Title of Invention;
Railroad Axle Bearing Overheat Warning and Locating System Spacer Variant 3

Background of Invention;

The field of art for this invention is in the use of axle roller bearings and associated parts in a railroad application. When roller bearings overheat, failure can be catastrophic especially with heavy loads, such as in railroad applications. This invention addresses that problem with a warning system that detects overheating bearings before they fail. This system also indicates the location of the overheating bearing. The prior art that is known to the inventor is not clear as to overheating bearings. Prior art known to the inventor are larger systems with electrical connections, sensors, radio antennas and microprocessors that differ drastically from this invention and seem be not clear and precise regarding roller bearings. And the inventors previous filed provisional patent application date 03/22/2023 that uses other variants of this invention.

Summary of Invention;

This invention uses a piped air system with a low voltage warning buzzer and blinking light that indicates air loss in the system along with an air operated whistle. At a roller bearing overheating condition a plurality of devices using a meltable material retainer holds back air pressure then melts from the overheating roller bearings higher temperature. The melting of this retainer causes a low air pressure condition that activates a warning light and low air pressure buzzer, alerting operators. Simultaneously a flag device releases at the overheating roller bearing and there by indicates the location at the affected roller bearing. Use of the air operated whistle can be controlled at the locomotive assisting in locating the affected roller bearing also.

Specifications

The retrofit Variant 3 of this invention would be using a pipe-like cylindrical or alternative-shaped tube device that would be threaded and grooved on the inside and out; threads are to accommodate air fittings also to lock in a melt/meltable material air pressure retainer and to thread in a whistle device and a lock nut. The threads and grooves will aid in securing the meltable material. At the casting/injection of the melt material into the device a pre-bent actuator rod with hooked end which operates a flag location indicator, will be installed before liquid melt casting solidifies or any paste injection cures; all parts and housing of the flag indicator will have a liberal coating of a high temperature anti-seize compound applied at installation for smooth operation. A flag location indicator device will be circular, or alternative-shaped passageway machine bored into the spacer device to house the flag and part of the actuator rod for the location indicator with a spring inside to push the flag out. At bearing overheat, the higher temperature will melt the air pressure-retaining material, releasing the flag via that spring. Flag and rod will have smaller diameters and a step down-cone threaded fitting to retain the flag. Flag will have to have a larger back short flange stop rear

portion and smaller exit diameter/dimension on a longer length portion so the flag will have limited travel and stop. The longer portion sticks out for identification and locating. The pipe-like cylindrical or alternative-shaped passageway will be threaded on the inside to accommodate these cone or other shaped devices that would step down the diameter/dimension to retain the spring and to limit the travel of the flag indicator. They could alternatively be stamp molded and/or press fitted, welded, pinned or high temperature adhesives could be used to attach the fittings for stop and retainers of the spring and flag. Alternatively shaped flag indicators that are oval, triangular, hexagon, octagon, any flat blade, rectangular bar, square block or other shapes can also be used with appropriate changes to the shape of the locating device outer housing. The new manufacture bearing housing would have all the above-mentioned internal parts and have to have bores drilled into it to accommodate the air pressure retainer air fittings and the flag location device; these can be alternative-shaped holes or bores also. Flag location device part will have a dead end in its bore; so, the spring would push against that dead end and then threads or some other shaped reduced diameter/dimension fitting can snap in clip in weld in the part at the beginning of the bore to install the fitting to limit and stop the flag's ejection; all parts and housing will have a liberal coating of a high temperature anti-seize compound applied at installation for smooth operation. The bore for the air pressure retaining device can be a round or alternative-shaped bore but it would be threaded for air fittings at the rear and or have threads, groves at any points where the melting material needs retention and it would go through to the other side of the bearing assembly housing where it would be attached to air fittings and the air line system. Casting or injecting the melt material and installation of the rod actuator with hooked end and flag parts, spring, fittings would be at the same time to solidify or cure the melt material and lock the actuator rods hooked end in the melting material and all parts and housing will have a liberal coating of a high temperature anti-seize compound applied at installation for smooth operation so it is ready to go for an overheating event. The materials used for the above would consist of, but are not limited to the use of heat sensitive melting metal such as lead, tin, pot metal, solder etc. or plastics or other temperature-sensitive melting materials that may be better suited for use. The flag actuator rod could be made out of stainless steel it will be threaded and bent to route it in and out of the devices and the part that's inside the melt material must have a hook shape to ensure it's locked in to the melt material. The flag will be made of steel or aluminum and could be threaded or have other attachment method. It will need to be prepared to take paint well so it could be colored or printed with any type of codes or reflective coating or light-reflecting pieces on to it or wrapped with a sticker that has a high-temperature adhesive with colors, bar codes, letters, wires, or other identification devices or methods. The new and improved manufacture bearing spacer with the bored holes and passageways should be a steel casting as a single part and then machined, or it could be forged steel single part and then machined. It's outside/inside dimensions as to the bearings and axle parts would be the size currently being used for railroad axle bearings and attachment points to the trucks of the rail car's carriage and the length/width/depth would be sufficient to accommodate all those mentioned measurements accordingly. If the industry makes changes to those dimensions, then the new and improved manufacture bearing housing with air pressure retaining device and flag/tube/rod indicator would be changed accordingly.

Detailed description of invention;

The invention consists of the following;

A system comprising of metal or plastic tubing and fittings suitable for air pressures exceeding 100 psi that are interconnected between railroad cars and the railroad locomotive. Using a quick disconnect fitting and air shut off valve at the connecting ends of the rail cars to interconnect the system. This would make a single main air line running the length with (T) connections to each side of car's trucks of the train when connected together.

At the location of the trucks of each rail car a (T) fitting and air line tubes will go to each side of the rail car's truck assemblies, where another (T) would send a separate line to each of the new manufactured or retrofitted railroad axle bearing spacer that connect with the rail car's truck carriage systems and the axles. At that point air line fittings, elbows, and heavy flexible rubber air lines for routing the air line tubes to supply air pressure to the (T) on a truck carriages and its outer bearing housings will be used along with a plurality of devices, tubular, cylindrical - shaped, that have a melting material air pressure retainer inside them to hold back air pressure would be machine bored into existing spacers for retrofit application and machined into a new manufacture roller bearing top spacers application along with a warning flag and rod indicator assemblies machined bores next to them.

The new improved manufactured version; a new casted or forging and machined spacer part with molded parts for the devices built into it with the melted material air pressure retainer and flag and rod indicator machined bored in at top or any alternative suitable locations above.

In this variant 3 of the meltable material air pressure retainer device, this variant is working in conjunction with a saddle like spacer above the railroad axle bearing assembly. It consists of possibly 3 versions; one is a machine bored version with passage ways from the front to the rear. The second is a machine bored grooved and sectioned passageway from the front to rear. All variants have shorter dead-end bores for the flag indicator Device. The first mentioned version will use a machine bored passageway that can be threaded to accommodate the air fittings and the meltable material air pressure retainer and whistle device. The grooved/sectioned second version will use a pre-made insert configuration of the meltable material air pressure device. In this configuration can be a tapered/non-tapered design and/or a key lock in design and will have exterior threads and a lock nut at the inside wheel end of the spacer to secure it and also have threads inside to accommodate the whistle device and the meltable material air pressure retaining device. It will be a contact type device that uses the contact of itself to the spacer and in the grooved/sectioned bored version it would make contact with the roller bearing assembly directly through an open cut away section running the full length of the bored passageway. Both versions can be a new

manufactured part or can be modifications of existing spacers that are already in use and would be machined to accommodate each version accordingly. The first version can also be machine threaded inside the bore to accommodate the whistle, air line fittings and the meltable material air pressure retaining parts. Or could have the insert type air retaining device if appropriate this would make the Third version. All versions will have a sufficient amount of machine threads at the entrance of all the flag indicators bores so that the reduced diameter/dimension end stop fittings can be installed with along with the parts of the flag indicator device.

At a point of bearing overheat the transfer of heat at a predetermined temperature level reaches the melting temperature of the sensitive - metal or alternative temperature reacting material in the melting air pressure retaining device causing it to melt releasing air pressure causing an alarm blinking warning light and audible low air pressure buzzer warning at the locomotive, and releasing a flag/tube/rod indicator from the location retainer device assembly so that it could be identified as to what bearing overheated on the train the whistle device could be now be controlled/modulated at the locomotive and make auditable sounds for location. The flag/tube/rod indicator would now be seen by personnel to identify the overheated bearing or alternatively a drone aircraft could be flown along the train with a Camera that would pick up a certain pattern or codes, colors, reflective metallic coating colors on the flag/tube/rod indicator to locate the overheated bearing. The melt device could also have a whistle - like reed or other air pressure sounding device installed inside of it so that if air pressure was applied by the engineer at the locomotive under full continuous air or intermittent burst of air pressure when searching for the overheated bearing, that would make a whistling or other audible sound as an indicator of the location of the overheated bearing. The air would start through the air line tubes at the locomotive where use of valves and air tanks and would be supplied by the air pressure from locomotives air compressor system and would charge the air pressure and pressurize set/fix it into the system. The warning buzzer and warning light would be a low voltage audible buzzer device and blinking warning light device working in concert with a low air pressure switch, which would sound and flash blinking light alarms to the engineer. The engineer would stop the train, and personnel would go out to look for the flag/tube/rod indicator on the car’s bearings or have a drone fly up and down the train and look for the flag/tube/rod indicator on the cars and/or listen for or pick up on the drone microphone the sound of the whistle or other audible device if a drone is used or the personnel could hear. After which repairs could be made to the car or it can be put out for later repairs if possible. The flag/tube/rod indicator assembly would be in a tube that has a spring pushing the flag indicator out to the outside of the bearing assembly end; this will be achieved by the melting of the material in air retaining device; after it melts an arm that’s held in place by the air retainer piece would be free and the spring would push the flag/rod indicator out.

At the point of joining up rail cars together, air lines will be flexible rubber hose type air lines with disconnect fittings and shut off valves; the air line connection points would have valves on them so the last car in the line will just be shut off at the very end

of the train to keep air pressure in the system. At points in the system where the metal line would need to be flexible, a heavy rubber line with fittings could be employed where joints or articulation are needed; this way the line system would be flexible at those points, and hard metal line would be used in areas where it's not necessary to have flexibility; hard metal air lines would be attached to various parts of the rail car framing structure to run the system along from truck to truck and along the framing of the wagon/carriage assemblies that the axles attach to. The fittings will be a feral type compression type sealing fitting with a nut that connects to a metal male fitting or other suitable fittings with threads. There also may be brazed or welded connections or press lock type connections. The regular flexible lines would also have male or female threads depending on the fittings they are connected to. All fittings need to be airtight to prevent leaks. Brass fittings and copper line would be the premium example. Steel may be used in the same fashion. Plastic type line could be used in a lot of different places in the system. Metal tubes and fittings might be more rugged for railroad applications where suitable; having a point to disconnect the line near the bearing assembly would make replacement of an overheated bearing assembly easier and faster for work crews. For rail cars that do not have the system employed; an air line will run through from end to end attached to the rail car and with shut off valves and rubber lines for joining up rail cars to allow air to travel through that car's undercarriage to other cars and to cars that have the system employed as to make it a complete air system within the complete train. This may be necessary since implementation of the system may take time to achieve on all railroad cars. If a train is made up of a mix of new and improved axle bearing conversion cars OR retrofitted cars OR brand-new manufactured train cars equipped with the new and improved axle bearing assemblies and cars that have no system at all but equipped with a pass - through air line there would be some protection available until the whole train could achieve total protection by total implementation of the roller bearing overheat warning and locating system on all railroad cars.