INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE PENNSYLVANIA RAILROAD AT MANHATTAN TRANSFER, N J, FEBRUARY 24, 1925

MARCH 19, 1925

TO THE COMMISSION

On February 24, 1925, there was a rear-end collision between two passenger trains on the Pennsylvania Railroad at Manhattan Transfer, N J, which resulted in the death of 3 employees, and the injury of 36 passengers, 21 employees of the railroad, and 2 Pullman employees The investigation of this accident was conducted jointly with the New Jersey Board of Public Utility Commissioners As a result of this investigation I respectfully submit the following report

LOCATION AND METHOD OF OPERATION

That part of the New York division of the Pennsylvania Railroad upon which this accident occurred is a double-track line extending westwardly from the Pennsylvania Station in New York City to Manhattan Transfer, N J, a distance of 8 8 miles The tracks extend through tubes under the Hudson River, thence westward upon a fill, passing over the Hackensack River drawbridge, the Erie Railroad, the Delaware, Lackawanna & Western Railroad, and the Jersey City line of the Pennsylvania Railroad The fill upon which this track is located extends to within less than 1 mile of Manhattan Transfer, from the western end of the fill there is a 0 5 per cent grade descending westward 2,700 feet in length, followed by level track for 908 feet to the point of accident Approaching Manhattan Transfer from the east there is a compound curve to the right of 0° 30′ reducing to 0° 22′, for a distance of 3,800 feet, and the track is then tangent for a distance of 3,264 feet to the point of accident

The line between New York and Manhattan Transfer is equipped with automatic block signals, each track being signaled for movements in both directions, and automatic train-stop devices are installed in connection with signals in the tunnels and approaching Hackensack River drawbridge In this territory there are three interlocking plants, train movements at the west end of New York station being controlled from tower A, located in the Pennsylvania

Station yard, a short distance east of Ninth Avenue, movements over Hackensack River drawbridge are controlled from tower W, 5 8 miles west of tower A, and movements over the several tracks at Manhattan Transfer are controlled from tower S, which is located 2 5 miles west of tower W and 556 feet east of the westbound platform at Manhattan Transfer

Approaching tower S there are four home interlocking signals governing westbound trains, namely, signal 64–L, 4,323 feet east of tower S, signal 54–L, 711 feet west of signal 64–L, signal 66–L, 1,835 feet west of signal 54–L, and signal 70–L, 1,467 feet west of signal 66–L Signal 70–L is 310 feet east of tower S

The weather was clear at the time of the accident, which occurred at 9 33½ a m

DESCRIPTION

The trains involved in this accident were train No 185, en route from New York City to Key West, Fla, and train No 219, en route from New York City to Philadelphia, Pa Train No 185, in charge of Motorman Newman and Conductor Farwood, consisted of electric locomotive 35, one baggage car, one dining car, five sleeping cars, one parlor car, and one dining car, in the order named, all cars being of steel construction This train left New York at 9 15 a m, on time, and stopped at Manhattan Transfer at about 9 31 a m At that point the electric locomotive was detached and a steam locomotive coupled, while this coupling was being made the rear end of this train was struck by train No 219

Train No 219 consisted of electric locomotive 12, six coaches, and one baggage car, in the order named, all cars being of steel construction and being equipped with UC brakes This train, with Conductor Willard and Motorman Keilt in charge, left New York at 9 20 a m, on time, passed tower W at 9 29 a m, passed signals 54–L and 66–L in caution position, signal 70–L in stop position, passed tower S at 9 33 a m, and collided with the rear end of train No 185 while running at an estimated speed of 30 miles an hour

The force of impact moved train No 185 ahead a distance of approximately one-half car length Electric locomotive 12 struck the dining car on the kitchen end, overrode the steel center sill, and plowed its way approximately to the middle of the car, and then turned over on its left side The steel sides and roof of the dining car were sheared off and forced upward and outward, slightly damaging the station platform roof The leading unit of the electric locomotive was torn loose from its truck and came to rest on its left side, fouling track 3, the adjoining track toward the south The rear unit of the locomotive was partially overturned and was derailed, it was broken loose from the leading unit but remained

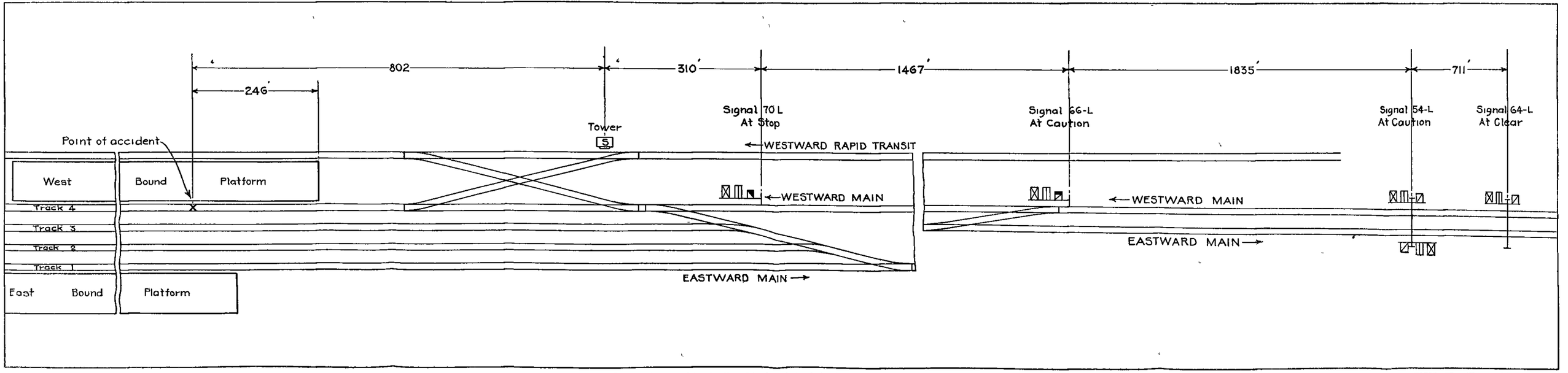

Diagram showing relative location of tracks and signals in vicinity of point of accident

coupled to the train The dining car was practically destroyed and the electric locomotive was badly damaged, other cars in the two trains sustained relatively slight damage, principally to brake rigging and draft gear The employees killed were two car inspectors, who were making the coupling between the steam locomotive and cars of train No 185, and a chef in the rear dining car of train No 185

SUMMARY OF EVIDENCE

The only member of the crew of train No 185 who prior to the accident had any warning of the impending danger was Flagman Keeley Flagman Keeley stated that when his train stopped at Manhattan Transfer he picked up his flagging equipment, went out upon the station platform, and while standing near the east end of the station platform his attention was attracted by several blasts of the whistle on the motor of the approaching train He immediately began giving stop signals with his flag and also noticed that the first interlocking signal east of the platform was in stop position Flagman Keeley stated that he ran down off the end of the station platform and started back, continuing to give stop signals When the motor had reached a point approximately opposite tower S he saw the motorman's helper jump off and then saw the motorman come out on the front step As the train approached the motorman called to him, "Get away, I've lost my air, get away," but he was then too far away from his train to give any alarm The motorman jumped off just before reaching the flagman, and as the collision occurred the brakes on the cars of train No 219 applied in emergency He stated he helped the motorman get up and the first thing the motorman said was, "I lost my brakes" He estimated that the speed of train No 219 as it passed him was about 30 miles an hour

Car Inspector Brady stated that he was on the station platform at the rear of train No 185 when he noticed that train No 219 was approaching at a high rate of speed and not slowing down as it should He saw some one jump from the motor, and realizing that a collision could not be prevented he called a warning to the occupants of the dining car and then ran around the end of the waiting room on the station platform to get out of danger He stated he did not hear the whistle signals of the approaching train nor did he hear the emergency whistle signal sounded from tower S

Train Director Badter, who was on duty at tower S, stated that about 9 33 a m he was attracted by whistle signals from train No 219 as that train approached tower S and while it was between signals 66–L and 70–L He stated that at that time signals 54–L and 66–L were at caution and signal 70–L was at stop Thinking that

the approaching train was not going to stop for the stop signal, he instructed the leverman in the tower to sound the emergency whistle signal which requires all trains moving within the interlocking limits immediately to come to a stop This signal was sounded but train No 219 continued to approach at undiminished speed Before the train reached the tower the motorman came out of the front door and began to wave his hands, but it was impossible to prevent a collision by diverting the train to another track, as all of the station tracks were occupied He thought the speed of the train passing his tower was 25 or 30 miles an hour, he noted that the wheels of the motor were locked and sliding, but did not notice fire flying from any of the car wheels Other employees in the tower corroborated Mr Badter's statements except that the estimates of speed varied from 20 to 30 miles an hour

As train No 219 approached Manhattan Transfer, Conductor Willard and Head Brakeman Farley, who had been collecting transportation, were in the rear end of the third coach from the engine Flagman Thomas was in the fifth or sixth car and Baggage Master Critchlow was in the rear car Prior to the accident none of these employees noticed anything unusual in connection with the operation of their train, nor had they heard the whistle signals for brakes which were sounded by the engineman of train No 219 or the emergency whistle sounded at tower S The first indication that any of them had of danger was the shock of the collision None of them noticed the running test of the brakes leaving New York station nor any application of the brakes between New York and the point of accident Conductor Willard stated that when the trains collided the train line was broken and the brakes on the train applied in emergency With respect to the motor whistles, Conductor Willard stated that they are not as clear and shrill nor as easy to hear as steam-locomotive whistles, and Brakeman Farley stated that the motor whistles have a low tone, quite similar to the rumble of the train, and are difficult to hear Baggage Master Critchlow stated that when the baggage car is on the rear of the train he is unable to hear the motor whistles, but when his baggage car is operated next to the locomotive he is able to hear it

Car Inspector Blumett, who was on duty at the Pennsylvania Terminal in New York, stated that on the morning of February 24, after completing his inspection of a train due to leave at 9 o'clock, he went to track 2 to inspect train No 219 The cars of train No 219 had been standing on this track for a considerable period of time and the brake-pipe angle cock on the head end of the first car was open When the motor was coupled on he stated he opened the angle cock on the rear of the motor and then as the train brake system was being charged he went back over the train inspecting for leaks

and to determine whether any of the emergency valves were unseated He found no leaks and when he reached the rear end of the train he pulled the whistle cord to determine whether the train signal system was connected and operating properly, this test indicated that the train signal system was properly connected He then returned to the head end of the train and waited until the brake pipe was fully charged and the motorman applied the brakes This was done at about 9 09 a m He then inspected the train brakes a second time and ascertained that all brakes had applied properly, at the rear end of the train he pulled the whistle cord four times, the signal for the motorman to release the brakes, and as he returned to the head end of the train he inspected the brakes on each car and ascertained that all released properly He told the motorman the brakes were O K on seven cars and that the train was No 219 He then got upon the platform and gave Conductor Willard the same information Afterwards he walked up the exit steps and waited until the train departed He stated positively that when he opened the angle cock on the rear of the motor he opened it wide and the handle dropped into its locked position, that he did not again close the angle cock, and that he saw no one else around that part of the train who might have done so

Motorman Keilt, of train No 219, stated that on the day of the accident he signed up for duty at Sunnyside Yard at 6 05 or 6 10 a m, got on his motor at about 6 20 a m, and between that time and the time of backing in against train No 219 made some switching movements having no connection with train No 219 Shortly before 9 o'clock he moved his motor in on track 2, to pick up train No 219, and the motor was coupled to the train at about 9 02 or 9 03 a m, when the air inspector appeared After the coupling was made there was a considerable drop in brake-pipe pressure, indicating that the angle cock had been opened and the brake system of the train to which his motor was coupled was empty or nearly empty of air A period of seven or eight minutes was required to charge the train and a terminal test of the brakes was then made This terminal test consisted of a 15-pound brake-pipe reduction to apply the brakes, and the brakes were left applied to enable the car inspector to examine them and until he received a whistle signal from the rear end to release After the brakes were released the inspector returned to the motor and told him that the brakes were O K on seven cars

This train departed at 9 20 a m, on time, and after running a distance of 10 or 12 car lengths, when a speed of approximately 18 miles an hour had been attained, he made the usual running test of the brakes, which consists of an 8-pound brake-pipe reduction, followed shortly afterwards by another reduction, in this case of about 4 pounds This test was made with the power on, and as he noticed

a reduction in speed he considered the test satisfactory and released the brakes The running test was completed before entering the tunnel West of the tunnel the train attained a speed of approximately 55 miles an hour, which is the maximum speed permitted by rule on this line, and Motorman Keilt stated that he shut off the power some distance east of Hackensack River drawbridge, over which there is a speed restriction of 45 miles an hour, and allowed the train to drift to the drawbridge as the speed had been sufficiently reduced, he did not apply the brakes at that point After passing over the drawbridge he again used power and maintained the usual speed of 50 or 55 miles an hour until he approached signal 64–L, approximately 1 mile east of Manhattan Transfer He then saw signal 54–L, a short distance beyond, which displayed a caution indication He shut off power and attempted to apply the brakes, making a brake-pipe reduction of about 8 pounds Feeling little or no response to this application, he made another reduction of about 10 pounds, still obtaining little or no response, he remarked to his helper that the brakes were not very good and he placed the brake valve in emergency position Still failing to obtain proper action of the brakes, he reversed the motor and applied power and this resulted in locking the motor driving wheels During this time he also sounded the whistle signal calling for brakes and repeated this signal two or three times As his train approached tower S he could clearly see the train at the station platform on the same track, and while he had done everything in his power on the locomotive to stop the train and the speed had been somewhat reduced he realized that the brakes were not working properly and he told his helper to get ready to jump He then went out on the front end of the motor and attempted to attract the attention of the towerman in the hope that his train might be diverted to an unoccupied track He remained on the front end of the motor shouting and giving hand signals until within a short distance of the station platform and then jumped just before the collision occurred He stated that he was somewhat stunned by the fall and did not examine the brake equipment after the collision occurred in order to ascertain the reason why his train brakes failed to work

Road Foreman of Engines Garabrant stated that he arrived at the scene of the accident, accompanied by Assistant Road Foreman of Engines Mayo, at about 10 10 a m , and that he and Mr Mayo discovered that the brake-pipe angle cock on the rear end of electric locomotive 12 was nearly closed This angle cock is of the self-locking type, and the cock was not closed sufficiently to allow the handle to drop into locked position Careful examination of the angle cock failed to disclose any mark or scar upon it, and the paint

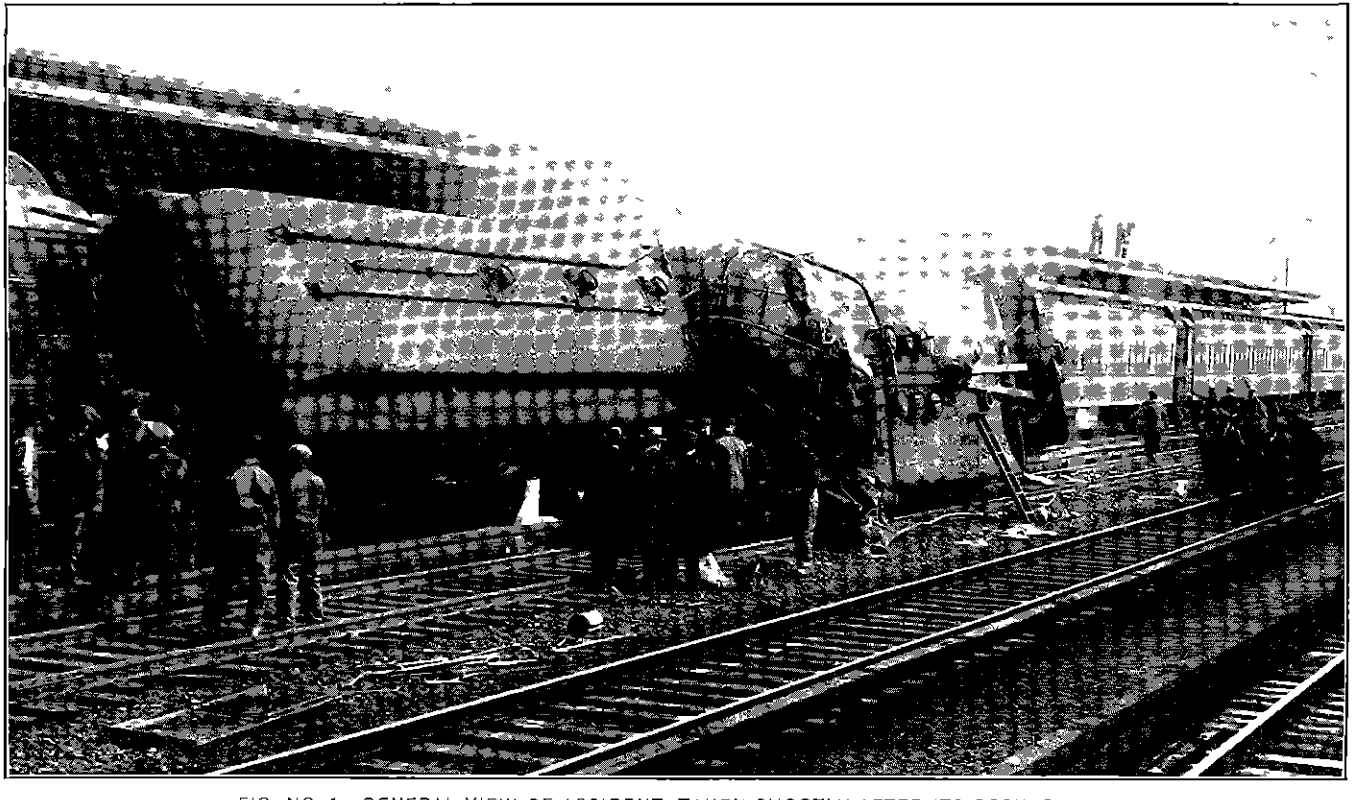

FIG NO 1—GENERAL VIEW OF ACCIDENT TAKEN SHORTLY AFTER ITS OCCURRENCE

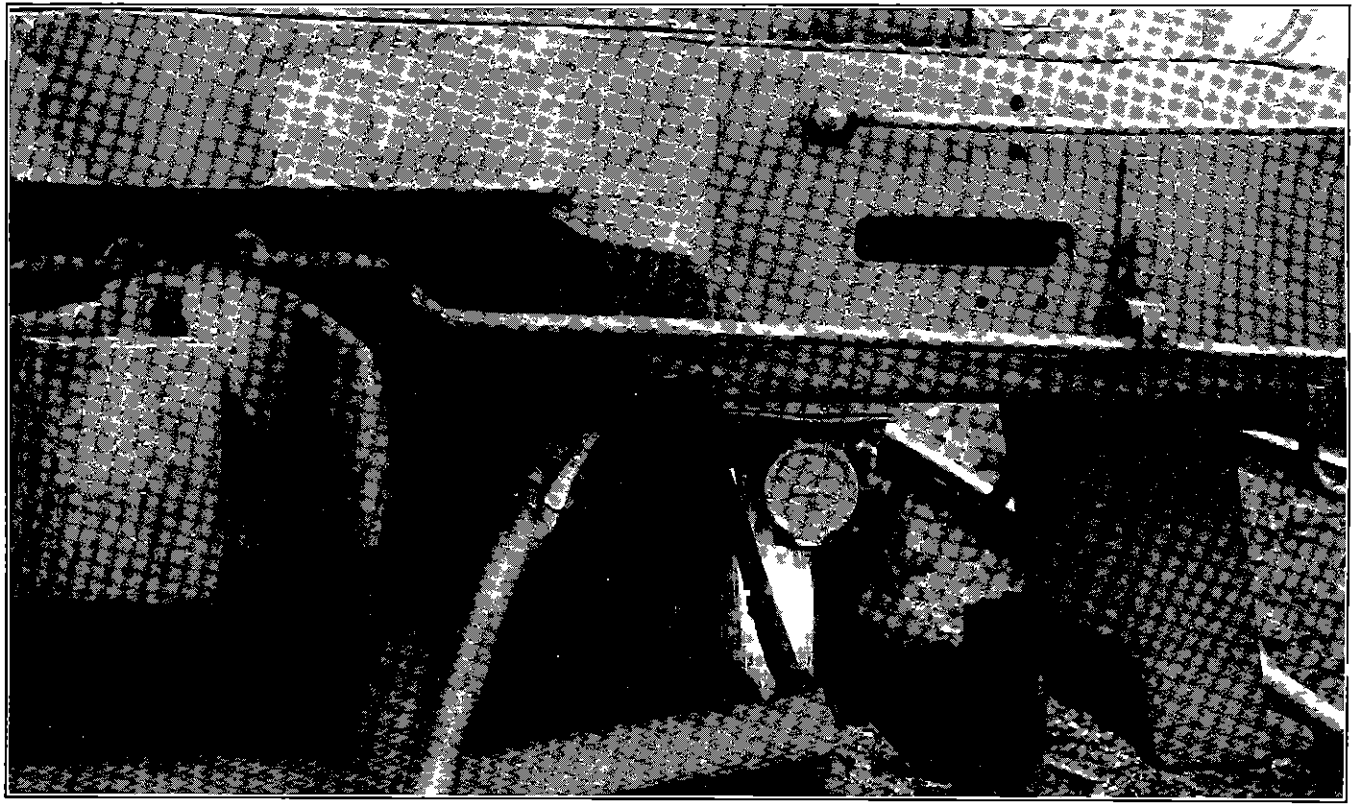

FIG NO 2—VIEW OF REAR OF ELECTRIC MOTOR SHOWING PROTECTED POSITION OF ANGLE COCK HANDLE

n the handle was not marked in any way, as would probably have been the case if the handle had been struck and moved to the position n which it was found at the time the accident occurred The position in which the angle cock handle was found was marked, the ngle cock was then carefully removed, to avoid moving the handle, nd subjected to various tests

Shortly after the accident and before the position of the angle ock handle was changed the angle cock was attached to the brake ipe on another engine carrying 110 pounds brake-pipe pressure, and t was found that the valve was so nearly closed that only a very mall amount of air would flow through it On following days this ngle cock was installed on another motor, and a number of trips were made with the angle cock nearly wide open, but not locked, to letermine whether the vibration and jar of a train running at various rates of speed would cause any movement of the angle cock oward the closed position . The handle did not change its position n any of these tests In another test, with a train consisting of an electric motor and the cars used in train No 219 on the day of the accident, this angle cock installed on the rear of the motor was placed in the position in which it was found after the collision, with the brake pipe fully charged, the brake valve was placed in emergency position The result was a heavy application of the brakes on the motor, but the brakes on the train did not apply for a period of one and three-fourths minutes, at which time the brake on the first car applied lightly, and after an additional period of two minutes the brakes on the third car applied lightly The brakes on the other cars did not apply during the next eight minutes, at which time the test was concluded Following this test an attempt was made to release the train brakes with the condition of equipment unchanged The brake valve on the motor was placed in full release position for a period of about five seconds and then placed in running position The brakes on the motor released properly, but the brakes on the train did not release in a period of 10 minutes, when the test was concluded The results of these tests indicate that with the angle cock in the position in which it was found immediately after the accident it would have been impossible to charge the train-brake system or to make a terminal test, as was done in the New York station before train No 219 left that terminal

For the third test the train-brake system was fully charged and the angle cock was then placed in the position in which it was found after the accident The brake valve was left in running position for a period of 15 minutes, which is approximately the running time from New York to Manhattan Transfer After a period of one and three-fourths minutes the brakes on the first car

applied lightly, and after an additional period of two minutes the brakes on the third car also applied lightly The brakes on other cars in the train did not apply The results of this test indicate that it was possible for the train to have been operated from New York to the point of accident with the angle cock in the position found after the accident without a sufficient application of the brakes, due to brake-pipe leakage, to retard materially the speed of the train

The fourth test consisted of operating a train made up in the same manner as in the previous tests westward toward Manhattan Transfer at normal speed The speed of this train when passing signal 54–L was approximately 50 miles an hour At that point the independent brakes on the motor were applied and the power shut off, the train being allowed to proceed until stopped by the application of the brakes on the motor alone The train passed the point of accident at a speed of approximately 30 miles an hour and came to a stop 1,416 feet west of the point of accident

A further test was made to ascertain the time required for a motorman or his helper to go from the west end of the motor into the first car in the train for the purpose of pulling the cord to the conductor's emergency valve The helper started back when the motor passed signal 64–L at a speed of about 50 miles an hour and the train traveled a distance of about 650 feet before he reached the emergency cord

During these tests observations were made for the purpose of determining whether or not the motor whistle and the tower whistle could have been heard by members of the train crew Whistle signals from the motor were faintly heard by observers in the third car from the engine when on the alert and expecting to hear them, the same whistle signals were not heard by other observers, some of whom were nearer the engine and some farther back The emergency tower whistle was heard distinctly as the train passed the tower

The whistle on the motor is located on the roof of the cab directly above the motorman It is operated by air pressure from the main reservoir, the normal pressure being between 125 and 140 pounds

During these tests the angle cock which at the time of the accident was on the rear end of motor 12 was operated by several observers to determine whether it moved freely, it was found that while it was not difficult to operate, yet an appreciable amount of effort or strength was required to move it These observations tend to discredit any theory that the position of the angle cock was accidentally changed while the train was en route from New York to Manhattan Transfer

Mr Garabrant stated that electric motor 12 weighed approximately 312,000 pounds, that it had brake shoes on all four driving wheels and four truck wheels on each of the two units and was braked to approximately 90 per cent of its weight He also stated that a running test of the brakes is required to be made on a train at the first opportunity after leaving a terminal and before starting down a descending grade On trains with brake equipment of this character the instructions require an initial brake-pipe reduction of 8 pounds, followed by a second brake-pipe reduction sufficient in amount to cause a reduction in speed which will show that the train-brake system is operating properly He said that such a test when made in accordance with instructions would consume 25 or 30 seconds

When Motorman Keilt, on train No 219, was questioned further concerning the running test of the brakes which he made on the day of this accident he said that he was satisfied at the time this test was made that the brakes on his train were operating properly, but he did not particularly notice the length of the brake-valve exhaust When he was informed of the position in which the angle cock on the rear of his motor was found after the accident and the results of the tests which were made after the accident, he stated that it was possible the angle cock was in that position when his train departed from the station in New York and his running test failed to disclose that condition

The investigation of this accident established the fact that the brake system on train No 219 was properly charged before that train left New York terminal also that a proper terminal test of the brakes was made at New York station, and that the brake system on this train was in proper operating condition at the conclusion of this terminal test some two or three minutes before the departure of the train from the terminal, however, the brake-pipe angle cock on the rear of the motor was moved to a nearly closed position between the time the terminal test of the brakes was completed and the time when the motorman tried to apply the train brakes approaching Manhattan Transfer As a result of the tests and observations which were made subsequent to the accident it is believed that this angle cock was placed in that position manually and not by any action of the moving train Because of its protected position and the difficulty of access to it from the motor or car platform, it is believed the angle cock was placed in this position while in the New York terminal between the conclusion of the terminal test and the time the train departed from the station Investigation failed to disclose by whom this angle cock was closed

CONCLUSIONS

This accident was caused by the loss of control by the motorman of the power train-brake system by reason of the angle cock in the brake pipe on the rear of the motor being partially closed

The running test of the brakes which is required to be made on a train leaving a terminal is made for the purpose of giving the engineman positive information whether the train-brake system is operating properly The investigation indicated that in this case the running test which was made by Motorman Keilt was not made in such manner as to furnish reliable information concerning the condition of the train-brake equipment The time consumed in this test was too short and the reduction in speed was too slight to enable the motorman to know definitely whether the train brakes applied, and Motorman Keilt admitted that he did not pay any particular attention to the length of the brake-pipe exhaust when the reductions were made for this running test As one measure to prevent recurrence of accidents of this character steps should be taken to require running tests of the train brakes which will positively reveal whether or not the train-brake system is in proper operating condition

Motorman Keilt stated that when he realized the train brakes were not operating properly it did not occur to him to go back or send his helper back to the first car to operate the conductor's valve Had this been done when he first discovered that the brakes were not operating properly it is probable that the train would have been stopped in time to avert the accident or the speed of the train would have been sufficiently reduced materially to mitigate disastrous results of the collision

Under circumstances of this character when control by the motorman of the train brakes is lost, the whistle of the motor or the locomotive is the means provided for communication with the train crew and calling upon them for assistance In this case no member of the train crew heard either the whistle signal for brakes or the emergency tower whistle, and the investigation disclosed that with vestibule trains with the doors and windows closed, with members of the train crew occupied by other duties in various parts of the train, and with the type of whistle used on these electric motors, whistle signals can not be distinctly heard by the train crew As a further measure to prevent recurrence of accidents of this character whistles of adequate volume and unmistakable tone should be provided or some other reliable means of communication between motorman and train crew should be furnished Conductor Willard stated that had he heard the whistle signals calling for brakes sounded by the motorman he would immediately have pulled the

conductor's cord, thereby applying the train brakes in emergency The fact that the brakes on the cars in this train applied in emergency just after the collision occurred, due to the broken brake pipe, is conclusive evidence that the brake system was charged, and had the conductor's valve been operated in response to the motorman's whistle signals this accident undoubtedly would have been averted

The motors operated over the tracks in this territory are equipped with automatic stop valves, and automatic stop devices are installed in connection with some of the block signals in this territory There was no automatic stop device installed in connection with signal 70–L, which was in stop position when train No 219 passed it However, the automatic stop devices if operated in this case could have done nothing more than had already been done by the motorman toward applying the brakes on the train

All of the employees involved in this accident were experienced men with good records Motorman Keilt had been employed as a fireman and engineman since 1913 and during this period had been engaged as a helper in electric service for a little more than one year and as a motorman in electric service for approximately six years Car Inspector Blumett had been in the service of the railroad company for approximately 21 years

None of the employees involved in this accident was on duty contrary to the provisions of the hours of service law

Respectfully submitted

W P Borland,
Director

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