of the train under control, and allowing the engineman sufficient time to recharge.

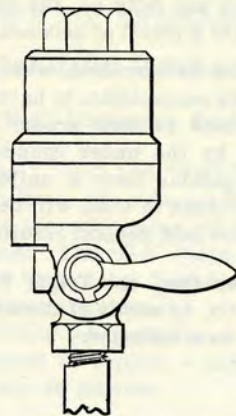
7. There are two styles of this valve, a 10 and 15 pound, and in operating the Pressure-Retaining Valves, the handle of same must be placed horizontally (see cut); and ten or fifteen pounds pressure of air is retained on the brakes by means of the weighted valve contained in the valve case, which has to be lifted whenever any of the air pressure is exhausted.

SECTIONAL VIEW
—OF—
PRESSURE-RETAINING
VALVE.

The small openings in the body of the Pressure-Retaining Valves serve as air-exhaust passages, and must always be kept open.

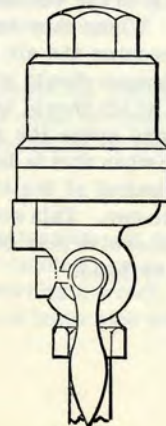


PRESSURE-RETAINING VALVE OPEN.



8. Cut out the Pressure-Retaining Valve by placing the handle down, or in perpendicular position, which allows the entire pressure to escape from the brake cylinder, in which position it must always remain on level track, or when ascending grades (see cut).

PRESSURE-RETAINING VALVE CLOSED.



9. The adjustment of brake gear should be such that when brakes are fully on, the pistons of brake cylinders will have a travel of between 6 and 7 inches.

Great care must be exercised, when taking up the slack in the brake connections, to have the levers and pistons *pushed back in their proper places* and the slack taken up by the under connections, or dead levers. If the pistons have a uniform travel, the working of each brake in train will be practically the same, insuring the best general results.

10. In cold weather, the Triple Valve should be drained frequently, to admit of discharge of condensation that may have collected.

BREAK-IN-TWO OF TRAINS.

11. In case a train breaks in two, the brakeman should close the stop cock on the rear car of the part of train remaining attached to the engine, when he reaches it, and then give the engineman the signal to let the brakes off. When cars are again properly coupled up, before opening the air into the rear end of the train, the brakeman should give the engineman signal to set brakes, which should be done strong, and left on until brakeman opens the air cocks into the rear section of train; when this is done, the engineman will have regained control of the air in entire train, as before the break-in-two. This action will save valuable time, which otherwise may be lost in releasing the air on each car by hand.

DESCRIPTION OF ENGINEMAN'S BRAKE AND EQUALIZING DISCHARGE VALVE.

The "G-6" Engineer's Brake Valve.

12. The "D-5," "E-6" and "F-6" Brake Valves are practically identical; the different letters and figures simply refer to the same valve, as illustrated in different catalogues. The "G-6" Valve is also the same, except that the Slide-Valve Feed Valve supplants the former Feed Valve attachment.

Before describing the operation of the Brake Valve, it is advantageous to explain a few commonly used terms, which are as follows:

EXCESS PRESSURE.—The difference between the pressure in the main-reservoir and that in the train pipe; this, when the train brake apparatus is fully charged, is usually from 20 to 30 pounds. Excess pressure combines with abundant main-reservoir capacity to insure prompt release and recharging. The amount of excess pressure to be carried is determined by the character of the road, length of train, size of main-reservoir, and kindred considerations.

SERVICE APPLICATION.—A gradual application of the brakes, such as is usual in slowing up or in a station stop; a gradual reduction of train pipe pressure produces this effect.

EMERGENCY APPLICATION.—Is one in which the full braking power is applied almost instantaneously, for the purpose of avoiding a wreck, saving lives, etc.; a sudden reduction of train pipe pressure produces this effect.

The red hand gauge connection is piped to *r* (Plates 7 and 8), and indicates main-reservoir pressure. A tee is usually inserted in this pipe for a pipe connection to the pump governor, which is generally adjusted to cut off the steam supply when main-reservoir pressure has reached 90 pounds. The black hand gauge connection is piped to *w* and is directly connected to the equalizing reservoir; but, as will presently be explained, the black hand also indicates train pipe pressure. The black hand is usually referred to as the train pipe pressure hand, and the red as the main-reservoir pressure hand.

The customary standard train pipe pressure is 70 pounds, while 90 pounds is quite general as a standard main-reservoir pressure; but these pressures may be modified to meet special conditions. In this book, 70 pounds will be considered the standard train pipe, and 90 pounds the standard main-reservoir pressure; but it should be understood that, in special cases, it is proper to modify this practice.

There are five different positions of the Brake Valve handle, namely: Release, Running, Lap, Service Application and Emergency Application positions. As the engineer faces the valve, the position farthest to his left is Release, and the other positions follow to the right in the order named.

13. RELEASE POSITION.—The purpose of this position is to provide a large and direct passage from the main reservoir to the train pipe, to permit a rapid flow of air into the latter, to insure a quick release, and recharging of the brakes. Release is the position shown on Plates 7 and 8. Referring to Plate 2, it will be seen that a pipe leads from the main-reservoir to the Brake Valve. It is connected at X (Plate 7), and when the Brake Valve is in Release position, main-reservoir air flows through passage A, A to the chamber above rotary valve 14, thence through port *a* in

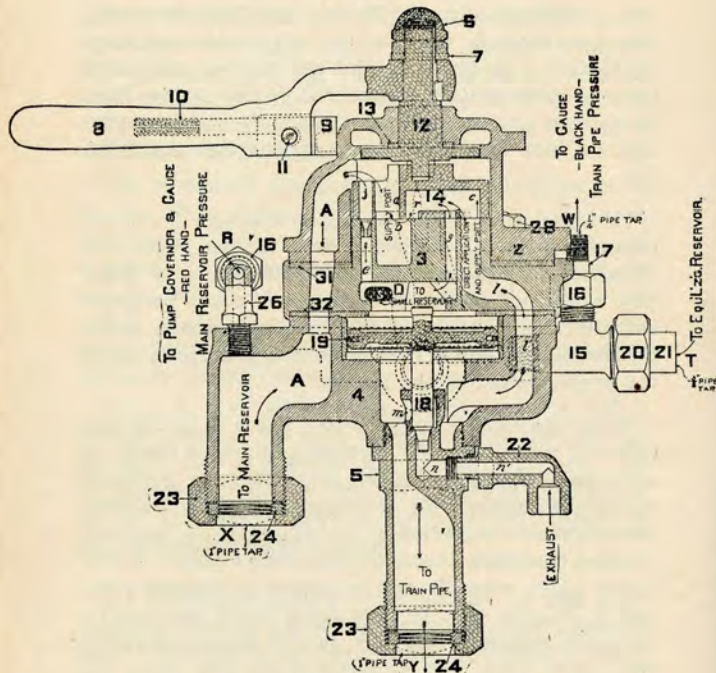
that valve, cavity *b* in its seat 3, cavity *c* in the valve (which overlaps cavity *b*) and passage *l*, *l'* to the train pipe at Y. Port *g*, being then also exposed to cavity *c*, simultaneously conducts air into chamber D above equalizing piston 18. Chamber D is, by means of passage S, and a pipe connected at T, always in open communication with the equalizing-reservoir, shown on Plate 2. Port *j* of the rotary valve registers with port *e* in its seat, and air is also conducted through these ports to chamber D. It thus occurs that, in Release position, two small ports feed the equalizing-reservoir and one large one supplies the train pipe.

The purpose of the equalizing-reservoir is to increase the volume of chamber D above piston 18. Without this reservoir, the volume would be so small that a desired reduction of pressure could be made only with difficulty, and the equalizing-piston could not be depended upon to operate in a manner to cause the proper action of the brakes.

While the handle of the Brake Valve is in Release position, "warning port" *r* (shown in dotted lines) of very small area, discharges main-reservoir pressure to the atmosphere with considerable noise, attracting the engineer's attention if he subsequently neglects to move the valve handle to Running position. If the Brake Valve were allowed to remain in Release position, a pressure of 90 pounds would result, not only in the main-reservoir, but also in the equalizing-reservoir, train pipe, and auxiliary-reservoirs, since, in this position, they are all in direct communication. To stop the escape of air through the "warning port" and to prevent overcharging brake system, the valve handle is moved to Running position.

14. RUNNING POSITION.—This is the proper position of the Brake Valve when the brake apparatus is charged and ready for an application. In this position (shown on Plate 9), the main-reservoir pressure

PLATE 7.

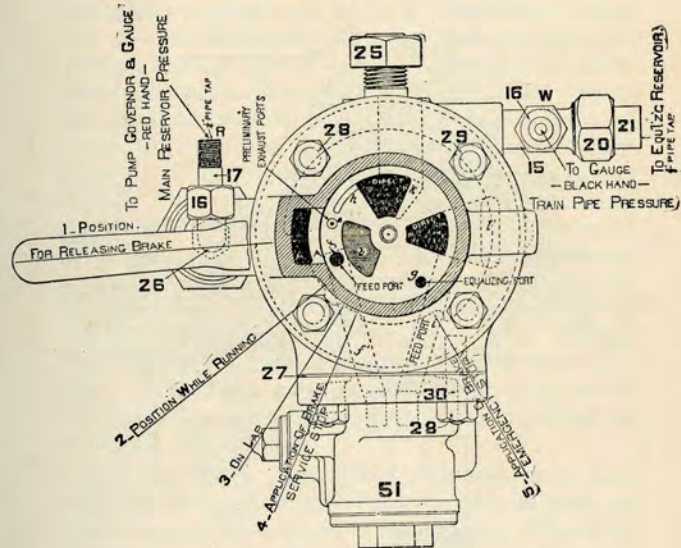


"G-6" ENGINEER'S BRAKE VALVE.

attains the proper excess above that in the train pipe. Main-reservoir air, which is always present in the chamber above rotary valve 14, is conducted by port *f* in that valve and passages *f* and *f*¹ into chamber F (Plate 8); thence, as hereafter explained, its course is through the feed valve, from which it is conducted by

passages *i*, *l* and *l*¹ (Plate 7) into the train pipe at Y. Port *g* still connects chamber D with cavity *c* of the rotary valve, and, as cavity *c* still overlaps passage *l*, the equalizing reservoir and train pipe are directly connected; the same pressure consequently exists

PLATE 8.



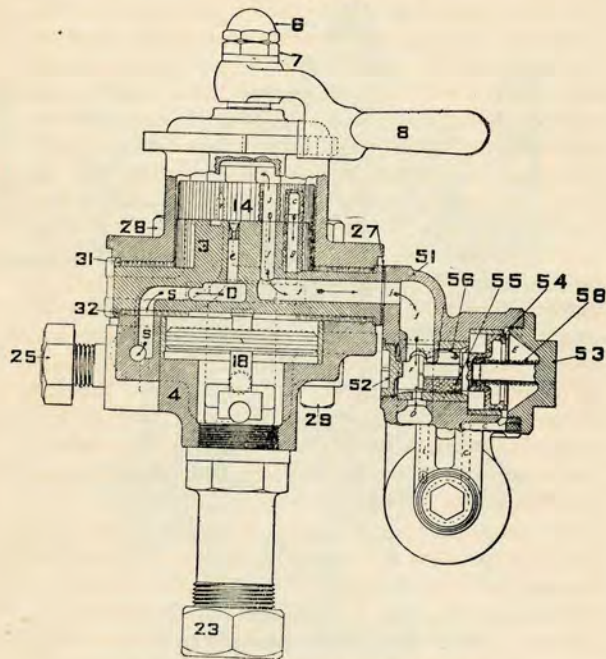
"G-6" ENGINEER'S BRAKE VALVE.

above and below equalizing piston 18. The Feed Valve is adjusted to cut off the air supply to the train pipe when the pressure reaches 70 pounds, so that charging them ceases, though the pump governor will not stop the pump until main-reservoir pressure has reached 90 pounds.

The operation of the Feed Valve is described hereafter.

15. LAP POSITION.—This position, the second from Release, is that in which all ports are operatively blanked. After the preliminary discharge of air for a service application of the brakes the valve handle is

PLATE 9.



"G-6" ENGINEER'S BRAKE VALVE.

placed in this position until it is desired to make a further train pipe reduction or to release the brakes. If the pump be started with the Brake Valve "on lap," the result will be a pressure of 90 pounds in the main-reservoir and no pressure in the train pipe when the pump is stopped by the governor.

16. SERVICE APPLICATION POSITION.—This position is the third from Release, and is used to cause the service application, as already described. A groove in the lower face of rotary valve 14 connects port *e* with groove *h* in its seat, causing air to be discharged from chamber D and equalizing-reservoir, through port *k*, into the atmosphere, thus reducing the pressure above piston 18. The greater pressure in the train pipe below the piston thereupon forces it upward and unseats the attached discharge valve, and train pipe air discharges through port *m* and passages *n* and *n'* of exhaust fitting 22, into the atmosphere. The desired reduction of pressure in chamber D having been secured, the handle of the valve is moved back to Lap position. It is to be observed, however, that after the handle of the valve has been moved to this position, air will continue to discharge from exhaust fitting 22 until the pressure in the train pipe has been reduced to a trifle less than that in chamber D and the connected equalizing-reservoir; then piston 18 automatically forces the discharge valve to its seat, through the action of the greater pressure upon its upper surface. Ordinarily a reduction of from 5 to 8 pounds in the train pipe pressure is sufficient for an initial application of the brakes.

17. EMERGENCY APPLICATION POSITION.—This position, which is the farthest from Release, is used for an emergency application of the brakes. "Direct-application-and-exhaust-port" *k* and "Direct-application-and-supply-port" *l* (Plate 8) are directly connected by means of large cavity *c* in rotary valve 14, which in this position overlaps both, thus permitting a very rapid discharge of train pipe air through large ports. The resulting sudden reduction of train pipe pressure causes the nearly instantaneous application of the brakes throughout the train, as already described.

The Slide-Valve Feed Valve.

18. Plates 10 and 11 illustrate the device known as the Slide-Valve Feed Valve, which may be used with

either the "D-5," "E-6," "F-6" or "G-6" Brake Valve, to maintain a predetermined train pipe pressure while the Brake Valve handle is in Running position.

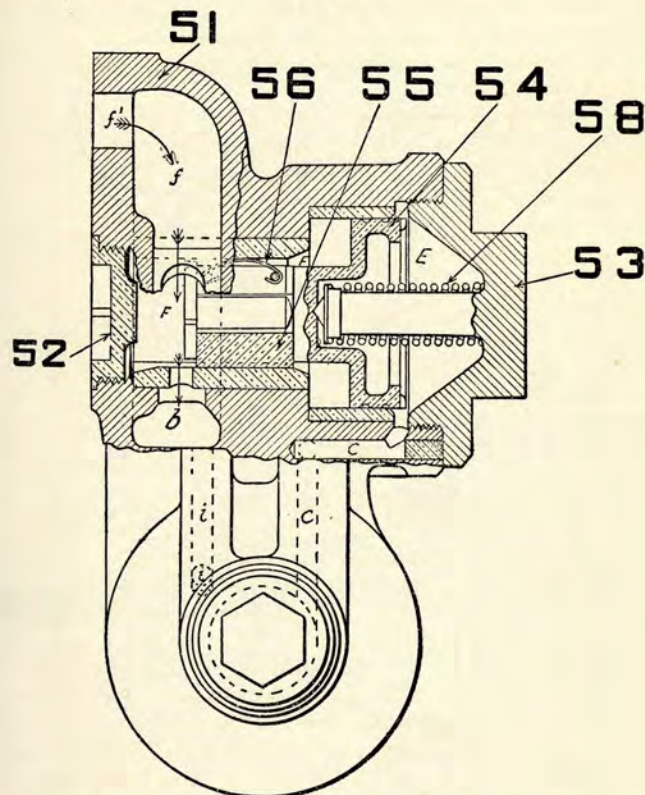
Plate 10 is a central section through the supply valve case and governing device, and Plate 11 is a central section through the regulating valve and spring box and a transverse section through the supply valve case.

Ports f^1 and i register with ports in the Brake Valve, designated by similar letters on Plate 8, and, in Running position, main-reservoir pressure constantly has free access through passages f^1 and f , to chamber F. Chamber E, which is separated from chamber F by supply valve piston 54, is connected with passage i , and thus with the train pipe, through passage c , c , port a (controlled by regulating valve 59) and chamber G, under diaphragm 57. Regulating valve 59 is normally held open by diaphragm 57 and regulating spring 67, the tension of which is adjusted by regulating nut 65. When so open, chamber E is in communication with the train pipe and is subject to train pipe pressure.

When the handle of the engineer's Brake Valve is placed in Running position, air pressure from the main-reservoir in chamber F forces supply valve piston 54 forward, compressing its spring 58, carrying supply valve 55 with it and uncovering port b , and thereby gains entrance directly into the train pipe through passage i , i . The resulting increase of pressure in the train pipe (and so in chamber G under diaphragm 57) continues until it becomes sufficient to overcome the tension of regulating spring 67, previously adjusted to yield at 70 pounds. Diaphragm 57 then yields and allows regulating valve 59 to be seated by spring 60 closing port a and cutting off all communication between chamber E and the train pipe. The pressure in chambers F and E then become equalized, through leakage past supply valve

position 54, and supply valve piston spring 58, previously compressed by the relatively high pressure in

PLATE 10.

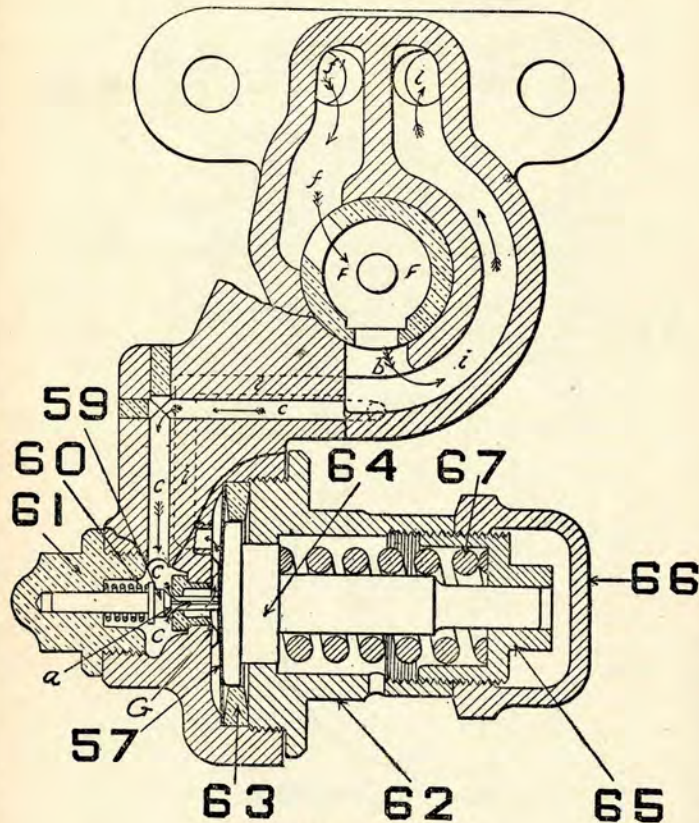


SLIDE VALVE FEED VALVE.

chamber F, now reacts and forces supply valve 55 to its normal position, closing port b and cutting off communication between the main-reservoir and the

train pipe. A subsequent reduction of train pipe pressure reduces the pressure in chamber G and permits regulating spring 67 to force regulating valve 59 from

PLATE 11.



SLIDE-VALVE FEED VALVE.

its seat, thereby causing the accumulated pressure in chamber E to discharge into the train pipe. The

equilibrium of pressure upon the opposite faces of supply valve piston 54 being thus destroyed, the higher main-reservoir pressure in chamber F again forces it, with supply valve 55, forward and recharges the train pipe through port *b* as before.

The Old-Style Feed Valve.

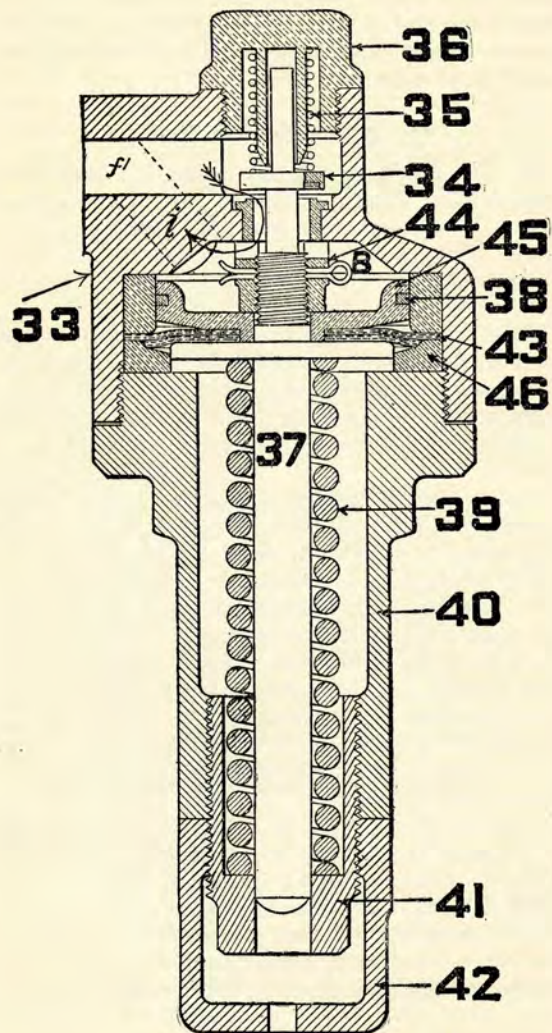
19. The accompanying cut (Plate 12) illustrates what is now usually known as the Old-Style Feed Valve. It was used with the "D-5," "E-6" and "F-6" Brake Valves to maintain a pressure of 70 pounds in the train pipe when the brake valve was in Running position.

When connected to the Brake Valve, passage *f*¹ registers with passage *f*¹ of the Brake Valve (Plate 8), and passage *i* registers with passage *i* of the Brake Valve, which passage is connected with the train pipe by means of passage *l*, *l*¹ (Plate 7), into which it leads.

Piston 45 of the Feed Valve is subject to the upward pressure of regulating spring 39 and to the downward air pressure in chamber B above the piston. The tension of spring 39 is so adjusted, by regulating nut 41, that a pressure of 70 pounds (or other desired train pipe pressure) is necessary in chamber B to overcome it and force the piston down. An upward movement of the piston unseats supply valve 34 and a downward movement permits spring 35 to seat it. Chamber B always contains the same pressure as that which exists in the train pipe, being in open communication therewith.

When the Brake Valve is in Running position and the pressure in chamber B is less than 70 pounds, regulating spring 39 will raise piston 45 and unseat supply valve 34. Air from the main reservoir, coming through passage *f*, *f*¹ of the Brake Valve, enters the Feed Valve passage *f*¹, passes supply valve 34 into chamber B, and thence discharges, through passage *i*

PLATE 12.



OLD-STYLE FEED VALVE.

and the corresponding passage *i* in the Brake Valve, into the train pipe. When the pressure in the train pipe and chamber B becomes 70 pounds, it overcomes the tension of regulating spring 39 and forces piston 45 downward, allowing spring 35 to seat supply valve 34. No further movement of air can take place through the Feed Valve until the pressure in chamber B and the train pipe becomes by leakage or otherwise so reduced that the regulating spring can again force the piston upward and unseat the supply valve.

20. When applying brakes for ordinary or station stops, move handle 8 to "on-lap" position. This blanks all ports in the rotary valve and seat. Then moving the valve handle to the position "application of brakes, service stops," the small exhaust cavity *p*, in the lower surface of the rotary valve 13, establishes communication between the two "preliminary-exhaust ports" *e* and *h*, the latter leading to the atmosphere; and after discharging about eight pounds pressure, as shown by the gauge, restore the handle to "on-lap" position. This preliminary discharge of air from chamber *d* will cause the piston 17 and its stem to rise, which operation is followed by a discharge of air from the train pipe to the atmosphere through ports *m* and *n*, applying the brakes gently. This discharge of air from the train pipe continues after the valve handle is carried to 'on-lap' position, gradually equalizing train pipe pressure, and until the train pipe pressure has been reduced slightly lower than that yet remaining in the chamber above the piston, when the latter is forced downward, and its stem to its seat, closing the outlet *n*, and preventing the further escape of air until the operation is repeated, which may be necessary to apply the brakes with the desired degree of force.

21. To throw off brakes, push handle 8 to "position for releasing brakes," causing the excess of air pressure in main-reservoir to be discharged into the train

pipe, insuring their prompt and certain release. But as the Feed Valve is inoperative in full release, care must be exercised to not overcharge the train pipe and auxiliary-reservoirs.

22. For an "emergency" application of the brakes push the handle to the extreme right, to position "application of brake, emergency stop." This operation establishes direct communication between the train pipe and the atmosphere, through the "direct-application-and-supply-port," *l*, cavity *c*, and the "direct-application and-exhaust-port," *k*, applying the brakes with full force instantly.

23. If the engineman's Brake Valve is to be located against the boiler head, make the bracket of sufficient length to prevent injury to gaskets by heat.

24. It is of the utmost importance that *direct connections be made from the engineman's Brake Valve to the main-reservoir*, instead of tapping the discharge pipe leading from the air pump to the main-reservoir. The latter practice is dangerous, as a great deal of moisture and oils is discharged into the train brake system that would otherwise be deposited in the main-reservoir, from which it can be drained.

25. A one-inch stop cock should be placed in the train pipe a short distance below the engineman's Brake Valve, within convenient reach of the engineman, and should be closed up on all but the head engine of a train where two or more engines are coupled in the same train, in order that the head engine may operate the train brakes.

26. It is important that the pipe connections to the Brake Valve be perfectly air tight, and that the valve should occasionally be cleaned. The Feed Valve 51 can be readily cleaned by unscrewing cap nuts 53 and 61.

ENGINEMEN.

27. Enginemen of passenger trains must avoid making exhibition stops, and must never, except on heavy grades or in case of necessity, hold the brakes fully applied until the train comes to a full stop, as this causes a reaction in motion of train which is very disagreeable to passengers. This can be avoided ordinarily by releasing brakes gradually before a full stop, so that all the air will be off at the moment the stop is made. *No man is fully competent in the use of air brakes who does not study and practice this point; and especially is he incompetent to handle passenger trains.*

Freight train brakes should not be released at slower speed than eight miles per hour to prevent slack of train from running out and breaking train apart.

28. Frequent breaking of or pulling out draw-heads, will, as a rule, be evidence of incompetency or carelessness of enginemen handling the train.

29. On Valley Divisions the standard train pipe pressure will be:

For passenger trains, 80 pounds.

For freight trains, 70 pounds.

On mountain divisions 80 pounds train pipe pressure will be carried on both freight and passenger trains.

With High Speed Brake 110 pounds train-line pressure will be carried on all divisions. With Schedule "U," 100 pounds train-line pressure will be carried on High Pressure Feed Valve.

30. Enginemen must know, from personal inspection of engines before leaving round-house, that the air pumps, connecting hose and couplings on engine and tender are all in perfect working order. The air pump is then to be lubricated and started for the trip, and maximum pressure pumped up with which to charge the brakes, before engine is coupled to train.

31. After coupling to train, and before leaving a terminal or car inspection station, the engineman must apply the brakes by gradual reduction to full force, and hold them on while the inspectors go over the train to make sure that all the brakes are set. Upon signal from the inspectors, the brakes may be released; then wait for the inspectors' report regarding condition and number of brakes, before starting out. Similar precautions must be taken where trains are made up, or cars are taken in or set out of trains at intermediate stations. (See Rule 67.)

32. When starting air pumps, enginemen must allow water of condensation to escape gradually, and not force it out by running the pump with full steam pressure, start up slowly; increase speed gradually.

On high pressure engines, the pump throttle must not be opened full; only with enough to supply the pump.

33. Steam cylinder of air pump must be kept lubricated with cylinder oil, and air cylinder sparingly lubricated with valve oil. Tallow and lard oils must not be used in the air cylinders.

34. It is important to drain water out of the main-reservoir daily. Open drip cups in train pipes under tenders frequently. This is especially important in case of engines equipped with the "Sweeney" device.

35. It is of very great importance that every engineman should bear in mind that the air pressure may sometimes reduce slowly, owing to the steam pressure getting low, or from the stopping of the pump, or from a leakage in some of the pipes when one or more cars are detached for switching purposes, and that in consequence it has been found absolutely necessary to provide each brake cylinder with what is called a leakage groove, which permits a slight pressure to escape without moving the piston, thus preventing the application of the brakes when the pressure is slowly reduced, as would result from any of the above causes.

36. It is thus very essential to discharge enough air in the first instance, and with sufficient rapidity, to cause all the leakage grooves to be closed. For ordinary stops, the brakes should be applied lightly by opening the engineman's valve and closing again slowly until the pressure has been reduced on the gauge from four to eight pounds.

37. The brakes are *fully applied* when the pressure as shown on the gauge is reduced thirty pounds. Any further reduction is waste of air.

38. When descending heavy grades, regulate the force of brakes so as to maintain a regular and steady speed.

The practice of running long distances on heavy grades before recharging has been found objectionable, as it causes heating of wheels. Trains should be recharged at least every two miles, and oftener if found necessary.

A greater time for recharging is obtained by considerably reducing the speed of the train just before recharging, and by taking advantage of the variations of the grades and curves.

39. Keep the engineman's Brake Valve in releasing position while recharging, thereby giving the brakes the greatest advantage in recharging quickly. Make no new application of brakes until the full amount of pressure consumed in previous application has been restored. Reduce the pressure as shown on gauge not more than fifteen to twenty pounds from one recharging to another, as it would be difficult to replenish a greater amount in so short a time, for the quick automatic Triple Valve charges the auxiliary-reservoir at the rate of about one pound per second.

40. Enginemen, upon finding that brakes have been applied by the trainmen, or by bursting of hose, or by break-in-two of train, must at once aid in stopping the train by placing the engineman's Brake

Valve to "lap" position, thus preventing the escape of air from main-reservoir, and be prepared to release brakes immediately on receiving signal.

41. In releasing brakes the handle of the Brake Valve must be removed quite *against the stop*, and be kept there for five seconds, and then moved back against the intermediate stop, which is the feed position, and where it must remain while train is running.

42. On a long train, if an engineman's Brake Valve be opened suddenly and wide, allowing the pressure to escape quickly, the brakes will be set on front end some time before those on rear end, causing a severe shock on train; then, if engineman's valve be closed quickly without giving time for the pressure to become equalized throughout the entire train, the forward brakes will become released, causing further severe shocks to the train. This mode of handling brakes almost invariably results in drawheads being pulled out and broken. (See Rule 28.)

43. When two engines are coupled to a train, the engineman of the head engine alone must operate and control the train brakes, except in case of accident to brake apparatus on leading engine, when, on signal from the leading engineer, the second engineer will assume control of the train brakes, or assist in recharging, for which contingency the second engineman must at *every moment be prepared to act instantly*, and having assumed control of the brakes, the second engineman will retain entire charge of same to end of trip, except in cases of necessity, which may reverse the operation.

43-A. Where two or more engines are used on a train, one or more being on the rear end, the following rules should apply in making stops:

The engineer on the head engine makes his stop (if the stop be made to take on water, and there is more

than one engine on the head end, they must be cut off from the train to allow the second engine to reach the tank).

When ready to start, the head man sounds two long blasts of the whistle; when the rear man is ready he answers, two blasts; head man then releases the brakes, the start is made; when rear engine reaches the point at which stop is to be made, engineer sounds one long blast of the whistle, continues to work steam, using lighter throttle, until head man makes the stop with the brakes; rear engine is then cut off, etc. In coupling up again, care must be taken that air plug in the train-line under engineer's valve be cut out before the air is turned into the train, in order to keep from releasing the train brakes. When the rear man is ready to leave, he sounds two blasts of the whistle, and is ready to assist in starting. The head man *must* release the brakes.

44. Two short, full blasts, followed by one long blast, of the whistle (thus, — — —) is signal that, for some cause, the air on the leading engine has failed and it is desired to give up control to the second engineman, who, by repeating the signal, signifies that he understands and has control of the air brakes. Two short, full blasts of the whistle, repeated three times (thus, — — — — —), is signal that head engineman desires the second engineman's assistance in recharging the train with air.

45. *Have always in mind, on mountain grades, to keep control of the train.*

46. Enginemen will understand that when train is standing, and test of signal apparatus is being made, either by car inspectors or rear brakemen (see Rules 75 and 90), they are not to whistle for flagmen.

47. The air signal pipes are intended to carry 40 pounds of air pressure. Signal pipes on engines should be tested each trip in round houses, to see that reducing valves are all right, and are carrying the proper

pressures. Car repairers in passenger yards will give air signal apparatus the same attention they do the air brakes.

HIGH SPEED BRAKE.

With the high speed brake the engine equipment consists of engine truck brake, double pump governor, double feed valves to engineer's valve, quick action triple on tank and automatic reducing valves to all brake cylinders.

The car equipment consists of an automatic reducing valve to brake cylinder.

The various valves to the equipment will be set to carry the following pressures:

Front pump governor.....	140 lbs.
Back pump governor.....	130 lbs.
Left feed valve.....	80 lbs.
Right feed valve.....	110 lbs.
Engine and tank automatic reducing valves.....	60 lbs.
Car automatic reducing valve....	70 lbs.

With this arrangement it is the intention that 110 pounds train-line pressure shall be carried at all times, and the engine must be run with the driver and engine truck cut in, except on mountain divisions, where the engines have been fitted up independently, and the driver and truck brakes can be run alternately.

The brake will be handled in the same manner that the ordinary quick action brake is used, although enginemen must exercise caution in making stops on account of the high brake pressure obtainable and the disagreeable shock to passengers in case an emergency application should be used. It must be understood that all cars and engines in such a train must

be equipped with high speed apparatus, and in case a car should be put in a train temporarily that is not so equipped, a small brass safety valve (Figure a, Plate F 48, Westinghouse Catalogue), set at 60 pounds, must be put into the oil plug hole in brake cylinder head, and in case of a double header, both engines must be equipped. If one should not be, it will be necessary to use the left Feed Valve, carrying 80 pounds train-line pressure, while such engine is on train.

DRIVER BRAKES.

48. Adjust the American Driver Brake Shoes so that the piston will have a travel of 4 to 6 inches.

On other styles of driver brakes the travel should be from 1½ to 2 inches.

49. Any defect in the working of the driver brake must be reported by engineman promptly.

50. *Engines must not be reversed with driver brakes set.*

51. On valley divisions the driver brakes must be used in making all stops.

On mountain divisions, when descending grade, driver brakes must be used in conjunction with train brakes in making all station stops, and in cases of emergency.

A too free use of driver brakes on mountain grades heats the tires of the driving wheels, expands and loosens them on wheel centers, and thus not only destroys their brake efficiency, but renders the engine unfit for draught purposes also.

WATER BRAKES.

52. The "Le Chatelier," or Water Brake, is, on this road, intended to be used as an auxiliary to other brakes, and when used with discretion is a valuable

aid in steadying a train down mountain grades. It is most effective on a steady motion of from three to twelve miles per hour, above which latter speed it is of lessened value. It should not be used at a greater speed than eighteen miles per hour, *and is for mountain work only.*

Operation of Water Brake.

53. Water is led by a small pipe connected to the boiler, below water line of same, to the exhaust pipe cavity, and through to the cylinders. This affords a counter pressure on pistons when engine is reversed, which should be just back of the center notch of quadrant. The act of forcing compressed moist vapor—which the water jet drawn into the cylinders with engine reversed supplies—back into the boiler, causes the retarding force on pistons, operating through the connections on the crank pins, and gives the desired brake power. Only a very small amount of water is used, a portion of which, except that converted into vapor and returned to boiler, passes through the open cylinder cocks. *The amount of brake power exerted depends upon the position of the reversed lever.*

54. In operating the Water Brake, first have the engine in slow motion without steam, have cylinder cocks wide open and keep them open, with reversed lever placed one notch back of the center, and throttle securely shut. Give the small water cock one-eighth of a full turn open, and notice that steam water passes the cylinder cocks freely.

55. The speed may now be regulated by placing the reverse lever back as required, and should be done without any change in the water cock. A too free use of water is dangerous to cylinder heads, and water may be forced out of the smoke-stack, and does not produce any useful effect.

56. In shutting off water brake, throw the reverse lever ahead slowly, *first closing the water cock*, to avoid throwing water from the stack.

57. It must be remembered that the Water Brake acts on the drivers, and that the combined use of water and driver brakes will be too great, causing the sliding of wheels; hence the combined use of water and driving brakes must not be made, except as provided in Rule 59.

58. Light engines, when fitted with air and water brakes, are best controlled by setting the Water Brake moderately and using the Air Brake to regulate speed.

59. In case of necessity, the Water Brake, the Air Brake and all other available means may be used together.

NOTE.—When two engines are coupled to trains descending mountain grades, the engineman not operating the Air Brake must assist in retarding speed by using the Water Brake to some extent, with the view of preventing flat and heated wheels. The Water Brake should not be used at a greater speed than eighteen miles per hour.

THE SWEENEY AIR COMPRESSOR.

60. The Sweeney Air Compressor is a device attached to engines as an auxiliary, to enable engineers to maintain air-pressure in train pipes in case of failure of air-pump, or in recharging when descending mountain grades.

61. This device consists of a valve and spring to resist a pressure of 90 pounds, attached to top or side of steam chest, as most convenient to suit style of engine; a globe valve placed between safety valve and steam chest, this valve being operated from the cab of engine; a discharge pipe connecting steam chest and main air-reservoir, and in discharge pipe is placed a check valve, preferably close to main-reservoir.

62. When it is necessary to use the device, *steam*

being shut off, the reverse lever is placed slightly back of center notch, and the cylinder cocks left open for three or four revolutions of the engine to allow water that may be in the cylinders to escape; then open the globe valve and place the Brake Valve in charging position.

The reverse lever must be left back of center notch at least fifteen seconds after full pressure has been indicated on the air-gauge.

63. Then, before the reverse lever is moved forward, place the Brake Valve on the lap; and, in case the air-pump is not working, the globe valve should be closed, as the pistons will draw air from the main-reservoirs before the check valve will close.

64. By placing the Brake Valve on the lap, and closing the globe valve before moving the reverse lever forward, sufficient pressure will be retained in the main-reservoir to release the brakes.

65. After the air compressor has ceased to work, the Brake Valve should be left on the lap at least five seconds, so that the air in the train will have time to equalize. If air is used immediately after moving lever ahead, there being a higher pressure in the train pipe than in auxiliary-reservoirs, air will be wasted, as the air in train pipe must be reduced to a lower pressure than that in auxiliary-reservoirs to set the brakes; but if time be allowed to let the air equalize, all air that has been forced back may be used to advantage.

66. Steam must never be used through the Sweeney device; and enginemen must use great care to prevent opening of globe valve when working steam, and promptly report any leakage of globe valve.

This device to be used only in case of emergency, or as provided by Rule 59. It must be tested by all enginemen immediately after leaving terminals to ascertain if it is in proper working order, and if not, the fact must be reported by wire from the first telegraph office reached.

TRAINMEN.

67. Either the conductor or the rear brakeman will station himself opposite the rear car and note from personal inspection that the brakes are applied by the engineer, as provided in Rule 31.

After making up, setting out cars from or adding cars to the train, or after change of engines between terminal stations, trainmen shall ascertain whether the brakes are connected through the train, and see that the stop cocks in train pipe are all open, except the stop cock on rear of the last car, which should be closed. Car inspectors will make this test at all terminal stations. The rear brakeman will then proceed to apply the brakes by opening the cock at rear end of last car in train gently, allowing only enough air to escape to apply the brakes slowly and firmly, *but without making the emergency application*. Having thus applied the brakes he will close the cock, and if the brakes are at once released it is plain that all cocks between the rear of train and the engine are open. If the brakes do not release promptly it indicates that there is some obstruction which prevents the air from flowing back through the train pipe. This must be remedied before the train starts. This test must also invariably be made by the rear brakeman at stations, at the summit and foot of all mountain grades (whether any switching is done at such station or not); and in case a train passes over a division without change in its makeup, this test must also be made at two or more intermediate stations between terminals, whether on grades or levels, such intermediate stations to be designated by the Division Superintendent.

In addition to the usual inspection of air brakes made at points where trains are made up, the engineer after starting the train should make a trial application of the brakes, so as to be certain they are in

proper working order. This trial application should be made immediately after getting under way, before the speed of the train exceeds six miles per hour, and in every case where the train pipe has been broken or interfered with, through cutting out or taking on a car, breaking in two, sticking of brakes, etc.

The conductor must not give the starting signal at such stations until assured by the rear brakeman that the brakes have been applied and released properly.

68. Brakemen must at each station (and between stations on grades where trains are moving under control of the air brake) listen for the exhaust of air from the brake cylinder when the brakes are released by the engineman, and if they fail to hear this on any car, an immediate examination should be made of the brakes.

In addition to all other rules and instructions relative to the automatic brake, it is hereby ordered that the rear brakeman at every station on mountain grades, and at each alternate station on other parts of the road, shall get out and observe whether or not the brakes apply properly in making the stop, and release properly before starting. If he finds the brakes do not apply and release properly, he must immediately report the fact to his conductor, who will take necessary action to remedy the defects.

69. Before starting up or down mountain grades, the trainmen must examine brakes and air apparatus carefully. When it is found necessary to cut out brakes on cars, the engineman should be notified of all cars so cut out.

70. Before descending mountain grades, the handles of Retaining-Pressure Valves must be turned up (see Rule 7) on all cars, except mail and express cars without end doors. Watch the wheels closely to prevent heating or sliding. At foot of grade, the handles of all Retaining-Pressure Valves must be turned down. (See Rule 8.)

On all passenger trains, at all station stops, descending mountain grades, the brakemen will turn down the Pressure-Retaining Valves as soon as station stop is made, leaving them turned down until after brakes are released and train started, when they will again be turned up.

At water tanks the retainers must not be turned down until enginemen have taken water.

71. Trainmen will be held responsible for sliding and flattening of wheels.

72. The conductor's valve must be used to stop trains only in case of emergency. By use of the conductor's valve the brakes are applied suddenly and with full force, causing the wheels to slide, and disarranging adjustment of brakes.

73. The conductor must note on cards provided for the purpose all defects of air brakes on his train, and hand the card to the car inspector at the end of the trip; when no defects to report, note on card "Brakes O. K."

74. It is the duty of trainmen and yardmen, when detaching air-hose between cars, to properly couple hose to the dummy coupling. (See Rule 3.)

75. When passenger trains are cut at a way station, and cars are set out from or added to the trains, and rear brakemen make the test of the automatic brake (as per rule 67), they will also test the air signal apparatus in the same manner as car inspectors do at terminal stations. (See Rule 90.)

Conductor must not start train until assured that air signal apparatus is working properly.

76. In case anything should happen to air signal valve in a car, the air signal can be cut out of that car by closing the cut-out cock just below signal valve.

77. In giving air signals from train, each exhaust of signal valve must be clear and distinct, and at an interval of from one to two seconds between each exhaust; otherwise the signals will run together.

78. The air signal hose couplings are painted red, and all concerned should understand that they will not couple with air-brake hose couplings.

79. Hose couplings of air signal apparatus must be hung up in dummy couplings when not in use.

THE AUTOMATIC REDUCING VALVE.

When air enters the brake cylinder from the auxiliary-reservoir, it has free access to the Reducing Valve through a pipe connected at Z (Plate 28, Fig. 2), so that chamber *d*, above piston 4, is always subject to brake cylinder pressure. Regulating spring 11, adjusted by nut 12, provides a resistance to the downward movement of piston 4, which is finally arrested by spring box 3. Combined with piston 4 is its stem 6, fitted with two collars, which control the movements of Slide Valve 8. Slide Valve 8 (Plate 30) is provided with a triangular port *b* in its face, which is always in communication with chamber *d*. Port *a* in the Slide Valve seat leads directly to the atmosphere, through exhaust opening Y (Fig. 1, Plate 28.)

In Fig. 1, Plate 28, Slide Valve 8 and its piston 4 are shown in their normal positions, occupied so long as brake cylinder pressure does not exceed 60 pounds.

It will be noted that, in Release position (Plate 30, Fig. 1), port *b* of Slide Valve 8 does not register with port *a* of its seat, so that, when the brakes are applied, the air-pressure is retained in the brake cylinder and is subsequently released in the usual way, unless it becomes sufficiently great to overcome the tension of spring 11 and force piston 4 downward.

When brake-cylinder pressure begins to exceed 60 pounds in a heavy service application, the pressure

PLATE 28.

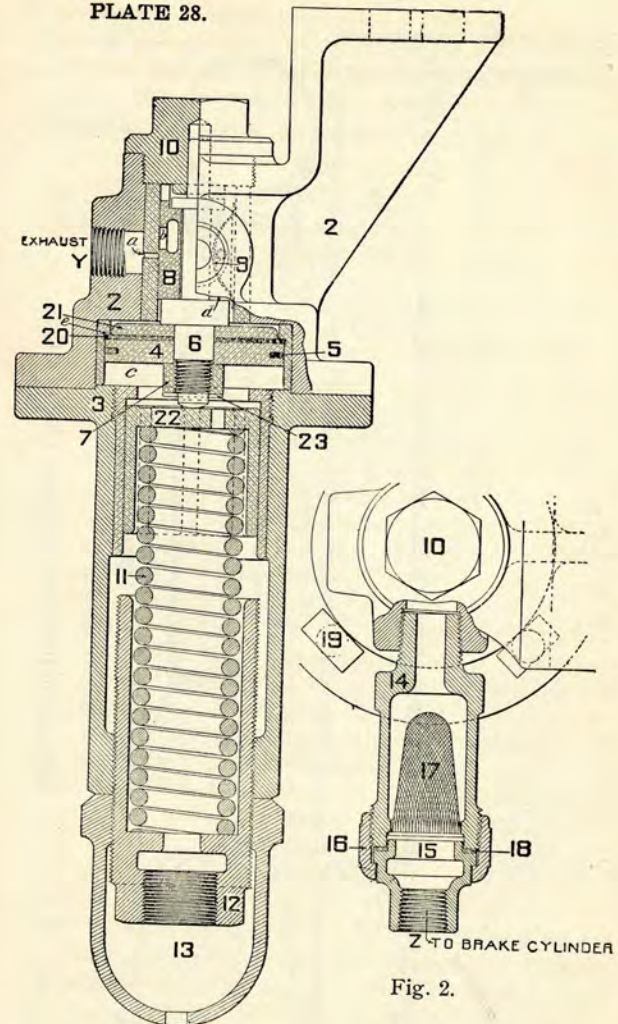
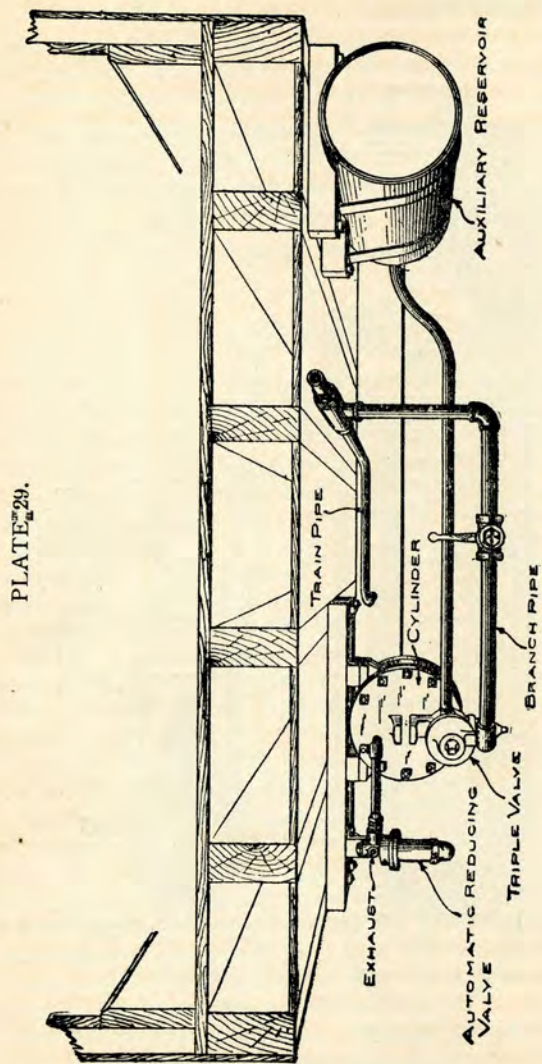


Fig. 1.

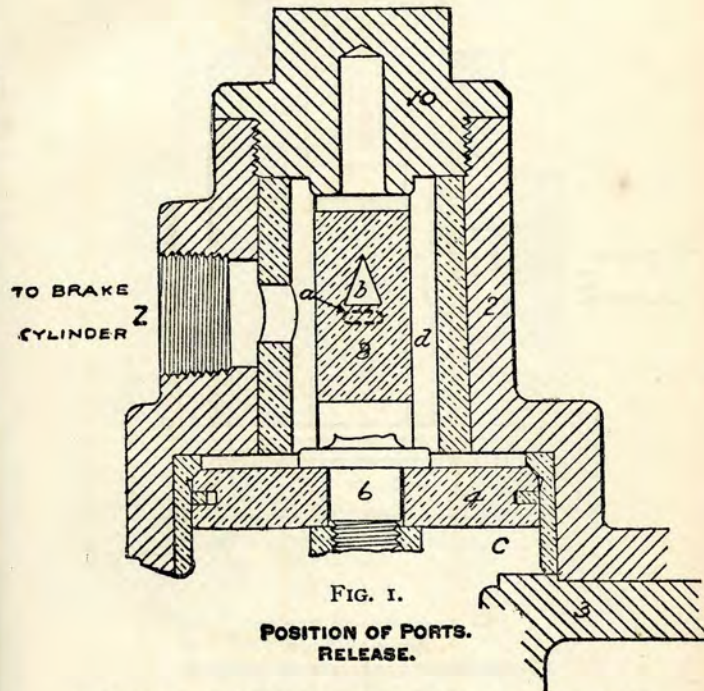
AUTOMATIC REDUCING VALVE.



AUTOMATIC REDUCING VALVE APPLIED TO A CAR.

upon piston 4 moves it downward until port *b* in the Slide Valve registers with port *a* in its seat, as shown on Plate 30, Fig. 2, in which position any surplus brake cylinder pressure is promptly discharged to the atmosphere. Spring 11 then raises the piston and

PLATE 30.



Slide Valve to their normal positions (Plate 28, Fig. 1), closing the exhaust port and retaining 60 pounds pressure in the brake cylinder. In the operation just described, the greatest width of port *b* is exposed to port *a* and these ports are so proportioned that, in this particular position, the surplus air is discharged

from the cylinder fully as rapidly as it is admitted through the service application port of the Triple Valve.

The position assumed by piston 4 and Slide Valve 8

PLATE 30.

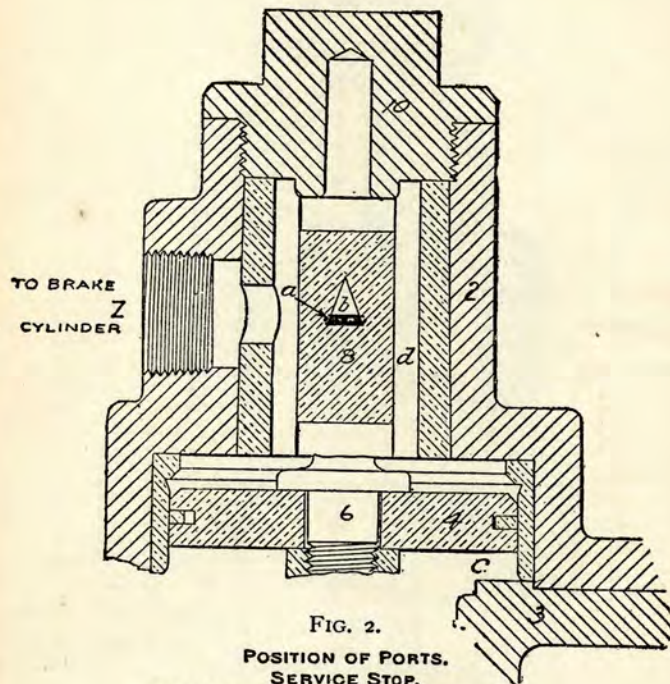


FIG. 2.
POSITION OF PORTS.
SERVICE STOP.
PRESSURE EXCEEDING 60 POUNDS
IN BRAKE CYLINDER.

in an emergency application of the brakes, are shown on Plate 30, Fig. 3. The violent admission of air into the brake-cylinder then so suddenly increases the pressure that piston 4 is forced to the lower end of its entire stroke, in which position the apex of triangu-

lar port *b* in the Slide Valve is brought into register with port *a*, and a comparatively slow discharge of brake cylinder pressure takes place while the train is at its highest speed; but the area of the opening of port *b* gradually increases as the reducing pressure

PLATE 30.

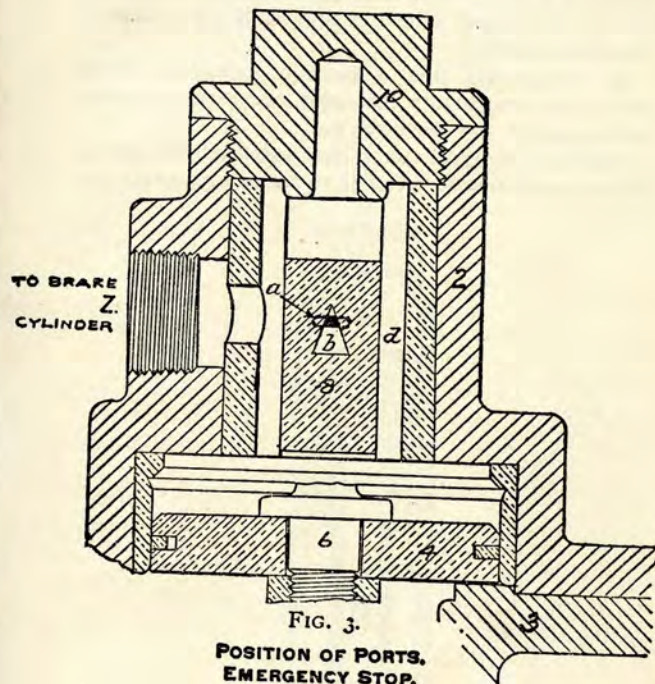


FIG. 3.
POSITION OF PORTS.
EMERGENCY STOP.

above piston 4 permits spring 11 to slowly raise the piston and Slide Valve. The rate of the discharge thus increases as the speed of the train decreases, until, finally, when the brake cylinder pressure has become reduced to 60 pounds, port *a* is closed and the remainder of the brake cylinder pressure is retained until released in the usual way through the Triple Valve.

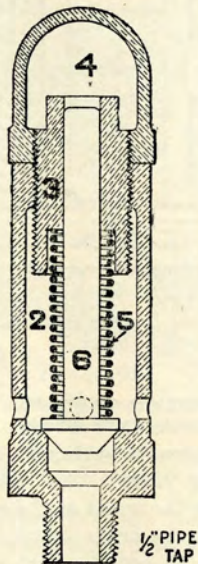
When an emergency application of the brakes occurs at high speeds, there is little danger of wheel sliding, and it will be observed that port *b* is so shaped that brake cylinder pressure escapes slowly; while at lower speeds, where a heavy service application is more likely to occur, and there is a greater tendency toward wheel sliding, the base of triangular port *b* is exposed, allowing brake cylinder pressure to reduce quickly.

It is essential that Automatic Reducing Valves should be occasionally inspected, to prevent possible leaks through the discharge port.

Cars not equipped with the Automatic Reducing Valve should not be attached to trains employing the

High Speed Brake, unless the brake cylinders are equipped with the Safety Valve provided for temporary use in such cases. The Safety Valve (illustrated on Plate 31) has been especially designed to prevent a higher than standard pressure in the brake cylinders of cars not equipped with the Automatic Reducing Valve; it may be quickly screwed into the oiling hole of the brake cylinder head, and removed when the cars are again in ordinary service.

PLATE 31.



SAFETY VALVE.

CAR INSPECTORS.

80. Inspectors must be prompt and regular in the discharge of their duties, and allow no defects in air-brakes to go unheeded.

81. Cylinders and Triple Valves must be cleaned and oiled once thoroughly every three months.

82. Packing leathers should be examined carefully each time cylinder is cleaned. If the leather is found broken or worn thin, it should be removed and replaced with a new one. Where leather is found in good order, or only slightly worn, give the piston a half turn (bottom side up), so as to allow an equal wear on both sides of the packing.

83. In oiling Triple Valves use mixture of one part of headlight oil and one part of lard oil. For cylinders, use car oil; clean all parts thoroughly, and note that all passages are open and clear of dirt. See that leakage groove in cylinder is clear of dirt before replacing piston. Before replacing cylinder head, move piston back and forth a full stroke to insure that it works freely.

84. Note with white lead, in proper place on cylinder, date of cleaning and oiling.

85. Water of condensation must be drained from auxiliary-reservoirs and Triple Valves frequently, especially in cold weather.

86. Inspectors must see that all passenger air-brake cars are supplied with dummy couplings, properly located as not to kink hose when coupled to it. Dummy couplings must be secured to chains.

87. It is the duty of the car inspectors to receive defect cards from conductor at end of trip, repair defects, sign card and return to Division Superintendent.

88. Inspectors must not allow trains to depart from terminal points until brakes are applied from the engine and they have satisfied themselves that all brakes in the trains are in good order; then report to engineman regarding condition and number of brakes in train. (See Rule 31.)

Car inspectors will make the test from rear of train at all terminal stations as provided in Rule 68.

89. Car inspectors at terminal stations will give the same attention to the air signal apparatus as they do to the Automatic Brakes, as per Rule 67.

They will see that the pipes and hose are tight, and that Signal Valves in each car are in good working order.

90. The signal for *releasing* brakes on passenger trains will be four short blasts of the air whistle given by inspectors from rear of train, which will also serve to test the whistle.

BAKER HEATERS.

To insure satisfactory results in the use of the heater, the following instructions must be strictly observed:

1. The heater should be kept half full of coal at all times. The coal should never be allowed to get below top of worm. This will give about fifteen inches of fire.

2. The inside safety lid should never be opened except to build the fire or to put in coal. (Never force the fire by opening inside safety lid.)

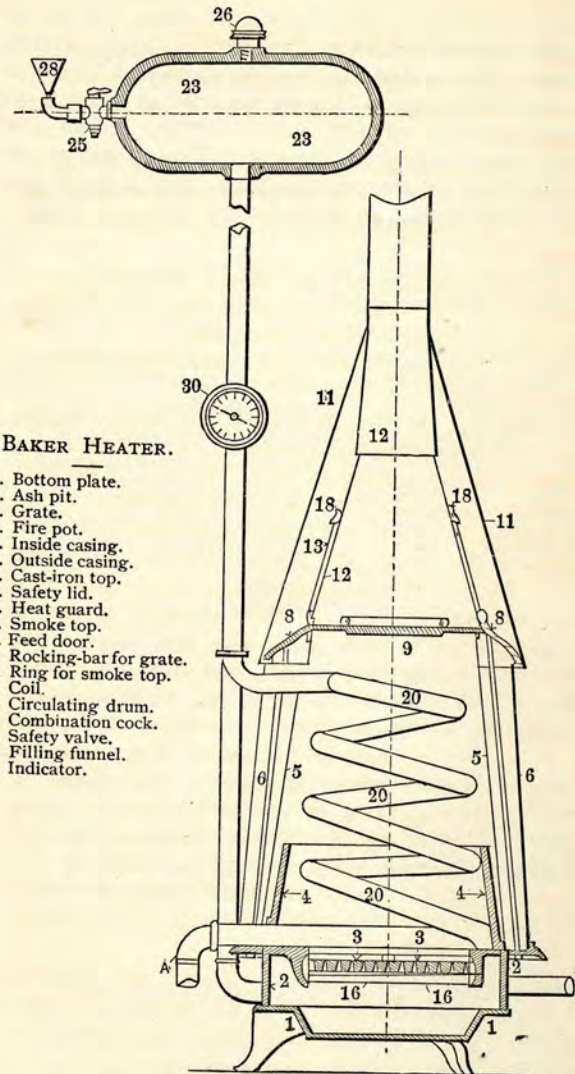
3. To increase the heat, open inside lower damper, and close upper damper.

4. To reduce the heat, close the lower damper and open the upper damper about two inches, or according to the amount of heat required. With both dampers closed the car will not be too warm at any time, and by proper working of the lower and upper dampers, the car can be kept at any temperature desired.

5. Failure of the heater arises from neglect or mismanagement, generally from allowing the fire to run too long without putting in coal, then filling them full and opening drafts, producing a rapid fire, which, instead of warming the car, stops the circulation and creates gases, which are liable to explode.

6. It will be readily understood that, with the large amount of piping in the cars, the circulation (which is principally caused by the weight of the column of water falling from the drum into the pipes and the difference in weight of a column of cold and hot water) must be necessarily slow, and that a forced fire will do no good, but will only cause the effect mentioned above.

7. In filling the heater pipes, be sure that the water contains all the salt it will hold in solution, and that no undissolved salt enters the drum. Open



the combination cock on end of drum, on top of car, and pour in water until it runs freely from same. The water should always stand at height of combination cock, which may be tried by opening the cock, but only when the fire is very low and no pressure on. Pipes should be warm all round before passengers enter the car. It takes from three to four hours to get up a good circulation.

DIRECTIONS FOR THE MANAGEMENT OF STEAM HEATING ON TRAINS.

Rules for Making Up Trains.

When a train is made up, all steam hose should be coupled and all the cocks or valves in the steam train pipe the whole length of the train should be opened.

When signal is given, steam should be turned on at the cab, and allowed to blow through the entire length of the steam train pipe.

After steam issues at the rear end of the train pipe, the rear train pipe cock or valve of last car should be closed, and reducing valve in cab set to 40 pounds pressure. If more than eight cars are in the train, add five pounds for each additional car. In very cold weather, the rear train pipe cock or valve should be left open enough to allow a little steam to pass, and escape through the rear coupling.

Regulation of Temperature.

To heat cars open steam inlet valves on each car, and when live steam appears at the drips, set each drip so that a little steam escapes with the water. If a trap be used, see that it is adjusted to allow hot water, but not steam, to escape.

Frequently examine traps and drip valves to see that they are operating properly. The latter should be as hot as can be borne by the hand. If cooler, or cold, they should be opened a trifle, or if steam is blowing, closed a little.

Changing Engines.

When approaching stations where engines are to be changed, or terminals where cars are to be laid up, five minutes before arriving at such stations the rear train pipe cock or valve must be opened

wide, and before coming to a stop at such stations, the engineer must shut off steam at boiler valve. Do NOT USE REDUCING VALVE FOR THIS PURPOSE.

If engines are to be changed, trainmen must satisfy themselves that STEAM IS SHUT OFF AT ENGINE BEFORE UNCOUPLING CARS.

In freezing weather, if cars are to be laid up, or stand thirty minutes after engine is uncoupled, the hose throughout the train must be uncoupled, and all valves opened.

(10-24-02-20M.)



