MAGNETIC CODING SYSTEM FOR RAILROAD CARS

Fig. 1.

PLAYBACK HEAD

PULSE SHAPER

MEMORY UNIT

Fig. 2.

PLAYBACK HEAD

TIME DELAY CIRCUIT

PULSE SHAPER

MEMORY TRANSFER REVERSE

ALARM

TIME DELAY CIRCUIT

PULSE SHAPER

MEMORY TRANSFER REVERSE

ALARM

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The present invention relates in general to systems and apparatus for communicating information between moving railroad vehicles and fixed wayside locations, and more particularly to magnetic railway car identification systems and apparatus for facilitating monitoring of railway car identification data for use in railroad operating, accounting and traffic operations.

Under present railway freight traffic procedures a large number of freight cars having many different ultimate destinations are assembled into freight trains for transportation over portions of the route which are common to the freight cars. Usually, each car must travel over the tracks of several different railroads, necessitating interchange of the cars at appropriate interchange points. A waybill for each car is made up at the point of origin of the car which gives details regarding the shipment, the route to be taken by the car, the charges, and like information. The individual cars are transferred from one train to another or are regrouped into different trains at the various classification yards through which the cars pass. Each car usually goes through a number of these classification operations wherein the cars are separated out from the arriving train and sorted on a plurality of classification tracks into groups corresponding to the outbound trains in which they are forwarded. This is the system of freight traffic control which has been used uniformly throughout the railroad industry for many years.

To exercise effective control over the classification and accounting of such freight cars, a facility must be provided for distinctively identifying the individual freight cars. Heretofore, railway freight cars have been identified only by means of the owner railroad and the car serial number imprinted on the side of the car or at some other conspicuous location. When a given freight train first reaches a classification yard, the waybills are delivered to the yard office where this information is coordinated with the consist and other railway traffic information to produce the switch list for that train for controlling the regrouping of the cars on the classification tracks. The consist, which is a list of the cars making up the arriving train and their order, was formerly made up by visual inspection of the car serial numbers as the train reached the receiving track, but in more recent years is teletyped to the yard in advance of the train's arrival. The consist, of course, must be checked upon arrival of the train in some manner.

The problem of freight car identification has been recognized for many years as the principal bottleneck in speeding up freight car classification and accounting procedures and the effective application of true automation techniques to these procedures. The former techniques of visually inspecting the car serial numbers made it necessary to slow down or stop every train and then laboriously check its consist upon entering and leaving the terminal. It was also necessary to await such checking before any other processing could be done.

Heretofore, attempts have been made to speed up identification of the arriving freight cars and production of checking of the consist by means of closed television systems, wherein a camera is set up at the yard entrance aimed at the car numbers, and the television monitor is located in the yard office where the identification numbers may be read off and recorded on tape or punch cards for appropriate processing in computing or for direct use by the yard clerk in formulation of the switch list or performance of other accounting procedures. However, since this still relies upon visual inspection of the image of the car serial numbers on the television monitor tube, the trains must still be slowed down substantially to insure accurate reading of the serial numbers and the accuracy and speed of identification is largely dependent upon the case with which the serial numbers can be read. Weather, erosion of paint, road dirt, and other factors which adversely affect the legibility of the read designation and serial numbers all impose severe limitations upon the speed and accuracy of identification with this system. This system represents an improvement over the direct visual inspection system in the elimination of the time consumed in delivery of the identification information from the trackside observer to the yard office.

Recently an attempt has been made to eliminate this bottleneck by providing a black metal plate on the side of each car, which plate is provided with a coded combination of white stripes which identify the car. A trackside electronic unit having a photocell responsive to the light reflected from the metal plate as the freight car passes the electronic unit is provided to be triggered by the white stripes and produce an output pulse pattern encoded in some relation to the serial number of the car, from which the identification of the car can be derived to be shown on a board or punched into cards and fed into a punch card tabulator to check the other information. However, this system was discarded in the experimental stage because it necessitated placing such a coded plate on each of over one million freight cars in interchange service, since the system would not be of any use unless every freight car operating in interchange service was so equipped. Such a system would require pulling every car in interchange service out of service for a sufficient time to apply the coded metal plate to it. Also, the accuracy of identification of the cars in this manner is dependent upon the white stripe on the metal plate remaining unobiterated and undistorted over long periods of use.

An object of the present invention is the provision of a novel system for communicating railway freight car identification information between the freight car and fixed wayside locations, which avoids or minimizes the above disadvantages.

Another object of the present invention is the provision of a magnetic recording and registering system for use in railway freight car identification.

Another object of the present invention is the provision of a novel system for magnetically identifying railway freight cars while the same are moving past a fixed wayside location to facilitate production of freight train consists and the classification and accounting of freight operations.

Another object of the present invention is to provision of a novel system for impressing a combination of magnetic codes on railway freight cars to distinctively identify the freight car in a manner not affected by factors which normally render printed car identification numbers illegible.

Another object of the present invention is the provision of a novel system for magnetically encoding railway freight cars with identification data to facilitate automatic identification of the freight car by magnetic sensing
means for use in effecting automatic switching systems for classification of freight cars. Another object of the present invention is the provision of a novel system for magnetically coding freight car identification data upon moving freight cars in response to detection of an absence of magnetic coding on the car, thus encoding the cars without necessitating alteration of the normal traffic routing of the cars or removing them from service.

Another object of the present invention is the provision of a novel system for identifying freight cars in response to magnetically encoded car identification information on a freight truck of the car and for selectively magnetically encoding appropriate identification information on trucks of freight cars having no encoded identifying data.

Other objects, advantages and features of the invention will appear as the specification progresses.

To attain the foregoing features, objects and advantages of the present invention, the system of the invention in general involves the provision of coded magnetic patterns or conditions at some appropriate location on railway freight cars, which patterns are distinctive of the identity of the cars with which they are associated to enable the cars to be identified by magnetic sensing means as they pass selected railside sensing stations. By magnetizing certain parts of the car in a distinctive manner, the cars can make themselves known through receipt of a signal transmittal by a railside sensing device without the necessity of attaching anything physical to the car. Physical attachment of an identifying plaque or the like to the car would necessitate withdrawal of each car from service for the period of time necessary to effect the attachment. The identification information is preferably recorded in the lowermost portion of one side frame of one of the wheel trucks associated with each car, usually that portion intermediate the journal boxes of the side frame and located below the bolster-supporting coil springs. It is considered preferable to impress the magnetization pattern distinctive of the freight car in the form of a binary indication of a selected code number indicative of the owner railroad and the binary equivalent of the car serial number, thus facilitating the production by railside magnetic sensing devices of a train of electrical pulses which is a binary translation of the identifying numbers. The location of the magnetization pattern in the truck side frame is selected to enable positioning of the railside sensing apparatus substantially at truck level.

With the freight cars distinctively magnetically encoded in this manner, the identification of the freight cars in an arriving freight train may be effected while the train is entering the yard at ordinary arrival speeds by providing alongside the rail and immediately below the path of movement of the magnetically coded truck side frames, a magnetic reproducing or playback head arranged to produce electrical pulses in the coil thereof in accordance with the binary coded magnetic pattern, which pulses may be shaped through conventional pulse-shaping circuits supplied to a conventional memory or temporary storage device, such as a magnetic drum, a bank of storage thyrratrons and relays, or the like. Numbers of the cars recorded in binary form in the memory device may then be read out into truly automatic systems for car recording and control such as producing punched cards for automatic punch card processing, magnetic tape recording and further processing by automatic computer equipment, or in such other form as may be suitable for conventional machine processing of the identification data.

The present invention also contemplates the provision of means including magnetic reproducing and recording heads at a railside location along the receiving track of the yard which is responsive to the absence of a coded magnetic pattern on selected truck side frames to signal this fact to an operator at a remote television monitor station arranged to reproduce an image of the printed number area of the uncoded arriving freight cars. A facility is associated with this means enabling the operator to read off the printed serial number of the car and other relevant identifying data from the television monitor and apply the same in appropriate binary coded form to a memory device which will automatically release the stored signals to a recording head to impress a magnetic condition indicative of the same on a truck side frame of the appropriate car at a location further along the track. Means are also associated with these components to detect a car identifying magnetic pattern on other truck side frames of the car than the one normally relied upon for sensing of car identification data, and in such magnetic conditions are present on any of the other side frames, to read the car identifying pattern off of the other side frame and impress the same on the appropriate truck side frame of the car. In this manner, uncoded cars or cars having identifying coding at improper locations are correctly coded while the cars are in transit in an arriving train so that the automatic counting and control procedures in the yard will be effective. This renders it unnecessary to pull any uncoded arriving cars out of service before the same can be conditioned for the automatic control facilities and no significant interference with such automatic control facilities is occasioned by the presence of uncoded cars in arriving trains so that it may be necessary with the present invention to have all freight cars in interchange service coded at one time, due to the facility with which the uncoded cars are conditioned upon arrival at the yard.

In the accompanying drawings:

Figure 1 is a diagrammatic view of a typical railside sensing installation for use in connection with the system of the present invention; and

Figure 2 is a diagrammatic view of magnetic coding apparatus for use in connection with the present invention; and

Figure 3 is a side elevation of a magnetic reproducing head assembly for use in the present invention; and

Figure 4 is a schematic diagram of suitable time delay, signal-no-signal discriminator and alarm circuitry which may be used in combination with the present invention.

Referring to the drawings, wherein like reference characters designate corresponding parts throughout the several figures, there is illustrated in Figure 1 an example of a satisfactory railside magnetic sensing installation which may be employed at a location along the receiving track, indicated generally by the reference character 10, near the entrance to a freight yard, for signalizing the magnetic signal pattern recorded in the lowermost intermediate portion of a truck side frame of an arriving freight car. To avoid confusion in the automatic devices to which the identification information will be subsequently applied, the location of the magnetic signal pattern on the freight car should be standardized. It is considered preferable, for reasons which in part will later appear, to record the magnetic signal pattern on the right hand side frame of the rearmost freight truck of each freight car, as viewed in the direction of motion of the train.

As an illustration of the signal to be recorded magnetically in the right rear side frame of a particular car, New York Central Gondola No. 648,763 may be translated into a binary signal in the following manner: By assigning a three-digit number to each of the railroads, for example by listing the railroads alphabetically and assigning the numbers in accordance with their numerical position, a code number 130 is assigned to the New York Central Railroad. The binary form of the number 130, indicative of the New York Central Railroad, would be 10000010. Allowing a numerical classification for car types, the number 5 may be selected as indicative of a gondola, which in binary form would be 0101. The serial number 648,763 in binary form would read...
As illustrated in Figure 1, there is provided alongside the receiving track 10 a magnetic reproducing or playback head 11 which may be of the design and construction hereinbefore described in connection with the recording unit illustrated in Figure 2, or in other forms which will be well-known to persons skilled in the magnetic recording arts. The electrical signals generated in the coil of the reproducing head 11 by the magnetic signals recorded in the right hand rear track side frames as they pass over the reproducing head are applied to a conventional pulse-shaper 12. The sharpened pulses produced at the output of the pulse-shaper 12 are then applied to a suitable storage facility such as the memory unit 13 which may be either a separate memory unit such as one or more magnetic drums or a bank of storage primer tubes and associated relays, or which may be the memory of a magnetic tape. The information stored in the memory 13, which is a binary indication of the freight car owner, type and serial number, may then be combined in accordance with well-known automation and computer techniques with the freight car orders regarding origin, destination, and other appropriate information which in turn can be taken out of the memory in part or in toto to punch or print cards or may be recorded in the form of recording tapes. As an alternative, the memory unit and the computing or tabulating machines operated from the information stored in the memory unit may be dispensed with and the identification information derived in binary form from the reproducing head 11 and pulse-shaper 12 may be translated into numerical form and applied to a board in the yard office for visual observation of the car identity and use of the information. The handling procedures in connection with the yard operations form no part of this invention and are well-known to those skilled in the railroad arts.

There is diagrammatically illustrated in Figure 2 an example of a track side installation embodying the concepts of the present invention which may be located at the receiving track portion of a yard for sensing the presence or absence of car-identifying magnetic coding in the proper track side frames of the cars of an arriving train. Upon sensing the presence of such magnetic coding on either track of an arriving freight car, an audible alarm will be energized at a remote television monitor station so that the monitor operator may visually read off the car serial number and owner designation and record this information in binary form in a memory unit so that information may be automatically read out upon arrival of the uncoded car at a location further along the track and magnetically recorded in the appropriate track side frame. To avoid confusion in automation devices, the coded signals should be recorded at a standardized location on the face of the car. For the purposes of the present invention, it has been determined that the magnetic coding should be recorded in the right hand side frame of the rearmost truck of each freight car. Conditions may arise during the early stages of use of the present car identifying system when the car identifying magnetic code will occur on the left front freight truck side frame of an arriving freight car as illustrated in Figure 2 also incorporates components for sensing the presence of magnetic coding on the left front side frames of arriving freight cars prior to energization of the alarm system denoting no coding an where this situation is present, reversing the train of code pulses and recording the reversed pulse pattern in the right rear side frame of that freight car.

Referring specifically to Figure 2, a magnetic playback head unit 15 is arranged alongside the right hand rail 16a of a receiving track 17 on the line to a freight yard. The playback head unit 15 and the erase and record head units described later in this specification are all preferably of the construction illustrated in Figure 3. The playback head 15 preferably comprises a substantially closed core 17 of high permeability magnetic material having a narrow magnetic gap 18 therein disposed to be located immediately adjacent the undersurface of the side frame of each freight car truck and one or more coils 19 wound about the core to have a voltage induced thereacross by charging flux through the core. The signals induced in the coil 19 are applied through the leads 20 to the electronic components of the apparatus. The core 17 and coils 19 of the playback head unit 15 are preferably carried by an upwardly arching frame or shoe 21 which is resiliently urged upwardly by coil springs 22 bearing against the ends of the frame 21 and supported on brackets 23 affixed in any convenient manner to the right hand rail 16a. Suitable guide pins which project upwardly from the brackets 23 and extend through vertical apertures in the core-supporting frame 21 may be provided to insure that movement of the frame 21 is confined to rectilinear vertical movement. Suitable timing means for metering the speed of movement of the freight cars and the time of arrival of the track side frame at the playback head station are also carried by the core-supporting frame 21. To this end, a pivoted arm 24 is supported at one end of a pivot pin 25 projecting laterally from the core-supporting frame 21 and supports a rubber timed timing wheel 26 on its free end. An electrical plunger switch 27 having a plunger resiliently biased to extend outwardly and disposed beneath the pivoted arm 24 in a position whereby its plunger is engaged by the arm 24 when the timing wheel 26 comes into contact with the underside of a freight truck side frame to effect closing of the switch 27. A spring 28 resiliently urges the pivoted arm 24 upwardly to position the uppermost peripheral portion of the timing wheel 26 above the elevation of the lower surface of the central region of the truck side frame. A suitable generator 29, which may be of the commutator type, is integrally associated with the timing wheel 26 to produce timing signals upon movement of the timing wheel 26 in accordance with the truck frame spacing. It will be observed that the springs 22 tend to maintain the magnetic gap 18 of the core 17 in contact with the underside of the central truck side frame region during the period the portion of the truck side frame which should be coded overlies the playback head station.

The signals on the output leads 20 from the coils 19 of the playback head 15 are then coupled through switch 27 and through a manual switch or key 31 which is under control of an operator at a remote location such as the yard interlocking tower, and through a time delay circuit 32 to a signal-no-signal discriminator stage 33. The signal-no-signal discriminator stage 33 controls activation of an alarm unit 34 located at the remote station occupied by the television monitor 35 and may, if desired, control imaging of freight car owner designation and serial number on the television monitor 35.

It will be understood that the television monitor 35 is part of a closed circuit television system receiving signals from a television camera stationed along the track 17 and oriented to image on the monitor screen the portions of the sides of arriving freight cars which bear the owner designation and serial number of the car. Additionally, counting circuits, such as a 18, are incorporated into the television system for counting the cars, indicated by the reference character 36, which are associated with the playback head and is interconnected with the TV monitor to display either on the monitor screen or alongside the monitor the sequence numbers of cars whose identifying data are imaged on the monitor screen. The counter 36 may, for example, be driven by electrical pulses produced upon closing of the plunger switch 27 or
by signals derived from timing wheel generator 29 associated with the playback head unit 15.

There is also associated with the left hand rail 16b a playback head 37 which may be of the same construction as the playback head 15, and which is positioned further along the receiving track 17 in the direction of movement of arriving trains relative to the playback head 15. The playback head 37 is designed to have electrical contacts induced in the coils of the left side frames of the foremost cars of each freight train. The signals derived from the output leads 20 of the coils 19 of the playback head 37 are applied through a lead 38 to the signal-no-signal discriminator 33 and through a lead 39 to a pulse generator 40 and thence to a memory transfer reverse unit 41.

Figure 4 is a schematic illustration of a circuit which may be employed to perform the functions of the time delay stage 32, and the signal-no-signal discriminator 33. This circuit includes six thyatron tubes T42-T47 and a triode T48. The alarm unit 54 is connected in the cathode circuit of the third thyatron tube T44. An arming relay, indicated by the reference character 49, is connected in the common cathode circuit of the thyatrons T46, T47 for arming the memory transfer reverse unit 41. Two-second delay network 50 and 51 are provided in the grid circuits of thyatrons T42 and T48 and in a one-second delay network 52 in the grid circuit of thyatron T44. The grid of the first thyatron tube T42 is connected to relay contact arm 53 and the grid of the second thyatron T43 is connected to the relay contact arm 54, the contact arms 53 and 54 being under control of a single relay coil energized upon closing of the plunger switch 27 associated with the playback head 15. The relay contact arms 53 and 54 normally occupy the solid line position illustrated in Figure 4 wherein the grid of thyatron T42 is connected through contact point to a grid biasing source and the arm 54 is connected to a free contact point. Depression of the plunger switch 27 of the playback head 15 energizes the coil controlling relay arms 53 and 54 to shift these arms to their dotted line positions, and thus grounds the grid of thyatron T42 and applies firing voltage to the grid of T43. However, thyatron T43 will not fire unless thyatron T42 has already fired for lack of plate voltage. Upon release of the track switch 27 of playback head 15, whereupon the contact arms 53 and 54 are shifted to the grid of thyatron T43 is leaked to ground and a two-second delay firing of the grid of thyatron T42 is commenced through the time delay network 50.

If two seconds, as determined by delay network 50, elapse before another depression of the track switch 27, the middle section of the freight car having been reached, the thyatron T42 fires, applying plate voltage to thyatron T43 and rendering the track switch 27 ineffective during the remainder of the cycle of operation of thyatron T42. When the right rear side frame of the freight car depresses the pivoted arm 24 and closes the track switch 27, contact arm 54, which is shifted to the dotted line position, contacts point 56 and fires thyatron T43, thereby applying voltage to the cathodes of thyatrons T44, T45, T46 and T47. Movement of the track switch 27 does not effect the system any further until the thyatrons T42 and T43 are cut off by further action of other parts of the system. If one second elapses after firing of thyatron T43 without signals from either playback head 15 or 37 being applied through the leads 55, 56 to the grids of thyatrons T46 and T47, thyatron T44 fires, by action of grid delay charging through the one-second delay network 52, and energizes the alarm 54. After lapse of an additional second, the two-second delay charging of the grid of thyatron T45 through delay network 51 fires thyatron T45. Conduction through thyatron T45 sends negative grid of triode T48 to cut off. Termination of conduction in the triode T48 causes its cathode to go to ground and sends an inverse cut-off voltage to tubes T42-T47 through the plate coupling capacitor 57.

If a pulse arrives on the lead 55 from the playback head 15 reading the presence of magnetic coding on the right rear side frame, which pulse will be ahead of one-second delay firing of tube T44, if at all, tube T46 will fire. Conduction through thyatron T46 immediately cuts off the negative grid coincidence by overriding the delay at the grid of tube T45 by feedback of the voltage drop across the common cathode resistor 58 to the grid of thyatron T45. If a pulse does not arrive on the lead 55 from the right rear playback head 15, then the arrival of a pulse on the lead 56 from the left front playback head 37 similarly institutes cut-off by feedback of the voltage drop across resistor 58 to the grid of thyatron T45 and additionally arms the memory transfer reverse unit 41 by energizing relay 49.

From the above description, it will be seen that the time delay and signal-no-signal discriminator units 32 and 33 have the function of activating the alarm 4 when no signal is detected on the right rear playback head 15 or the left front playback head 37. By also coupling a lead from the cathode circuit of thyatron T44 to the television monitor tube, the display of freight car side images on the television monitor 35 may be gated on only when no signal is detected by the heads 15 and 37. This is also provided in the grid circuit of signals from the playback head 15 effectively closes the circuit from the left front playback head 37.

The memory transfer reverse unit 41 performs the function of reversing the train of pulses sensed by the left front playback head 37 so as to arrange the train of pulses forming the binary indication of the owner code and car serial number for application to a recording head 60 positioned alongside rail 16a at a location to record the identification information in the right rear side frame of the freight car. This transfer reverse unit 41 may be any of several suitable devices which are commercially available to perform this function, such as a linear magnetic core or a magnetic disk unit whose speed is controlled in accordance with the speed of the arriving freight car and wherein a magnetic recording head 60 positioned alongside rail 16a at a location to record the identification information in the right rear side frame of the freight car. This transfer reverse unit 41 may be any of several suitable devices which are commercially available to perform this function, such as a linear magnetic core or a magnetic disk unit whose speed is controlled in accordance with the speed of the arriving freight car and wherein a magnetic recording head 60 positioned alongside rail 16a at a location to record the identification information in the right rear side frame of the freight car. This transfer reverse unit 41 may be any of several suitable devices which are commercially available to perform this function, such as a linear magnetic core or a magnetic disk unit whose speed is controlled in accordance with the speed of the arriving freight car and wherein a magnetic recording head 60 positioned alongside rail 16a at a location to record the identification information in the right rear side frame of the freight car. This transfer reverse unit 41 may be any of several suitable devices which are commercially available to perform this function, such as a linear magnetic core or a magnetic disk unit whose speed is controlled in accordance with the speed of the arriving freight car and wherein a magnetic recording head 60 positioned alongside rail 16a at a location to record the identification information in the right rear side frame of the freight car. This transfer reverse unit 41 may be any of several suitable devices which are commercially available to perform this function, such as a linear magnetic core or a magnetic disk unit whose speed is controlled in accordance with the speed of the arriving freight car and wherein a magnetic recording head 60 positioned alongside rail 16a at a location to record the identification information in the right rear side frame of the freight car.
ciliated with the stored identification information. The recording head 67 may be of the same construction as playback heads 15 and 37 and the car sequence number at the recording head 67 may be counted and applied through the time delay unit 66 to the memory 64 by suitable counting means 36 rendered responsive to actuation of a track switch incorporated therein by arrival of the side frames at the locations of the counting means 36.

Conventional erase heads 68 and 69 are associated with the recording heads 60 and 67, respectively, to be energized in relation to recording heads 60 and 67 in accordance with conventional magnetic recording procedure.

The above described apparatus provides an installation which will greatly facilitate proper magnetic encoding of freight cars while the same are still moving at normal speeds along the receiving track of a freight yard and thereby obviate the necessity of withdrawing uncoded freight cars from service to properly encode the same. When the right rear truck side frame of a freight car comes into contact with the timing wheel 26 of the playback head 33 and 27 at the same time, the existence of a magnetic identification record in that truck side frame produces a signal on the lead 55 of the signal-no-signal discriminator 33 to prevent firing of the thyatron T44 and therefore prevent energization of the alarm 34. The counter 36 will nevertheless record the car sequence number of the freight car. If no magnetic record is detected by the playback head 15, and no magnetic record is detected on the left front side frame by the playback head 37, the absence of any signal from these sources conditions the signal-no-signal discriminator 33 to fire the thyatron T44 and energize alarm 34. The various time delays incorporated in the signal-no-signal discriminator 33 prevent the signal-no-signal discriminator from responding to the next succeeding truck side frame which arrives over the playback head 15, which will be the right front side frame of the next freight car and, therefore, a normally uncoded one. When the observer at the TV monitor 35 is alarmed by the alarm 34, he reads the car sequence number signalled to the TV monitor 35 from the counter 36, and the car railroad designation and serial number imaged on the monitor screen to the operator of the decimal code typewriter 61. The typewriter is provided with an interface to convert the transfer unit 62 into binary code and store in the memory 64 along with the car sequence number to be read out to the recording head 67 and magnetically recorded in the right rear side frame of the uncoded freight car when that side frame arrives over the recording head 67. In the event no signal is detected by the playback head 15, but a magnetic record of the car identification is detected by the playback head 37, the signal-no-signal discriminator 33 disables the alarm 34 and the signals are applied through the pulse-shaper 40 to the memory transfer reverse unit 41 which reverses the coded identification information and energizes the recording head 60 in properly timed relation to record in the right rear side frame the reversed code read off of the left front side frame. If desired, suitable counting means responsive to car sequence number and associated with the recording head 60 may be employed to control the read out of the reverse code from the memory transfer reverse unit 41.

By means of the magnetic code sensing apparatus of the type illustrated in Figure 1 and described above, the identification of the freight cars making up an arriving freight train may be made automatically while the arriving train is still in motion in the yard and electrically signaled to conventional tabulating and computing apparatus for making up consists, switch lists, and other railroad traffic handling documents. This apparatus in conjunction with automatic switching systems in the classification yard, particularly where hump classification is provided for, provides a facility whereby the freight traffic operations may be rendered almost completely automatic.

It will be understood that the permanent magnetic signals constituting the identification code may be recorded in other parts of the freight car other than the freight truck side frame. For example, the signals may be impressed on the rim of one of the freight truck wheels, or in the transverse beam interconnecting a pair of side frames, or magnetizable structural components of the freight car frame. Alteration of the position and construction of the playback, erasure and recording heads to adapt the system to recording and detection of magnetic signals in these components will be apparent to persons skilled in this art as well as such variation in the timing and detection techniques as may be required.

While only one preferred embodiment of the invention has been particularly shown and described, it is apparent that other modifications may be made in the invention without departing from the spirit and scope thereof, and it is desired, therefore, that only such limitations shall be placed thereon as are imposed by the prior art and are set forth in the appended claims.

We claim:

1. A system for automatic identification of railway freight cars and the like comprising railway freight cars having a plurality of wheel trucks each having side frames extending longitudinally of the freight cars adjacent the sides thereof, said side frames having a magnetizable region adjacent an exposed surface thereof and at least one of said side frames having a magnetic impression recorded in said magnetizable region distinctive representative of the identifying data for its associated freight car, magnetic playback head means having a core located at a station alongside a railroad track, an alarm at a remote station, switch means disposed to be actuated by each side frame adjacent one side of the track as the freight cars pass along the track, discriminator means intercoupled with said alarm for activating the alarm following actuation of said switch means and having means responsive to the detection of a magnetic impression recorded in the side frames in selected time relation to the actuation of said switch means to disable said discriminator means from activating the alarm, and means disabling said discriminator means from actuating the alarm for a selected time delay interval following an actuation of the switch means covering a period of time required for the next succeeding wheel truck to pass said magnetic playback head means at normal speeds of movement of the freight cars along the track.

2. Apparatus for use in a railway freight car descriptor system including railway cars having metallic wheel truck side frames in which magnetic code impressions denoting identifying data for individual freight cars are recorded in a selected side frame of one selected wheel truck of the freight cars, said apparatus comprising magnetic transducer means for producing electrical signals representative of the magnetic code impressions when the side frames bearing such impressions are in inductive communication with said transducer means, an alarm located at a remote station, switch means disposed to be physically actuated by the side frames adjacent one side of the track along which the railway cars pass, means intercoupled with said alarm for activating the alarm a selected time delay interval following actuation of said switch means, means responsive to the detection of a magnetic code impression in said side frames by said magnetic transducer means within said selected time delay interval to disable said means for activating the alarm upon actuating the alarm, means for detecting the sequence number in the train of the freight cars whose wheel truck side frames come into inductive communication with said transducer means, means for producing the image at a station of the identifying indicia borne by the freight cars for which no magnetic records are detected, means for producing a coded electrical representation of the iden-
tifying information for such uncoded freight cars, means for storing said coded representations in selected relation to the car sequence numbers, magnetic recording means located in the path of movement of said selected side frames along the side of a rail of said track to be brought into inductive communication with said selected side frames as the cars move along said track, and means for reading out the stored representations to said recording means when the freight car corresponding to the sequence number associated with said stored representation arrives at said recording means to activate said recording means to magnetically impress a record of said stored representation of identifying information in the uncoded selected side frames.

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