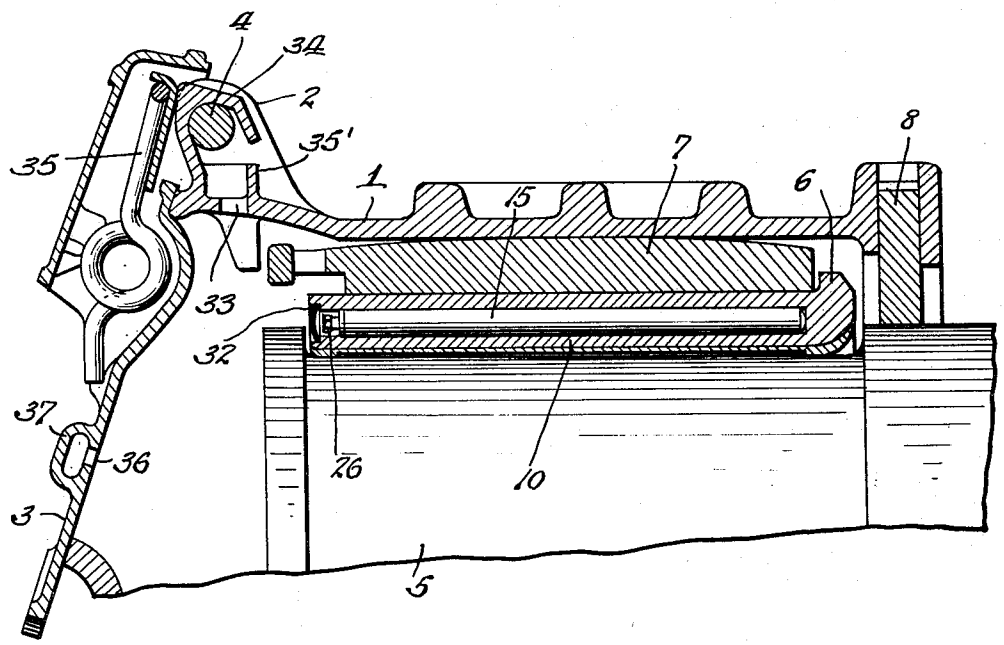
Oct. 31, 1950 H. W. FAUS 2,527,923

HOTBOX ALARMS OR INDICATOR

Filed Dec. 27, 1945 3 Sheets-Sheet 1

Fig. 1.



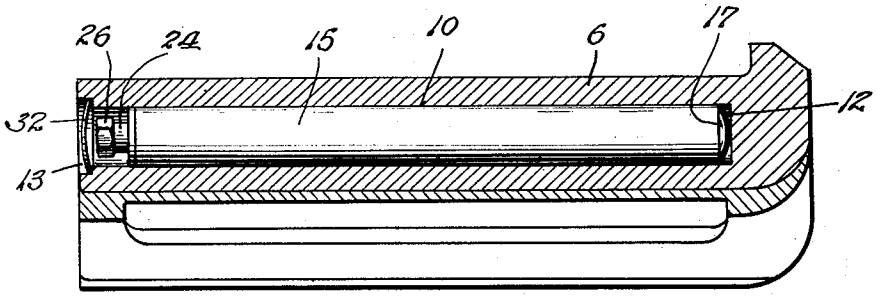


Fig. 2.

INVENTOR:
Herbert W. Faus,
BY
C. C. Hines,
ATTORNEY.

Oct. 31, 1950 H. W. FAUS 2,527,923

HOTBOX ALARMS OR INDICATOR

Filed Dec. 27, 1945 3 Sheets-Sheet 2

Fig. 3.

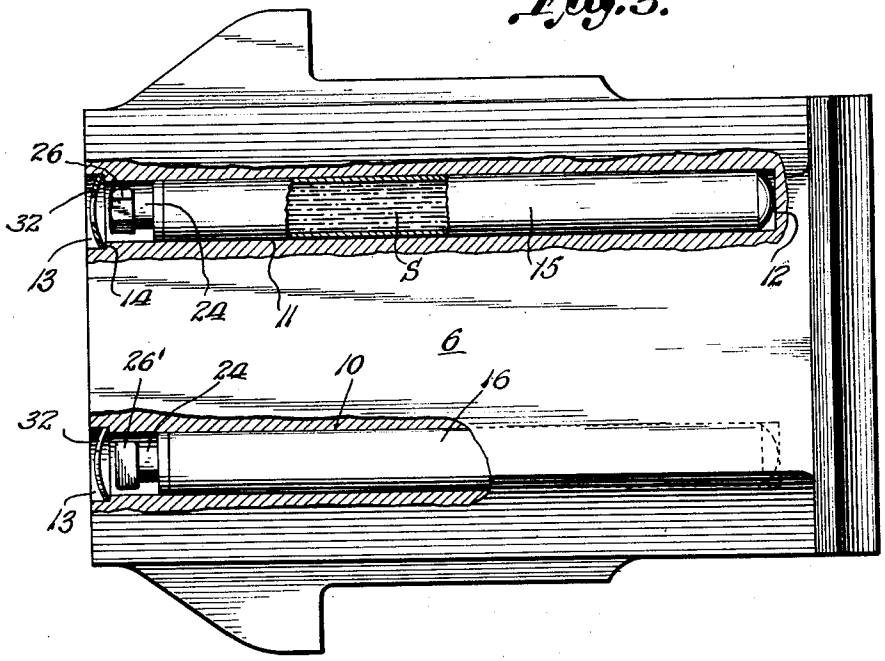


Fig. 4.

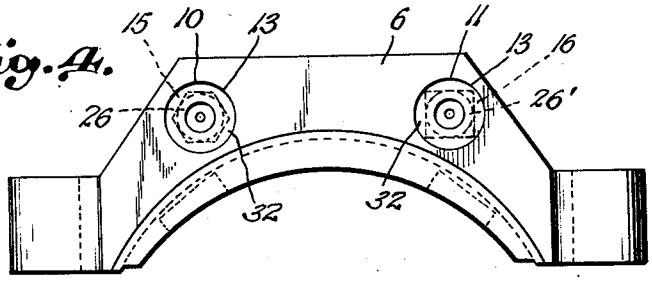
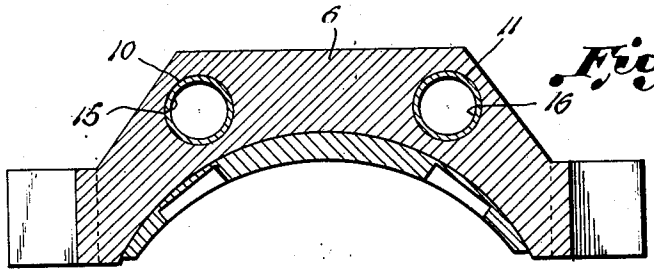


Fig. 5.

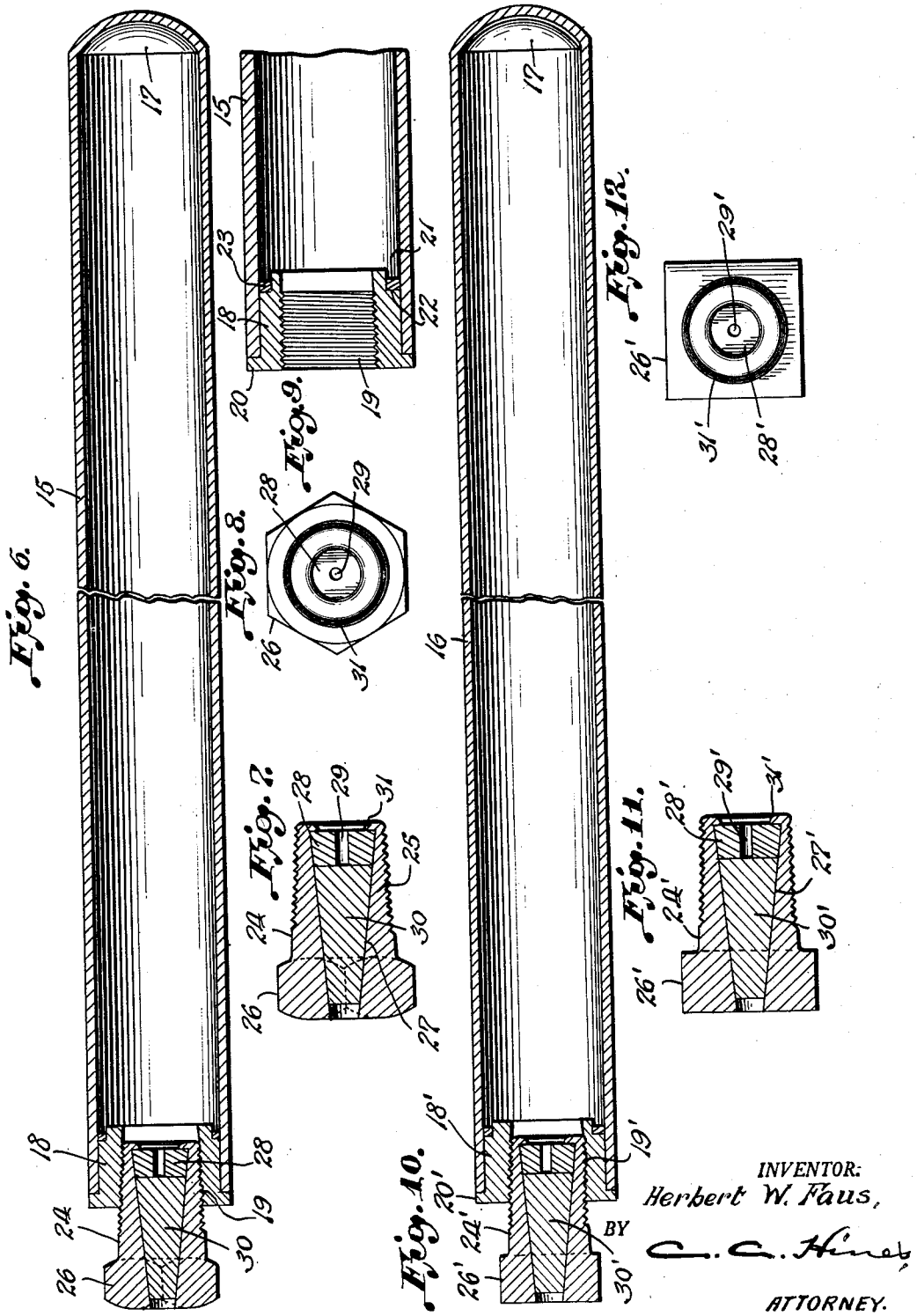


INVENTOR:
Herbert W. Faus,
BY
C. C. Kines,
ATTORNEY.

Oct. 31, 1950 H. W. FAUS 2,527,923

HOTBOX ALARMS OR INDICATOR

Filed Dec. 27, 1945 3 Sheets-Sheet 3



INVENTOR:
Herbert W. Faus,
BY
C. A. Hines
ATTORNEY.

Patented Oct. 31, 1950 2,527,923

UNITED STATES PATENT OFFICE

2,527,923

HOTBOX ALARM OR INDICATOR

Herbert W. Faus, White Plains, N. Y.

Application December 27, 1945, Serial No. 637,401

6 Claims. (Cl. 308—38)

1

This invention relates to hot bearing or hot-box indicators, and particularly to means for showing when a bearing on machinery or railway rolling stock has reached an abnormal temperature either by the emission of a dense cloud of smoke, a pervasive odor, or both. More particularly the invention relates to improvements upon the indicating means covered by my prior Patent No. 1,979,875, dated November 6, 1934.

The present invention embodies certain new and useful improvements in a bearing construction with an alarm device. The alarm device per se forms the subject-matter of a divisional application filed October 4, 1946, Serial No. 701,097.

In my aforesaid patent there is provided a journal box or locomotive driving box containing a bearing having one or more pockets normally closed by fusible elements or plugs which melt when the bearing reaches a predetermined elevated temperature and release material which is readily noticeable for indicating a hot-box, the box or its lid being desirably formed for venting said material while retarding the entrance of dirt or other foreign substances into the box. This material may be of a character to give a readily noticeable warning either by the development of a cloud of smoke, the production of a distinctive or pervasive odor, or both. The structure shown in the patent is efficient for its purpose, but is open to the disadvantage that upon the discharge of the material contained in a pocket in use, when giving an alarm, the pocket formed directly in the bearing itself must be recharged and this must be done at the point where the bearing happens to be, which, in case of the use of the bearing on a traveling body, such as in the journal box of a railway car truck, for example, cannot always be conveniently done.

One object of the present invention is to provide means for the purpose which overcomes this disadvantage of the prior patented construction, and which allows the bearing to be charged at the place of manufacture thereof or at the place where the bearing is mounted for use, and which allows recharging of the bearing thereafter whenever necessary in a ready, quick and convenient manner.

A further object of the invention, generally considered, is the provision of a bearing box, journal box or locomotive driving box containing a bearing provided with one or more pockets designed to receive removable or replaceable cartridges closed by fusible elements or plugs which melt when the bearing reaches a predetermined elevated temperature and release vaporizable material which is readily noticeable for indicating a hot box.

2

A still further object of the invention is the provision of a bearing having one or more material containing cartridges fitted therein and normally closed by fusible means, whereby when the bearing in service reaches an abnormal temperature, due to the development of a hot-box or heated bearing, the material escapes upon the melting of the fusible means to give a readily noticeable warning either by the development of a cloud of smoke, the production of a distinctive or pervasive odor, or both.

A still further object of the invention is the provision of a material containing cartridge of the character described which embodies a novel construction of fusible stopper or sealing means having a metering orifice for regulating the discharge of the material and which is normally closed by a fusible element adapted to securely seal the orifice against leakage of the material.

A still further object of the invention is to provide a bearing and cartridge of the character described so constructed that the heat of the overheated bearing will be transmitted as quickly as possible from the rubbing surface of the bearing to the fusible element or plug of the cartridge, and wherein a retaining means for holding the cartridge in place is provided which allows quick ejection of the fused material to ensure free escape of the vaporized signal material to the atmosphere.

With these and other objects in view, which will appear in the course of the subjoined description, the invention consists of the novel features of construction, combination and arrangement of parts hereinafter more fully described and claimed, and as exemplificatively shown in the accompanying drawings, in which:

Fig. 1 is a fragmentary vertical longitudinal section through a journal box, an associated journal bearing and associated parts embodying my invention.

Fig. 2 is a vertical longitudinal section on an enlarged scale through the bearing removed from the journal box and showing one of the cells or pockets and a charge containing cartridge fitted therein.

Fig. 3 is a top plan view of the bearing with parts broken away and in section to show the arrangement of the cartridge containing cells or pockets and the cartridges disposed therein.

Fig. 4 is a front end elevation of the parts shown in Fig. 3.

Fig. 5 is a vertical transverse section of the same.

Fig. 6 is a longitudinal section through the odor producing cartridge, showing the same in sealed condition but with the odor producing charge omitted.

Fig. 7 is a longitudinal section through the cartridge sealing closure on an enlarged scale.

Fig. 8 is a rear end elevation of the sealing closure shown in Fig. 7.

Fig. 9 is an enlarged longitudinal section through the discharge end of the cartridge and the sealing closure seat ring secured therein.

Fig. 10 is a view similar to Fig. 6 of the smoke producing cartridge.

Figs. 11 and 12 are views similar to Figs. 7 and 8 of the sealing closure of the smoke producing cartridge.

Hot bearings, generally designated as "hot-boxes," are one of the most frequent causes of derailments and train delays on railways today. On one large railway system during the year 1929, seventy hot-boxes on cars and locomotives were not detected until the journal melted off. Thirty-three of these resulted in serious derailments. During the same year, twelve locomotive driving axles failed. Most of these failures were caused by overheating. With the increase in length of trains and speed of operation, and as a result of the success which has attended efforts to make journal box lids fit as tightly as possible in order to exclude dirt from the bearings, it has become more and more difficult for the train crew to detect a hot-box in time to avoid serious consequences. With the shorter trains, lower speeds and loose fitting journal box lids formerly prevalent, the trainmen were usually able to see or smell the smoke from over-heated lubricating oil or grease in time to stop the train before any serious damage was done.

For the above reasons, a serious need has arisen for the provision of some device which will attract the attention of a machine operator or a reasonably diligent train crew, crossing watchman, tower man, or the crew of a passing train, to an over-heated bearing, at the earliest possible moment, in order that attention may be given to prevent injury to the journal or bearing.

I have, therefore, invented a replaceable cartridge type of device to give a definite signal to the train crew whenever any bearing equipped therewith becomes heated to a specific predetermined temperature. Such temperature must be above the normal operating temperature of the bearing, but below that at which the physical properties of the material of the journal and axle begin to be adversely affected. Investigation has shown that the normal temperature of oil lubricated car journals varies from atmospheric temperature up to about 150° F. The device which I have invented is adapted to give a warning signal to the train crew automatically when the bearing reaches a temperature sufficiently high to melt the fusible material but below that which will cause injury to bearing or axle, so that ample time will be available before any damage is done. Even under former conditions of operation, when the trainmen were able to depend upon their ability to smell or see the smoke from burning lubricating oil, it was seldom possible to detect the hot-box and stop the train before the bearing had been destroyed and the axle permanently injured. A device constructed in accordance with my invention will give a warning to the train crew and permit the train to be stopped even before the oil begins to burn.

In carrying my invention into practice I provide a hot bearing or hot-box alarm or indicator, preferably comprising two containers or cartridges which are placed in cavities, cells or pockets formed in the bearing for their reception. Each cartridge is filled with a different liquid or material and has a small orifice sealed with fusible metal, which melts at a predetermined temperature and releases the material. At this temperature the material vaporizes as fast as it can escape through the orifice. The material contained in one cartridge produces a distinctive and penetrating odor, while the material contained in the other cartridge produces a dense white smoke, both of which give warning of an overheated bearing. The discharge continues until both cartridges are empty, which requires from five to ten minutes.

The liquid used to produce the odor is preferably ethyl mercaptan, and the smoke producing liquid is preferably a mixture of titanium tetrachloride and carbon tetrachloride. The gases from both of these liquids are non-corrosive and can be inhaled within reasonable limits without harmful effects.

For the fusible element, the melting temperatures that have been found most satisfactory are 220° F. for roller bearing applications, 320° F. for waste packed friction bearings, and 450° F. for grease lubricated friction bearings. All three of these temperatures are substantially above the normal running temperature of bearings of the respective types. Extensive tests in railroad practice have shown that carbon steel axles in the normal 40–55 carbon range are not adversely affected by temperatures up to 525° F.

The fusible metal employed has a composition determined by the temperature at which the alarm is designed to function. Suitable compositions for the fusible metal are as follows:

	Fusible Metal	
	Melting Point	Composition
For Roller Bearings	220° F.	20% Cadmium, 54% Bismuth, 26% Tin
For Oil Lubricated Friction Bearings	320° F.	10% Bismuth, 40% Lead, 50% Tin
For Grease Lubricated Friction Bearings	450° F.	100% Tin

The loaded cartridges may be initially placed in the bearing by the bearing manufacturer or by the bearing installer or user and require no attention thereafter until they are discharged by an overheated bearing, when they are replaced by new cartridges. This may be done without the use of charging means wherever the bearing happens to be, by simply extracting the spent cartridges and inserting charged cartridges in their place.

Referring now more fully to the drawings for a detailed description of the invention, 1 designates a journal box provided with a hinge lug 2 and a lid 3 pivotally connected to said lug by means of a hinge pin or pintle 4. Received in the box is an associated journal 5 normally in engagement with a bearing 6 between which and the top of the box is disposed a usual form of wedge 7. The lid 3 closes the outer opening in the box

and a dust guard 8 of any desired character may close the inner opening around the axle 9.

In the embodiment of my invention as illustrated, the bearing 6 is provided with a pair of longitudinally extending cavities, cells or pockets 10 and 11, preferably arranged on opposite sides of the longitudinal center of the bearing and extending nearly the full length of the bearing, each pocket being arranged adjacent to and parallel or substantially so with the bearing surface of the bearing and closed at its inner end 12, and opening at its outer inlet and exit end through the front of the bearing, where the mouth portion of the pocket is counterbored or enlarged to form a keeper recess 13 and an abutment shoulder 14. These pockets are formed to respectively receive the cartridges 15 and 16 containing charges of the liquids or materials for respectively producing an odorous vapor and a smoke-like vapor, as hereinafter described.

The cartridges 15 and 16 are preferably in the form of cylindrical tubes and are generally similar in construction, differing only as to certain details regarding their sealing features, so that a description of one will generally suffice for both. Each cartridge tube is comparatively thin-walled and formed of a suitable heat transmitting metal and is permanently closed at its rear end 17, which, when the cartridge is fitted in its pocket, abuts against the inner end wall 12 of the pocket. Each cartridge is of somewhat less length than its receiving pocket so that its forward or discharge end terminates close to but in rear of the mouth or recessed end 13 of the pocket. The front or discharge end of each cartridge tube is normally closed by diameter reducing and sealing means to prevent escape of the charge material, said sealing means having a discharge passage or orifice closed by a fusible element or material which, when melted by the heat of the overheated bearing, will allow the charge to escape through the discharge passage or orifice to give the desired alarm or signal indication. The cartridges when fitted in the pockets are disposed inside the bearing sufficiently close to the rubbing surface of the bearing so that the heat of the overheated bearing will be transmitted as quickly as possible to the fusible elements of the cartridge.

The sealing means at the discharge end of each cartridge, cartridge 15, for example, comprises a diameter reducing and seat ring 18 fitted therein and having an inwardly tapering threaded bore 19, an outer end flange 20 and an inner end recess 21, and shoulder 22. The flange 20 of the ring 18 abuts against the outer end of the cartridge tube and the ring is fastened in place by means of a solder ring 23 disposed in the recess 21 and bearing against the shoulder 22 and inner surface of the cartridge tube and fused to the ring and tube to firmly secure the ring in place. The cartridge is charged with its signal producing material through the bore 19 of the ring 18, Fig. 3 showing such a charge S in tube 15, after which the bore 19 is closed by a special construction of sealing cap or plug 24 to hold the charge confined from escape until released by the overheating of the bearing.

The cap or plug 24 has an inwardly tapering body or shank portion 25 which is threaded to tightly fit the threaded bore 19 of the seat ring and is provided at its outer end with an angular gripping head 26. The plug is formed with an outwardly tapering bore or passage 27 at the inner end of which fits an orifice plug 28 having

a small orifice 29 which, when unsealed, will allow the charge within the tube when volatilized, to escape at a measured rate. This orifice is normally sealed by a fusible element or body of fusible material 30 fitted in the bore 27 between its outer end and the plug 28. The plug 28 is held from outward displacement under pressure of the charge by the fusible material 30 and is held from inward displacement by suitable means, as by spinning over the inner end of the shank 25 to form a bead or flange 31. It will be understood that normally, or before assemblage of the parts 28 and 30 within the plug, the reduced or attenuated rear end portion of the plug from which the bead or flange 31 is formed extends linearly at that end of the plug and initially forms a part of the wall of the bore 27. In assembling the parts the conical body 30 of fusible material is forced from the rear of the plug into the bore 27, the meter orifice member 28 is then inserted into the bore behind the fusible body 30, and the projecting rear end part of the plug is then, by means of a suitable beading, peening or spinning tool or machine, turned or spun inward to form the bead or flange 31 which confines the parts 28 and 30 in place. The plug is then ready to be fitted in the seat ring 18 at the normally open end of the cartridge tube, to seal said end of the tube after the tube is charged through the opening in the ring 18 with the signal material. By this construction the fusible element is arranged to lie outside the metering orifice 29 and to seal the orifice against leakage of the charge material as long as the fusible element remains intact, and, owing to the tapered form of the bore 27 and the fusible element 30, the pressure of the charge material on the orifice plug will cause the fusible element to fit more tightly in the bore 27, thus providing an additional safeguard against leakage of the charge from the cartridge tube.

As stated, the cartridges 15 and 16 are filled with charges of different liquids or materials, one of which when released produces a vapor having a disagreeable odor, and the other of which, when released, produces a smoke-like cloud of vapor. These charges are confined in the cartridges until the fusible elements are fused at the predetermined temperature to release the charges. At this temperature the charges vaporize as fast as they can discharge through the meter orifices, producing vapors of the character described, both giving warning of an overheated bearing and directing prompt attention to the location thereof. The discharge continues until both cartridges are empty, which requires from five to ten minutes.

A retainer 32 is provided to secure each cartridge in its pocket. This retainer is of spring washer type and designed to be sprung into the pocket mouth or recess 13 to frictionally bind against the shoulder and annular wall of the recess whereby it is adapted to be held securely in position against displacement. This retainer has an opening lying in line with the bore of the plug 24 and of such size as to allow the fusible material, when fused, to be blown through it by the force of the volatilized charge and the vapor of the charge to discharge freely therethrough to the atmosphere.

As a result of this construction of the tube and its sealing means and the use of the retainer 32 a cartridge tube is provided which meets all requirements and overcomes all objections to prior

alarm devices of the cartridge type heretofore suggested which have been either fatally defective in construction or have otherwise failed to meet practical requirements. One essential requirement is that the sensitive element of the device must be located in the bearing, or journal itself, to provide an effective indication of the bearing temperature. My cartridge tube fully meets this requirement. Another essential requirement is that the device must be readily applicable in its charged condition to the bearing and readily removable therefrom when spent so that a new cartridge may be quickly substituted for it. My construction of pocket cartridge meets this requirement, as a charged cartridge may be quickly inserted into the pocket through its open end and held in place by applying the retainer, and the cartridge when spent may be removed through the open end of the pocket on displacing the retainer, which operations may be performed without the use of any special tool. This is of great convenience and advantage from the standpoint of saving valuable time in removing a spent tube and applying a new one on the road when a train is stopped on account of the occurrence of a hot box. Still another essential requirement is that a hot box cartridge must be so designed that it can be filled and emptied through an opening of adequate size and one other than the aperture used for a properly regulated ejection of the charge vapor when the alarm functions, and that the seal used must be proof against leakage of the charge. Any opening large enough to permit ready filling of the cartridge will necessarily be so large that it cannot serve as a metering orifice. The metering orifice must be of such size and shape that it will prolong the discharge for a sufficient length of time to attract the attention of the crew of a running train. By experience it has been found to be at least five minutes. With my construction the tube may be filled through its outlet end after the diameter reducing seat ring **18** is applied, whereby an opening of sufficient size for this purpose will be furnished, which opening, however, will be too large to serve as a meter orifice. This objection is overcome by the use of the orifice member, which, as before stated, is arranged in rear of the fusible material, so that the meter orifice will be kept clear from and cannot become clogged by the fusible material when said material is fused and blown out. A fatal disadvantage of any cartridge that must be filled through the discharge port or orifice is that the closing seal must of necessity be fused in the orifice after the cartridge is filled. The application of heat is required to do this, and the inevitable effect, no matter how quickly or expertly the work is done, is to start premature vaporization of the charge, thus making it necessary to apply the seal against the vapor pressure, which has been repeatedly tried without success. My construction obviously avoids this objection. Any bearing during normal operation generates a certain amount of heat which causes the charge to expand and exert outward pressure. This pressure, in combination with the vibrations to which the bearing is subjected, tends to loosen any fusible seal and permit premature escape of the charge, thus causing a false alarm. In my cartridge the fusible material and the opening in which it fits are tapered in such manner that the greater the pressure generated in the cartridge the tighter the seal becomes so that it is maintained until the fusible material is melted. This sealing feature not only permits

of the application of the parts **24, 28, 30** as a unit after the part **18** has been secured in place and the tube has been charged through the opening therein, but prevents leakage of the charge under the ordinary working heat of the bearing when the bearing is in use, as although the charge may be expanded and the fusible material may be softened to some degree by the working heat, the pressure of the charge will only cause the fusible material to be wedged to a greater degree in its tapered seat, so that no leakage of the charge can occur. Finally, as in my alarm device the sealed end of the tube faces the open end of the bearing pocket and the apertured retainer **32** at that end of the pocket, the fusible material, when fused, is arranged to be blown from the plug through the opening in the retainer by the vapor so that no clogging of the meter orifice can occur and the vapor will be reliably discharged to produce an effective signal.

The cartridge **16** and its sealing features are similar in construction to the corresponding parts of the cartridge **15** with a certain exception, and the sealing features thereof are designated by similar primed reference numerals. The exception referred to is that the head **26'** of the sealing plug **24'** of the cartridge **16** is of a different form from that of the head **26** of the sealing plug **24** of cartridge **15**, the head **26** in the example shown being hexagonal while the head **26'** is square. These differences in the heads **26** and **26'** identify the character of the cartridges as being respectively odor and smoke cartridges, but other identifying means or marks, preferably applied to such heads, may be used to enable the cartridges to be distinguished from each other.

The advantage of the use of a cartridge type alarm is that a supply of cartridges of each type may be readily carried for use and supplied to a bearing to take the place of a spent or discharged cartridge wherever the bearing may be, a matter of great convenience in installing the cartridges in journal box or other bearings, particularly of rolling stock. Other advantages of my novel construction of alarm cartridge will be obvious from the foregoing description.

In order to provide for the escape of the warning material or vapor, an aperture **33** may be provided in the top wall of the box **1**, preferably adjacent the hinge lug **2** and beneath the cam portion **34** formed as part of the hinge lug for engagement by the resilient means **35** of the lid for holding the lid in open or closed position. The cam portion **34** is desirably extended over the aperture **33** and a flange **35'** desirably extends around the aperture so that said aperture is satisfactorily hooded to restrict the entry of dirt or other foreign substances into the box, while not interferring with the escape of hot-box indicating materials. Another venting aperture **36** may be provided through the lid of the box either as supplemental to the opening **33** or as an alternative thereto. The aperture **36** is desirably hooded by means of a hollow embossment **37** on the front face of the box to minimize the entrance of foreign material into the box. Other equivalent means of venting the vapors through the box may obviously be employed.

From the foregoing, it will be seen that I have provided a hot-box indicator adapted to be used on bearings generally and in connection with car, locomotive or other rolling stock bearings, and applicable directly to the bearing or brass

and adapted, upon the development of a predetermined abnormal temperature to emit a visible warning, an odorous warning, or both, whereby a hot-box may be detected and remedied prior to destruction of the bearing and associated journal with the consequent danger of derailment and loss of life.

While I have shown and described my invention as applied to a car journal box for indicating a hot-box when it occurs, it is to be understood that it is not limited thereto, as it may be used in machinery bearings or other bearing structures to indicate when the bearing is overheated so that attention may be given to prevent injury to or destruction of the bearing parts.

Although certain means have been shown for carrying my invention into practical effect, it will be understood that modifications may be made within the spirit and scope of the appended claims.

Having thus described my invention, I claim:

1. A bearing having a pocket opening outwardly through one of its surfaces, a cartridge tube fitted in said pocket and having an outlet end terminating adjacent to and facing the outwardly opening portion of the pocket, a sealing closure for the outlet end of the tube having a discharge passage closed by fusible material, said tube containing a charge of material which, when released by the fusing of the fusible material, is vaporized to indicate the overheating of the bearing, said tube and its closure being arranged within the pocket, and a retainer separate from and independent of the tube and its closure engaging the bearing at the open end of the pocket and serving to hold the tube from outward displacement and define an aperture of a size for the discharge therethrough of the melted fusible material and vapor.

2. In a signalling device for indicating the overheating of a bearing, a bearing member provided with a pocket having a mouth portion opening outwardly to the atmosphere, a thin-walled cartridge tube of infrangible heat conducting material fitted in the pocket and adapted to be slidably inserted thereinto and withdrawn therefrom through said mouth portion, said tube containing a charge of a vaporizable signalling material and having a closed inner end and a normally open discharge end, the latter terminating adjacent to but in rear of the face of the bearing through which the mouth portion of the pocket opens, a sealing closure for the discharge end of the tube lying therewith wholly within the pocket and having an outlet passage facing the pocket mouth and closed by fusible material, said closure being of a diameter not exceeding that of the tube and said tube and closure being free from connection with the bearing member, whereby when the pocket mouth is unobstructed the tube and its attached closure may be inserted into and withdrawn from the pocket therethrough, and a removable retainer on the bearing member formed and arranged to partially obstruct the pocket mouth against the casual outward displacement of the tube and to provide an opening of sufficient size to permit free discharge therethrough of the melted fusible material and vapor when the charge is vaporized.

3. In a signalling device for indicating the overheating of a bearing, a bearing member having a pocket closed at one end against communication with the atmosphere and having a mouth portion at its opposite end opening outwardly to the atmosphere, said mouth portion being of

larger diameter than the pocket, a thin-walled cartridge tube of infrangible heat conducting material fitted in the pocket and adapted to be slidably inserted thereinto and withdrawn therefrom through said mouth portion, said tube containing a charge of a vaporizable signalling material and having a closed inner end abutting against the inner end of the pocket and a normally open discharge end terminating adjacent to but in rear of the mouth portion of the pocket, a sealing closure for the discharge end of the tube lying therewith in rear of the mouth of the pocket and having an outlet passage facing the pocket mouth and closed by fusible material, said closure being of a diameter not exceeding that of the tube and said tube and closure being free from connection with the bearing member, whereby when the pocket mouth is unobstructed the tube and its attached closure may be inserted into and removed from the pocket through said pocket mouth, and a resilient diametrically contractible and expansible retainer on the bearing member sprung into the pocket mouth and structurally formed to partially obstruct the pocket mouth against the casual outward displacement of the tube and to leave an opening of a size to permit free discharge therethrough of the melted fusible material and vapor when the charge is vaporized.

4. In a signalling device for indicating the overheating of a bearing, a bearing member having a pocket closed at one end against communication with the atmosphere and having a mouth portion at its opposite end opening outwardly to the atmosphere, said mouth portion being of larger diameter than the pocket, a thin-walled cartridge tube of infrangible heat conducting material fitted in the pocket and adapted to be slidably inserted thereinto and removed therefrom through said mouth portion, said tube containing a charge of a vaporizable signalling material and having a closed inner end abutting against the closed end of the pocket and a normally open discharge end terminating adjacent to but inside the mouth portion of the pocket, a sealing closure for the discharge end of the tube lying therewith in rear of the mouth of the pocket and having an outlet passage facing the pocket mouth and closed by fusible material, said closure being of a diameter not exceeding that of the tube and said tube and closure being free from connection with the bearing member, whereby when the pocket mouth is unobstructed the tube and its attached closure may be inserted into and removed from the pocket therethrough, and a detachable ring-shaped retainer frictionally engaged with the wall of the pocket to hold the tube from outward displacement, said retainer having an aperture of a diameter less than that of the tube but of a size to permit of the discharge therethrough of the melted fusible material and vapor when the charge is vaporized.

5. In a signalling device for indicating the overheating of a bearing, a bearing member having a pocket closed at one end against communication with the atmosphere and having a mouth portion at its opposite end opening outwardly to the atmosphere, said mouth portion being of larger diameter than the pocket, a thin-walled cartridge tube of infrangible heat conducting material fitted in the pocket and adapted to be slidably inserted thereinto and removed therefrom through said mouth portion, said tube containing a charge of a vaporizable signalling material and having a closed inner end abutting

against the closed end of the pocket and a normally open discharge end terminating adjacent to but inside the mouth portion of the pocket, a sealing closure for the outlet end of the tube lying therewith in rear of the mouth of the pocket and having an outlet passage normally closed by fusible material, said closure being of a diameter not exceeding that of the tube and said tube and closure being free from connection with the bearing member, whereby when the pocket mouth is not restricted in diameter the tube and its attached closure may be inserted into and removed from the pocket therethrough, and a retainer comprising a concavo-convex spring metal disk located in and detachably engaged with the wall of the pocket to hold the tube from outward displacement, said disk having an aperture of a diameter less than that of the tube but of a size to permit of the discharge therethrough of the melted fusible material and vapor when the charge is vaporized.

6. In a signalling device for indicating the overheating of a bearing, a bearing member provided with a bearing surface and a pocket disposed in close proximity to and parallel with said bearing surface, said pocket being closed at one end against communication with the atmosphere and having a mouth portion at its opposite end opening outwardly to the atmosphere, said mouth portion being of larger diameter than the pocket and forming a keeper recess, a thin-walled cartridge tube of infrangible heat conducting material fitted in the pocket and adapted to be slidably inserted thereinto and removed therefrom through said mouth portion, said tube being arranged to lie in heat conducting contact with the walls of the pocket and containing a charge of vaporizable signalling material and having a closed inner end abutting against the closed end of the pocket and a normally open discharge end terminating adjacent to but inside the mouth portion of the pocket, a sealing closure for the discharge end of the tube lying therewith in rear of the mouth of the pocket and having an outlet passage normally closed by fusible material, said closure being of a diameter not exceeding that of the tube and said tube and closure being free from connection with the bearing member, whereby when the pocket mouth is not restricted in diameter the tube and its attached closure may be inserted into and removed from the pocket therethrough, and a removable washer-like retainer separate from and independent of the bearing member and the tube and its closure arranged in and frictionally engaged with the wall of the keeper recess to hold the tube from outward displacement, said retainer having an aperture of a diameter less than that of the tube but of a size to permit of the discharge therethrough of the melted fusible material and vapor when the charge is vaporized.

HERBERT W. FAUS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,979,875	Faus	Nov. 6, 1934
2,280,755	Hexamer	Apr. 21, 1942