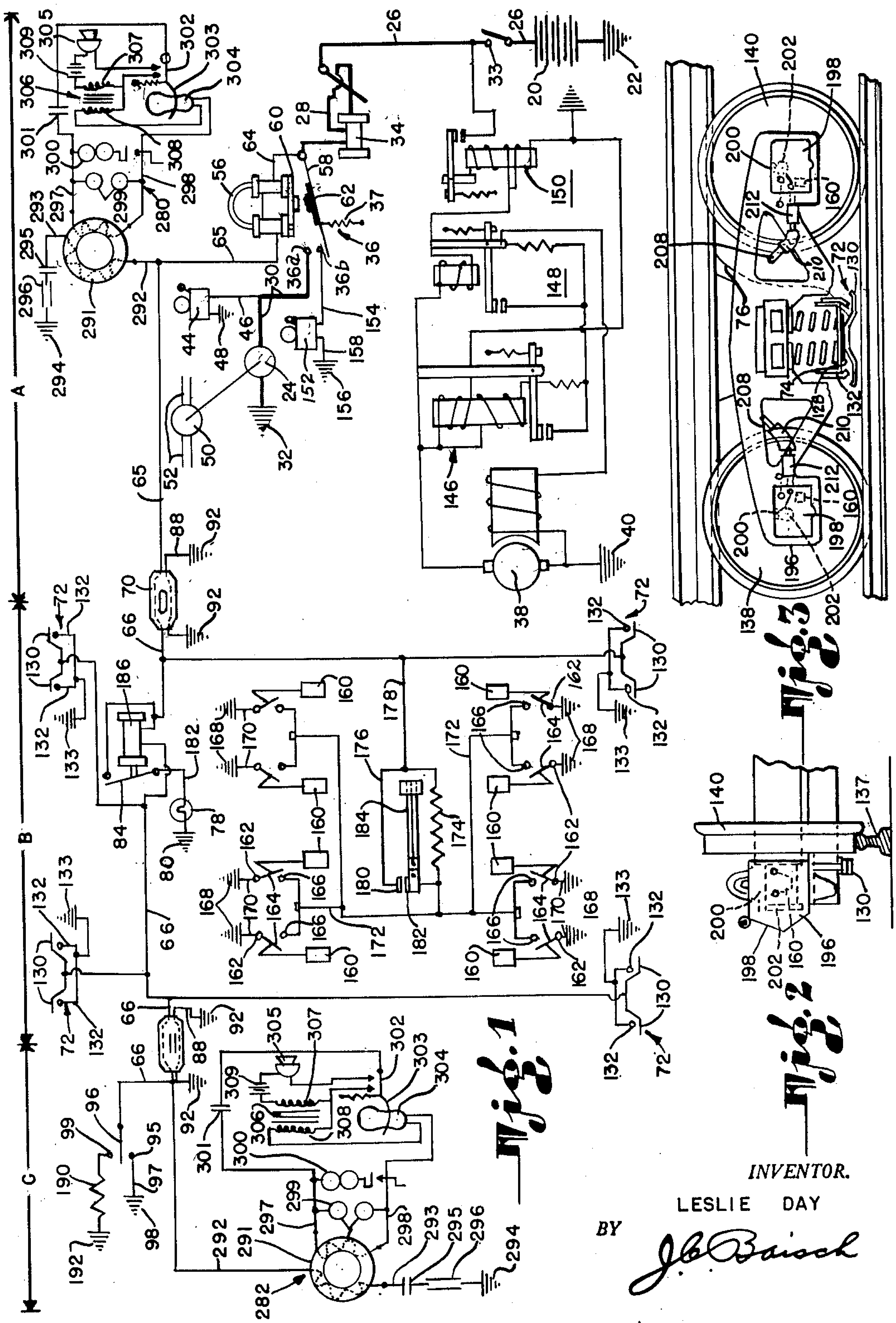
Feb. 17, 1953 L. DAY 2,629,047
ELECTRICAL CONTROL SYSTEM FOR
OVERHEATED BEARINGS ON TRAINS
Filed Sept. 6, 1947 3 Sheets-Sheet 1



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BY J. C. Baisch

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ELECTRICAL CONTROL SYSTEM FOR OVERHEATED BEARINGS ON TRAINS

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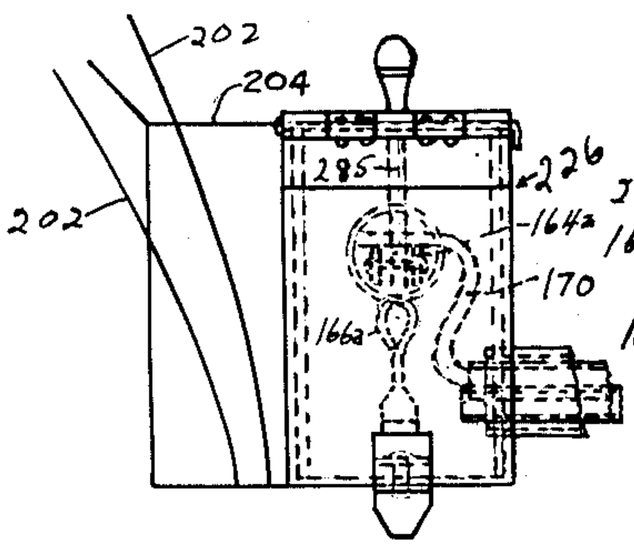

Fig. 15

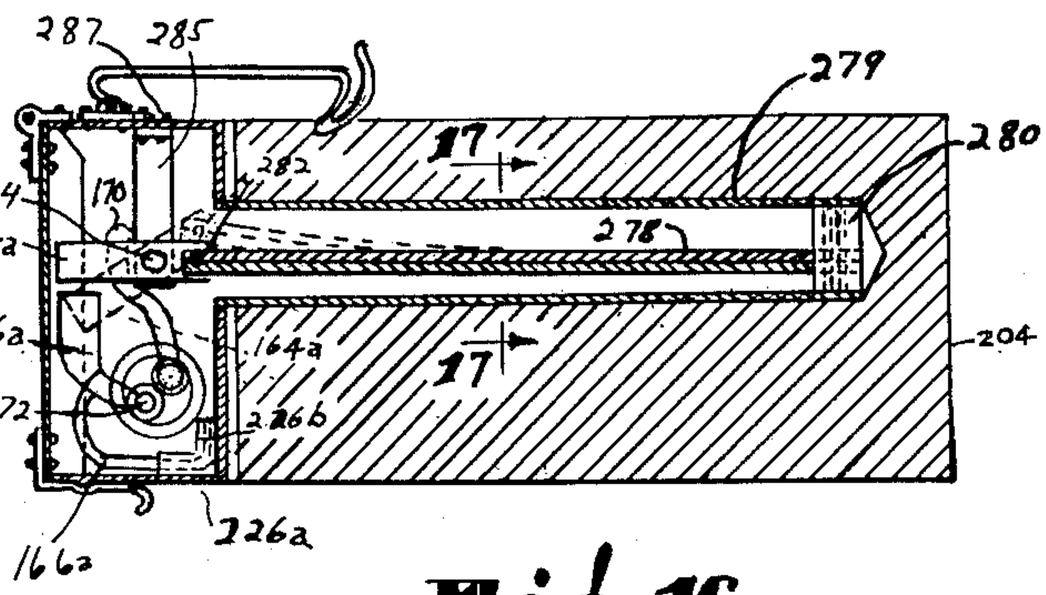

Fig. 16

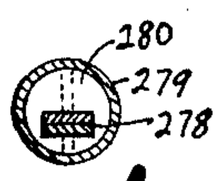

Fig. 17

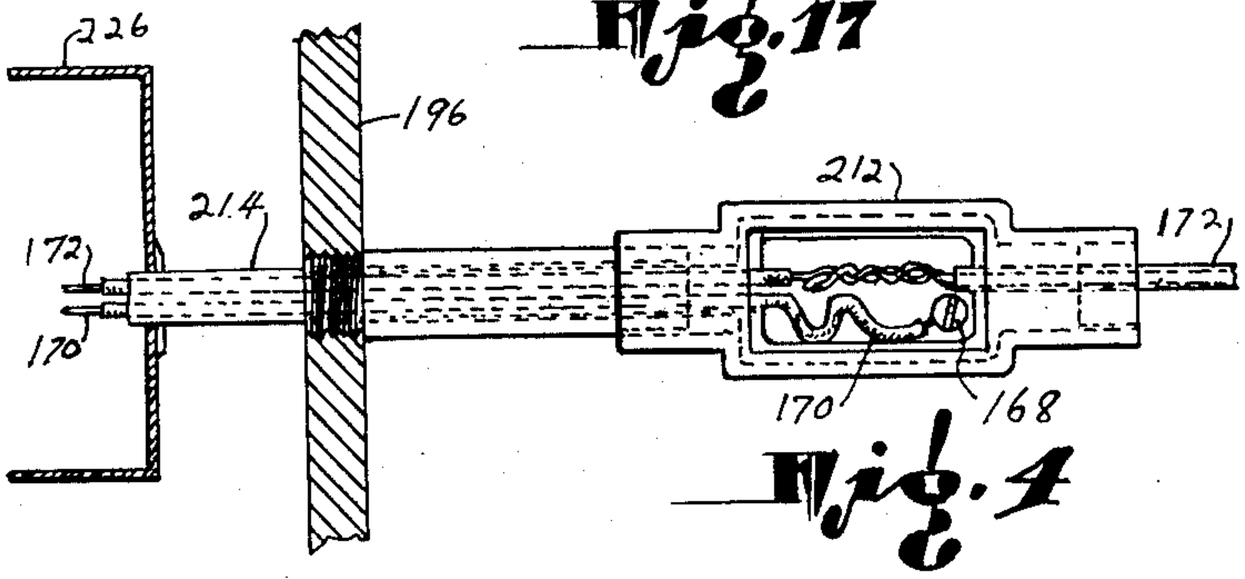

Fig. 4

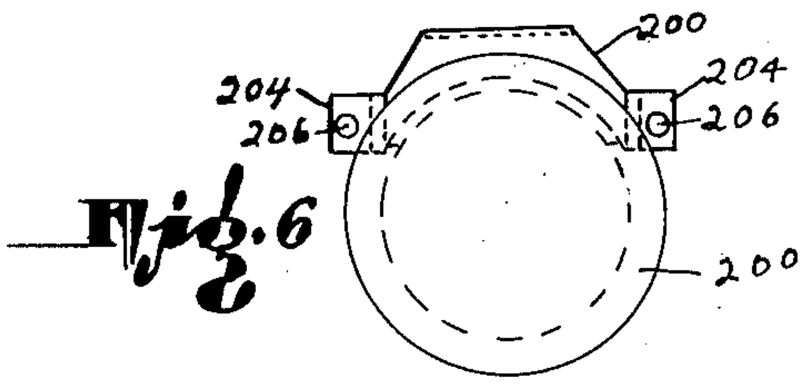

Fig. 6

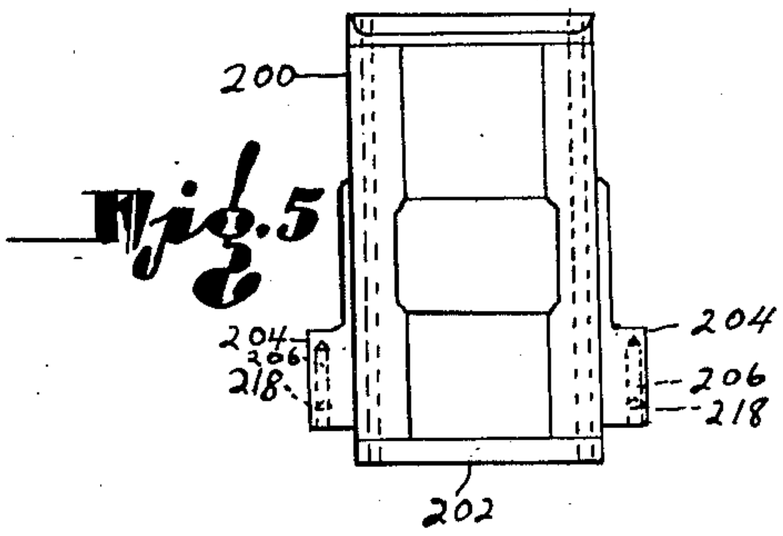

Fig. 5

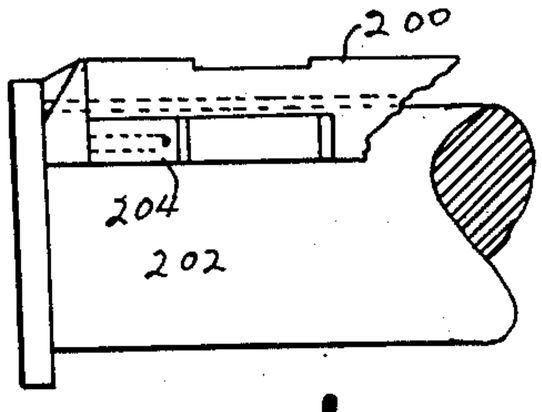

Fig. 7

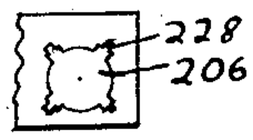

Fig. 6a.

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Fig. 9

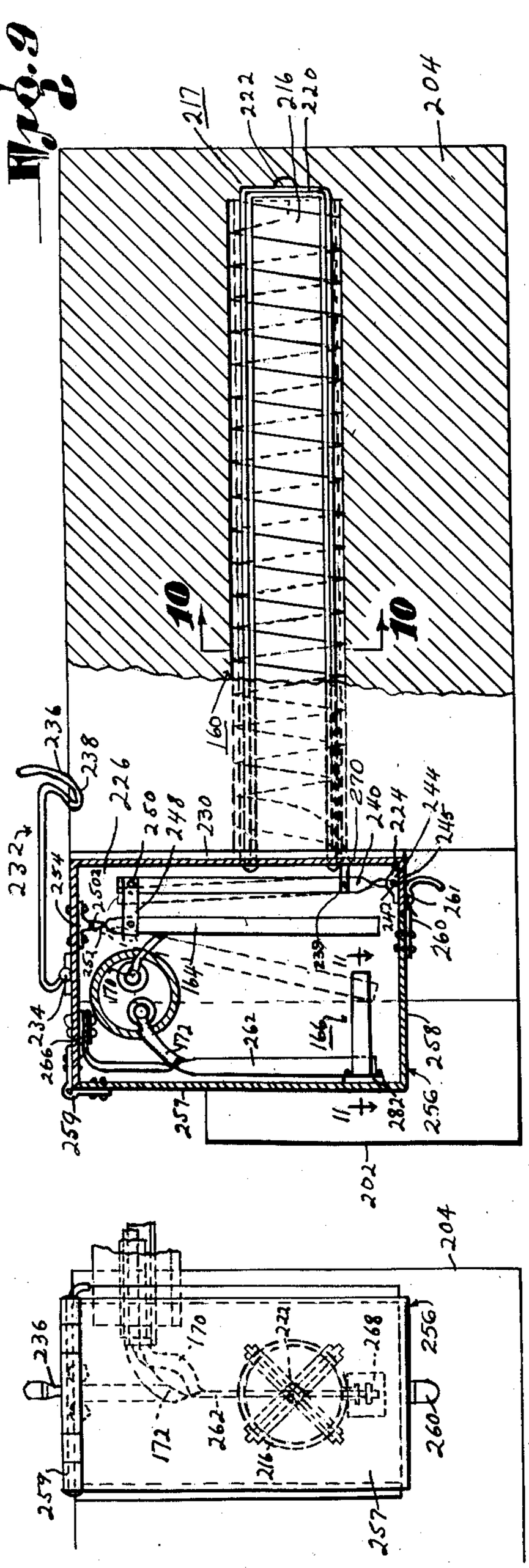

Fig. 12

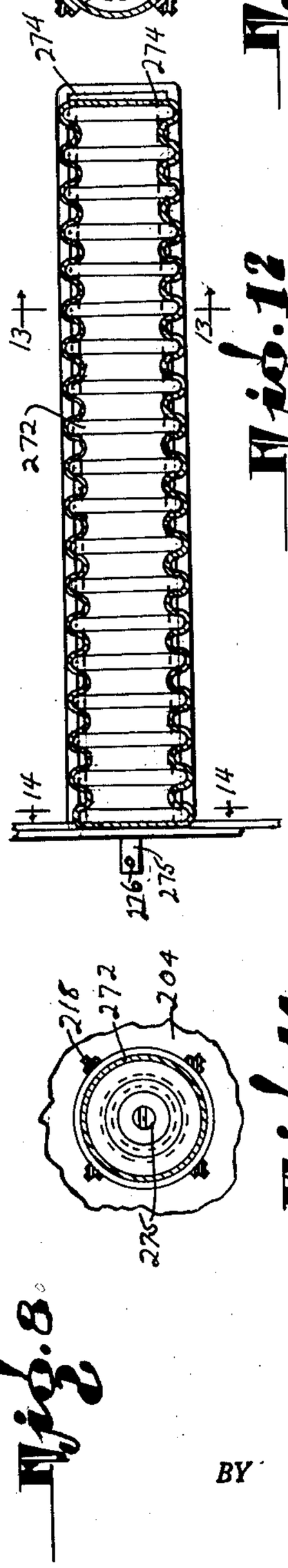

Fig. 13

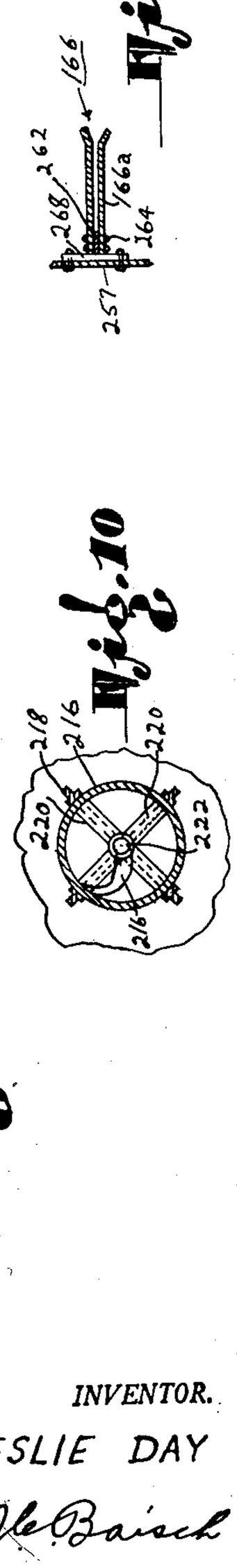

Fig. 11

Fig. 10

Fig. 14

Fig. 8

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2,629,047

UNITED STATES PATENT OFFICE

2,629,047

ELECTRICAL CONTROL SYSTEM FOR OVERHEATED BEARINGS ON TRAINS

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Application September 6, 1947, Serial No. 772,489

7 Claims. (Cl. 246—169)

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This invention relates generally to improvements in electrical control systems and relates more particularly to improvements in electrical control systems for railroad trains and the like, certain subject matter herein disclosed being claimed in applicant's copending application for Switch Mechanism, Serial No. 144,356, filed February 15, 1950.

It is an object of the invention to provide a control system of this character for use on railroad trains and the like having means for automatically controlling the brakes of the train upon which it is installed and is adapted to sound an alarm upon the occurrence of an abnormally hot journal bearing on the train, there being thermal responsive means for effecting said alarm.

Another object of the invention is to provide a system of this character wherein said thermal responsive means will also effect automatic setting of the train brakes within a short period of time after said signal sounds unless the engineer takes appropriate action.

Still another object of the invention is to provide a device of this character wherein the thermal responsive means comprises thermostats in the respective journal boxes of the train units for providing a control for the electrical system and said thermostats may be located in chambers in the "brass" of the respective bearings.

In journal boxes having roller bearings, the thermostats may be placed in any suitable position close to the journal where it will be heated immediately upon the journal becoming overheated.

A further object of the invention is to provide, in a control system of this character, contacts so constructed and arranged as to have a wiping action in order to remove any corrosion which may occur.

A still further object of the invention is to provide an arrangement which will operate within a suitable temperature range, as for example, a range from approximately 300° F. minimum to approximately 350° F. maximum, and which will operate within said range at both slow and fast rates of bearing heating.

Another object of the invention is to provide an arrangement of this character which may be easily tested and which will require very little in the way of inspection and maintenance.

Still another object of the invention is to provide an arrangement of this character having improved means for entering the journal boxes with the electrical wiring, which will provide a more certain ground, and which may be easily replaced if damaged.

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Still another object of the invention is to provide an arrangement of this character wherein there is a manual control for signalling the engineer without setting of the brakes.

It has also been found to be desirable for the conductor, who is usually on the rear car (caboose) of a freight train, to be able to talk directly with the engineer in the engine cab, as other types of signals are at times hard to pass on or see and frequently train time is lost by the engineer waiting for the signal.

It is therefore still another object of the present invention to provide telephonic means, connected into the rest of the control circuit, by means of which the conductor or other trainman may talk from such rear unit of the train directly with the engineer in his engine cab.

Further objects and advantages of the invention will be brought out in the following part of the specification.

Referring to the drawings, which are for illustrative purposes only,

Fig. 1 is a diagrammatic view of an electrical control system embodying the present invention;

Fig. 2 is a diagrammatic elevational view of a car truck showing the installation of parts of the present system;

Fig. 3 is a fragmentary end view of the car truck showing said parts of the invention;

Fig. 4 is a diagrammatic side view, partially in section, showing a journal box with a switch box, electrical conduit, fitting, and conduit leading into said journal box.

Fig. 5 is a top view of the "brass" of the bearing with the lugs thereof drilled to receive the thermostat element;

Fig. 6 is an outer end view of a journal box with a chambered "brass" mounted thereon;

Fig. 6*a* is an enlarged fragmentary end view of a lug of the "brass";

Fig. 7 is a side elevation and partial sectional view of the journal with the "brass" mounted thereon;

Fig. 8 is an enlarged outer end view of a lug on the "brass" with the thermostat element and wire connections;

Fig. 9 is an enlarged side view, partially in section, of the "brass" showing a lug with a thermostat therein;

Fig. 10 is a sectional view, taken on line 10—10 of Fig. 9;

Fig. 11 is a sectional view, taken on line 11—11 of Fig. 9;

Fig. 12 is a side elevation of an alternative type of thermostatic element;

Fig. 13 is a sectional view, taken on line 13—13 of Fig. 12;

Fig. 14 is a sectional view, taken on line 14—14 of Fig. 12;

Fig. 15 is an outer end view of a lug on the "brass" showing another alternative type of thermostatic element;

Fig. 16 is a side elevational view, partially in section, of the arrangement shown in Fig. 15; and

Fig. 17 is a sectional view, taken on line 17—17 of Fig. 16.

Throughout the drawings similar reference characters represent similar parts although where such parts are modified in structure or operation they are given a further differing reference character.

Referring more particularly to Fig. 1 the portion of the electrical system indicated by the character A is preferably installed on the engine; that portion indicated by B is installed on each car; and the portion indicated by the character C is preferably on the last car of the train.

Throughout the drawings it is to be understood that all grounds are grounded to the frame of the respective train units. All grounds are preferably welded to the frame or to such part as they are connected to.

It is to be noted that portions of the electrical system shown herein are similar to that disclosed in my Patent No. 2,391,228, issued December 18, 1945, and will be described herein but briefly.

The primary electrical system includes a source of power, such as a storage battery **20** having its negative terminal grounded at **22**. The positive terminal is adapted to be connected to a motor **24** by insulated wires **26**, **28** and **30**, the motor being grounded at **32**, there being a manually operated switch **33** interposed in the wire **26**.

Interposed in the connection between the battery and the motor, and more particularly between the switch **33** and the motor, is a delayed action circuit breaker **34** and a main control switch **36** urged open by a yielding means such as spring **37**, said switch **36** being a two position one having a contact **36***a* for the wire **30** and another contact **36***b* for a purpose hereinafter described.

An electrical generator **38**, operated by any suitable means such as a steam turbine or the like, is grounded at **40** and is adapted to be connected with the wire **26** by means of a circuit system which will be described later, said generator being adapted to supply current for operating the electrical control system and/or for charging the storage battery **20**.

A signal bell **44** may, if desired, be included on the engine and is connected to wire **30** by a wire **46**, said bell being grounded at **48**. The motor **24** is connected by any suitable well known means, such as gearing or the like, to an air valve **50** controlling the pipe line **52** of the air brake system of the train.

It should be borne in mind that the wires of the main circuit, which carry a heavy load, are relatively large to eliminate undue resistance and possible overheating when the battery delivers full power.

The control circuit includes a magnet **56** for actuating the switch **36**, said magnet acting on a hinged bar **58** of iron or other suitable material which comprises part of said switch. Buttons **60** and **62** of insulating material may be attached to the magnet and the bar **58** respectively, said buttons being arranged to form a stop for limiting movement of the bar. The magnet is connected to wire **28** by a wire **64** which leaves the magnet at **65** and is adapted to be connected to an insulated wire **66** on the adjacent car by means of a hermaphrodite split plug **70** which is fully described in said Patent No. 2,391,228 as well as in my copending application for Connectors for Electric Circuits, Ser. No. 623,813, filed October 22, 1945, now Patent No. 2,555,683, issued June 5, 1951, in which application said plug is being claimed.

Wire **66** runs the full length of the car and is adapted to be connected to the wire **66** of the next car by a similar plug **70**. The wires **66** of the cars may be relatively small if desired thus holding the cost to a minimum.

Each car is provided with switches **72**, there being a switch **72** secured adjacent the respective ends of the usual spring plates **74** (Fig. 3) of the car trucks at each end of the cars, said switches **72** being connected by wires **76** to the wires **66** and are grounded at **133**, a more detailed description of the switches being given in said Patent No. 2,391,228.

For passenger cars a signal light **78** may be installed, said signal being grounded at **80** and connected to wire **66** by means of a wire **182** which has a switch **84** interposed therein, said switch **84** being shown as controlled by a solenoid **186** although a magnet or other suitable means may be used to actuate same.

In order to insure an electrical connection between the frames of adjacent cars, wires **88** are grounded at **92** to the respective frames and said wires are connected together through the plugs **70**. This connection provides a positive flow of current throughout the control circuit, and the arrangement is particularly desirable to insure an electrical connection between the cars should said cars have loose draw-bars and coupling pins and be passing over insulated joints of the track when derailment occurs. If such an arrangement were absent under such circumstances there might be a delay in the setting of the brakes and severe damage to equipment or personnel and passengers might result.

As shown in the drawings the car at the rear of the train is provided with a switch **96** adapted to connect wire **66** of said car to ground **98** by means of contact **95** and wire **97**. If desired, such a switch and ground may also be included in the control circuit of other cars. This switch is provided to permit manual closing of the control circuit to effect setting of the brakes in case the engineer fails to see a hand signal or should such setting of the brakes be desirable for any other reason. The switch **96** may also be closed to test the control circuit and it therefore provides a simple and effective means for making such a test. It is to be understood, of course, that the rear car circuit preferably also includes the switches **72** as shown for the cars at B.

The switches **72** each comprise a resilient winged member secured to the under side of the spring plate **74** and insulated therefrom by a block **128** (Fig. 3) of any well known type of electrical insulating material such as Bakelite or the like. The winged member includes wings **130** which are oppositely disposed and downwardly inclined and are adapted, when deformed upwardly, to contact switch members **132** fixed to opposite sides of the spring plate **74** by any suitable means such as rivets or the like. Each part **130** has a horizontal portion which normally lies

parallel with rails 137 and such parts may terminate in upwardly inclined free end portions. It is to be understood that the members 132 are grounded to the spring plates 74 which form part of the underframe of the respective cars, the grounding of said members being shown at 133 in Fig. 1. The winged member of each switch 72 is connected to wire 66 by a wire 76.

The spring plates are customarily installed between the front and rear wheels 138 and 140 respectively of each truck of a car, as shown in Fig. 3, the truck being disposed adjacent the respective ends of the cars. An end view of a spring plate of a truck, with the switches 72 mounted thereon, is shown in Fig. 2 and it will be noted that said switches are disposed outwardly of and above the top plane of the adjacent rails 137.

The above described system is an open circuit arrangement wherein normally there is no current flowing therethrough and the operation thereof is as follows:

The delayed circuit breaker 34 and hand operated switch 33 are normally closed and the switch 36 is normally open as well as the switches 72 and the manual control switch 96. However, should a derailment occur the wheels of one side of one or more car trucks will fall outside the rails while the wheels on the other side will drop between said rails. The lower horizontal parts 130 of the switch 72 disposed between the latter set of wheels will strike the adjacent rail and will be thereby forced upward into contact with the members 132 of said switch thus closing the control circuit and causing magnet 56 to draw bar 58 toward it so as to close the main circuit switch 36. Upon closing of said switch 36 the motor 24 is supplied with current and is caused to operate, thereby opening valve 50 of the air brake system. The brakes are thus set and as the valve 50 is located on the engine at the head of the train the brakes at said head are set first, which is the most desirable arrangement, the brakes on the rest of the cars being progressively set toward the rear end of the train.

At the time the control circuit is closed the solenoid 186 is energized to close switch 84, thus turning on the warning light 78. If such a light is installed in each car of a passenger train the passengers of the respective cars are given a warning signal that an emergency setting of the brakes is being made. The warning bell 44 is also caused to operate, said bell being energized when the switch 36 is closed. The engineer is thus automatically given a signal to shut off the motive power of the engine. It is to be noted that the signal light 78 is primarily intended for passenger trains and may be eliminated if desired, particularly from freight cars.

However, if desired, the motor 24 may also be connected by gearing or the like with the motive power control whereby said motive power, whether steam, electricity, or an internal combustion engine or the like, is shut off automatically and simultaneously with the setting of the brakes. It is also to be understood that if desired substitutions may be made for various parts of the system. For example, a solenoid may be used instead of magnet 56; a light may be used instead of the bell 44; or a magnet may be used in place of solenoid 186. Other similar substitutions may also be made for these and other parts.

The delayed circuit breaker 34 is interposed in the main circuit to break said circuit after the valve 50 has been opened by the motor and the brakes of the train have been applied. An alternative arrangement may include a self-protected motorized valve for the air line control and such a valve may be so designed and constructed as to break the main circuit when the valve is opened, thus effecting de-energization of the magnet 56 and allowing the switch 36 to return to its normal open position. The circuit breaker 34 could then be dispensed with.

The circuit between the generator 38 and wire 26 includes a voltage regulator, current limiter and reverse current cut out, indicated respectively at 146, 148 and 150. These elements are of well known character, and function in the well known manner so no detailed description thereof will be made.

As above mentioned the switch 33, interposed in the wire 26, is a normally closed, manually operated switch. The purpose of this switch 33 is to permit the cutting out of the entire electrical control system in case the engineer in his cab decides to halt an application of the brakes as he may do upon receiving a "hot box" alarm or warning from bell 152.

Means are provided, in connection with the above described control system, for automatically giving a warning of a hot box or bearing and for thereafter automatically effecting setting of the brakes of the train if the engineer fails to act promptly in setting the brakes.

The hot box alarm or bell 152 is provided and is connected by a wire 154 to the contact 36b of the switch 36, said bell being connected to ground 156 by a wire 158.

Each journal box of each car is provided with a thermostat 160, which will be more fully described hereinafter, and each thermostat controls a switch 162 having a movable lever or contact 164, operated by said thermostat 160, and a fixed contact 166, the lever 164 being connected to ground 168 by a wire 170. The contacts 166 are connected by wires 172 to one end of a resistor or resistance unit 174 of a control device, indicated generally at 176. The other end of said resistance unit is connected by a wire 178 to the wire 66, said wire 178 also being connected to a fixed contact 180 which is adapted to be engaged by a contact 182 of the movable end of a thermostatic element, indicated generally at 184, which may be of bimetal or other suitable character and which is connected to the resistor unit adjacent to the first mentioned end thereof. The contacts 180 and 182 and the thermostatic element 184 comprise a thermostatic switch which is normally open and which will be more fully described hereinafter. However, it is to be noted that when this switch is closed the resistor unit is out of the electrical circuit and when said switch is open said unit becomes an effective part of said circuit.

If desired, the manually operated switch 96 may have a second contact, 99, connected to one end of a resistor unit 190, the other end of said unit being connected to ground at 192.

There may be one such switch 96 on each train, generally on the rear unit or car thereof, although if desired, as on a passenger train, there may be one of these switches on each car.

Referring to Figs. 2 and 3, there are shown portions of a car truck having journal boxes 196 with covers 198 of well known character. Included in each journal is the brass 200, Figs. 5, 6 and 7, on the adjacent end portion of axles 202. Each brass has oppositely disposed lugs 204 having bores 206 extending longitudinally therein and in which are received thermostats 160. There is a bore 206 in each lug so that the brass may be used for

either the right hand or left hand journal box, but it is to be understood that there is contemplated but one thermostat 160 for each brass.

The wires connected to the thermostatic switches 162 are housed in weather proof conduits, each including a tube 208, elbow 210, fitting 212 and flexible tube 214 leading through the wall of the respective journal boxes and into the housing 226, Figs. 2, 4 and 9.

Referring to Figs. 8, 9, 10 and 11, which show the thermostatic unit 160 and switch 162 controlled thereby, the thermostatic unit comprises a coiled metal element 216 disposed within a frame 217 having a plurality of longitudinally extending arms 218 which are T-shaped in cross-section. Oppositely disposed arms 218 are connected together at one end of the unit by integral members 220 which cross at said end and are fastened together at the point of intersection by a rivet 222 or the like. The adjacent end of the element 216 is also secured to the crossed members by said rivet 222. The opposite ends of the arms 218 are secured to the adjacent wall 224 of housing 226 in which the switch 162 is located. The thermostat unit is disposed within an opening 206 in a lug 204 of the brass with the frame arms received in the T-shaped slots of said opening. When the thermostatic unit is in position in the opening 206 the wall 224 of the switch housing is positioned against a gasket 230 which lies between said wall and the adjacent end of the lug 204, which receives said thermostatic unit.

Means for securing the assembly (thermostat 160 and switch 162) in position is also provided, and, as shown, comprises a spring latch 232 having one end secured at 234 to the top of the housing 226, said top being substantially flush with the top of the lug. The latch extends over the top of the lug and is provided with a hook-like end 236 which is received in a recess 238 in the top of the lug.

The switch end of the metallic thermostat element 216 is pivotally connected at 239 to a lever 240 in the housing 226, said lever being pivoted at 242 to a bracket 244 secured to the fixed bottom wall portion 245 of said housing.

The opposite end of lever 240 is pivotally connected to a second lever, which is the lever 164, by means of links 248 and pivot pins 250. The end of lever 164, adjacent its connection with lever 240, is turned or twisted, at 252, 90° and is secured to a bracket 254 by pivot pin 250*a* or the like, said bracket being riveted or otherwise suitably secured to the top wall of the housing 226.

The housing 226 has a cover 256 which includes a part 257, forming the front wall of the housing 226, and a part 258 which forms a portion of the bottom wall of said housing. The part 257 is hinged at 259 so that the housing 226 may be opened for inspection, testing and/or repair of switch 162. The part 258 of the cover 256 is provided with a resilient spring latching member 260 adapted to engage a small boss 261 of the fixed bottom wall portion 245. The cover 256 is therefore releasably secured in the closed position.

Contact 166 is located within the housing 226 and is so positioned as to be contacted by lever 164, said contact 166 comprising a pair of resilient, spaced, winged contact members 166*a* secured to the lower end of a spring member 262 by rivets 264 or the like, the upper end of said spring member 262 being insulatably secured at 266 to the top wall of housing 226. The contact members 166*a* are insulated from the adjacent cover part 257 by an insulating stop 268 secured to said part 257. Wire 172 is soldered or otherwise suitably secured to spring member 262 and ground wire 170 is soldered or otherwise suitably secured to lever 164. As the lever 262 is of resilient material it may be resiliently moved by hand so as to cause the contact 166 to engage the lever 164 when testing the unit after the cover 256 has been lifted.

Should a hot box occur, heat from the journal brass 200 heats up the thermostatic unit and thermostatic element 216 expands more than its frame, resulting in the left hand end, as shown in Fig. 9, moving toward the left, through an opening 270 in housing 226 and causing the free end of lever 240 to move in a counterclockwise direction. This effects a clockwise movement of lever 164 until the free end thereof enters between the contact members 166*a* with a wiping movement thereby closing the switch 162. The wiping movement of the switch member 164 cleans the contacts of corrosion and the like and thereby provides an effective and sure contact.

When the switch 162 is closed the control circuit is energized, said circuit including the resistor element 174 and the wires 66. Because the resistor element 174 is included in the circuit the power transmitted through the circuit is less than the normal full output of the battery 20 so that the magnet 56 will attract the bar 58 of switch 36 only sufficiently to cause said bar or switch element to engage contact 36*b*. This will result in energization of bell 152 which then sounds an alarm indicating there is a hot box on one of the train units.

Upon energization of the control circuit the resistor 174 begins to heat up and warm the thermostat 184. Should the engineer then fail to act within a short period of time after bell 152 has sounded, as for example, one and a half or two minutes, the thermostat 184 will be sufficiently warmed up so that its free end, carrying contact 182, will move so that said contact will engage the contact 180. Thereupon the resistor will be cut out of the circuit and more power from battery 20 will flow through the control circuit and cause magnet 56 to further attract the bar 58 so that it will engage contact 36*a* and effect energization of the motor 24 which will operate the valve 50 and cause the air brake system to apply the brakes of the train.

Upon cooling of element 216 the end thereof connected with the lever 240 moves toward the right and draws said lever and the lever 164 back to their normal position.

It is to be noted that while the contacts 180 and 182 are shown as "touch" contacts in the drawings this invention contemplates the use of contacts which will "make" with a wiping action as in the case of contacts 164 and 166*a*.

The switch 96 is provided so that should one of the trainmen wish to sound alarm 152 said switch may be manually moved to contact 99, thereby completing the control circuit through resistor 190 which is of substantially the same resistance as resistor 174. Thus only a sufficient amount of current will flow through the control circuit to effect closing of the circuit for the bell 152. Should the contact 95 be engaged by the switch member 96 greater power will be supplied to magnet 56 for effecting setting of the brakes.

In the alternative arrangement of the thermostatic journal box element shown in Figs. 12, 13 and 14, the thermostatic element is indicated at 272 and comprises a corrugated liquid filled,

sealed tube which is shown as soldered or brazed at the inner end, as at 274, to the adjacent parts of the frame 217. The opposite end of the element 272 is provided with an axial rod 275 which projects through the opening 270 in housing 226 and has a hole 276 therein adjacent its end for reception of a pin to provide a pivotal connection with the lever 240 for actuation thereof.

In the alternative arrangement shown in Figs. 15, 16 and 17, the thermostatic element is a bi-metallic strip, indicated at 278, disposed in a tube 279 received in the opening 206 of the journal box brass. The tube 279 is provided at its inner end with a plug 280 having an oblong opening in which the inner end of the bi-metallic element 278 is secured in any suitable well known manner. The free end of the element 278 has a pin and slot connection 282 with the adjacent end of twin levers or contact members 164*a* which are pivoted at 284, intermediate their ends, to the lower end of a supporting strip 285, the upper end of said strip 285 being secured by rivets 287 or the like to the top wall of the housing 226. When the free end of thermostatic element 278 moves upwardly the free ends of levers 164*a* move in a counterclockwise direction for contacting, with a wiping motion, the contact member 166*a*. Contact member 166*a* is insulatably secured to housing 226*a* at 226*b* and ground wire 170 is suitably secured to 164*a* whereas wire 172 is fastened into electrical contact with 166*a*.

Downward movement of the free end of the bi-metallic element 278 reverses the movement of lever 164*a* and results in opening of the switch 162.

The present invention also includes a telephone system connected into the above described electrical system and is operable without other wiring through the train. As the telephone circuits and parts are well known they will be but briefly described.

There are two parts to said telephone system shown, one part or station 280, being on the engine and the other part or station, 282, being at the rear of the train. Directly connected intermediate stations of the plug in type may also be provided if desired.

Each station is provided with a repeating coil 291, the coil of station 280 being connected by a wire 292 with the wire 65 and the coil of station 282 being connected by a corresponding wire with the wire 66.

The repeating coil of each station has a wire connection 293 with a ground 294 which connection includes a condenser 295 and a freeze plug or fuse 296. From the repeating coil of each station are the wires 297 and 298 having connections with the usual bell 299, a hand cranked magneto 300 and receiver 304. Interposed in wire 297 is a condenser 301, said wiring leading to the switch 302 controlled by the usual hook 303 for the receiver 304. There is also provided a transmitter 305 and induction coil 306 having primary and secondary windings 307 and 308 respectively. The transmitters 305 are supplied with direct current by batteries 309 for the primary circuits.

The telephones are preferably of the conventional wall type and work the same with the exception that the message is carried over the secondary circuit of the control system instead of over a separate wire. The return is through the ground or frames et cetera of the cars of the train. For example, station 280 delivers the message in the conventional form of electric current to repeating coil 291, by way of wires 297 and 298, whereupon coil 291 induces a like electric current into wire 292 and thence to wire 65, wire 66 and wire 292 of the repeating coil 291 of station 282 whereat a like current is induced in the wires 297 and 298 of that station for actuating the receiver 304 thereof.

The condensers 295 prevent the direct current from battery 20 in wires 65, 66 and 292 from reaching ground 294.

Should a condenser 295 become cracked or otherwise "leak" the direct current from battery 20 through to ground 294, the respective fuse 296 will "burn out" and break the circuit before the brakes of the train can be set by switch 36.

It is to be understood that the telephones use an all metallic circuit through the ground, as the grounds 294 are connected to the underframe of the engine and cars of the train.

I claim:

1. In an electrical system for controlling the application of the brakes of railroad trains and the like, having an automatic brake system including means for directly controlling said automatic brake system: a main control system including a source of power; electrically operable means for actuating the means for directly controlling the automatic system; means, including a main switch, adapted to connect the electrically operable means with the source of power; a control circuit extending substantially the length of the train; electrically actuated means connected with the control circuit and adapted to be controlled thereby, said electrically actuated means being so constructed and arranged as to actuate the main switch; a control circuit switch having a movable switch member and a contact member having a resilient support whereby the latter contact member may be manually urged into engagement with the movable switch member; and a temperature responsive device for actuating the movable switch member of said control circuit switch, said temperature responsive device being located adjacent a journal of the train and being responsive to the temperature thereof.

2. In an electrical system for controlling the application of the brakes of railroad trains and the like, having an automatic brake system including means for directly controlling said automatic brake system: a main control system including a source of power; electrically operable means for actuating the means for directly controlling the automatic system; means, including a main switch, adapted to connect the electrically operable means with the source of power; a control circuit extending substantially the length of the train; electrically actuated means connected with the control circuit and adapted to be controlled thereby, said electrically actuated means being so constructed and arranged as to actuate the main switch; a control circuit switch having a movable switch member and a contact member having a resilient support whereby said contact member may be manually urged into engagement with the movable switch element for testing the system; a temperature responsive device for actuating the movable switch member of said control circuit switch, said temperature responsive device being located adjacent a journal of the train and being responsive to the temperature thereof; and a switch box having a hinged cover and releasable latching means therefor, said switch box be-

ing disposed within the journal housing of a train unit and housing the control circuit switch.

3. In an electrical system for controlling the application of the brakes of railroad trains and the like, having an automatic brake system including means for directly controlling said automatic brake system: a main control system including a source of power; electrically operable means for actuating the means for directly controlling the automatic system; means, including a main switch, adapted to connect the electrically operable means with the source of power; a control circuit extending substantially the length of the train; electrically actuated means connected with the control circuit and adapted to be controlled thereby, said electrically actuated means being so constructed and arranged as to actuate the main switch; a control circuit switch; a temperature responsive device for controlling said control circuit switch, said temperature responsive device being located in an opening provided therefor in a brass of a train unit journal and responsive to the temperature thereof; a switch box having a hinged cover, said switch box being disposed within the housing of said journal and housing the control circuit switch; and a releasable latch for attaching the switch box to the end of the journal brass.

4. In an electrical system for controlling the application of the brakes of railroad trains and the like having journal boxes, said trains also having an automatic brake system including means for directly controlling said automatic system: a main control system including a source of power; electrically operable means for controlling the means for directly controlling the automatic system; an electrical alarm signal; a main switch having a contact for connecting the source of power with the alarm signal and a contact for connecting said source of power with said electrically operable means; a control circuit extending substantially the length of the train; electrically actuated means connected with the control circuit and adapted to be controlled thereby, said electrically actuated means being adapted to actuate the main switch to connect the source of power with the alarm signal when energized from said source by power of a predetermined value and to actuate said main switch to connect said source of power with the electrically operable means when energized from said source by power of another predetermined value; a control circuit switch for said control circuit; a thermostatic element for controlling said control circuit switch, said thermostatic element being positioned adjacent a journal box of the train so as to be responsive to the temperature thereof; a resistance element interposed between the control circuit switch and said control circuit; a resistance element cut out switch; and a temperature responsive device, responsive to the temperature of said resistance element, for controlling said cut out switch.

5. In an electrical system for controlling the application of the brakes of railroad trains and the like, having an air brake system including an air valve controlling the air line, said train comprising a plurality of units: a main control system including a source of electric power; electrically operable means for actuating the air valve; an electrically operated alarm signal; a main switch having one position for connecting the source of power with the alarm signal and another position for connecting said source of power with the electrically operable means; a control circuit extending substantially the length of the train with portions of said circuit on said units; electrically actuated means connected with the control circuit and controlled thereby, said electrically actuated means being so constructed and arranged as to actuate the main switch to said one position when energized by power of a predetermined value and to actuate said main switch to the other position when energized by power of a higher predetermined value; a resistance element having one end connected with the control circuit; a normally open control circuit switch connected with the other end of said resistance element; a thermostatic element for controlling the control circuit switch, said thermostatic element being located adjacent a journal bearing of a train unit so as to be subjected to the temperature thereof and to close the control circuit switch when the journal becomes overheated; a normally open resistance element cut out switch; and a temperature responsive device responsive to the temperature of the resistance element and adapted to close said cut out switch when the temperature of the resistance element rises above a predetermined value.

6. In an electrical system for controlling the application of the brakes of railroad trains and the like, having an automatic brake system including means for directly controlling said automatic brake system: a main control system including a source of power; electrically operable means for actuating means for directly controlling the automatic system; means, including a main switch, adapted to connect the electrically operable means with the source of power; a control circuit extending substantially the length of the train; electrically actuated means connected with the control circuit and adapted to be controlled thereby, said electrically actuated means being so constructed and arranged as to actuate the main switch; a control circuit switch having a movable switch member and a contact member having a resilient support whereby said contact member may be manually urged into frictional engagement with the movable switch member for testing the system; and a temperature responsive device operable to actuate said movable switch member, said temperature responsive device being located adjacent a journal of the train and responsive to the temperature thereof.

7. In an electrical system for controlling the application of the brakes of railroad trains and the like, having an automatic brake system including means for directly controlling the automatic system: a main electrical control system including a source of power; electrically operable means for controlling the means for directly controlling the automatic system; an electrical alarm signal; a main switch having a contact for connecting the source of power with the alarm signal and a contact for connecting said source of power with said electrically operable means; a control circuit extending substantially the length of the train; electrically actuated means connected with the control circuit and adapted to be controlled thereby, said electrically actuated means being adapted to actuate the main switch to connect the source of power with the alarm signal when energized by power of a predetermined value and to actuate said main switch to connect said source of power with the electrically operable means when energized by power of another predetermined value; a resistance element in said control circuit; a normally open temperature responsive journal box switch, responsive to an

increase in the temperature of said journal box for energizing the control circuit; and a temperature responsive resistance element cut out switch located adjacent to said resistance element, said cut out switch being adapted when heated by said resistance element, to move to a position whereat the resistance element is bypassed.

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