3 Sheets.

C. B. RICHARDS'

Sheet 1.

Appliance for the Bearings of Mechanical Movements.

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PATENTED AUG 1 1871

Fig. 1.

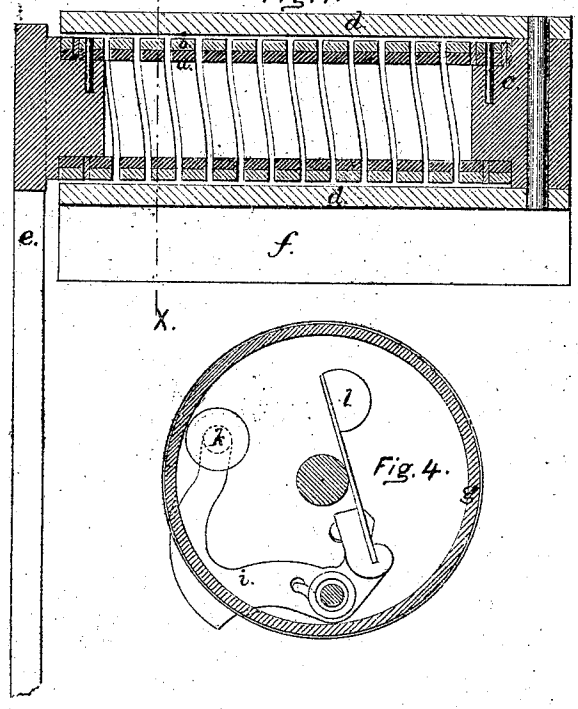
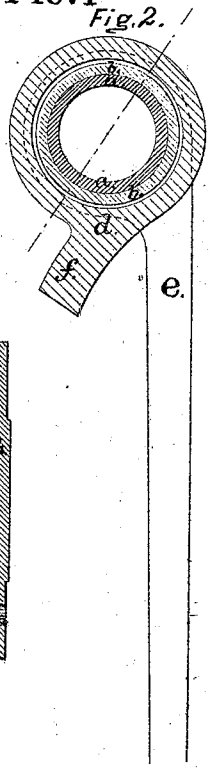


Fig. 2.



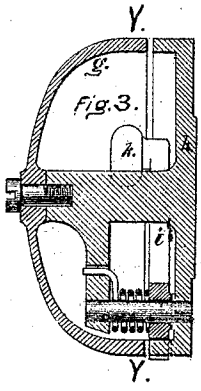


Fig. 6.

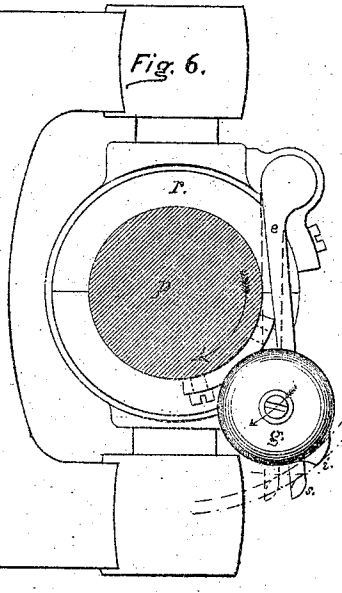
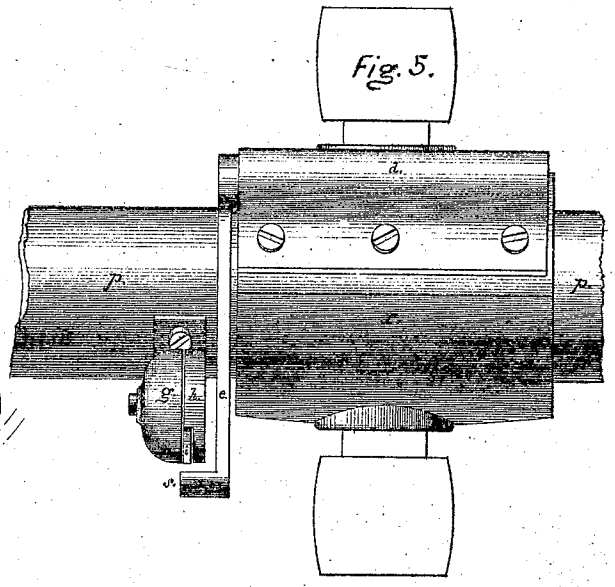


Fig. 5.



C. B. Richards Inventor.

Geo. F. Stone.
Edw. J. Murphy } Witnesses.

3 Sheets. Sheet 2.

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Fig. 7.

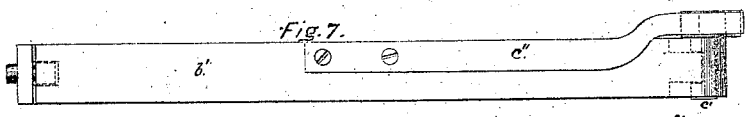


Fig. 8.

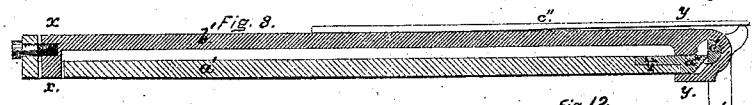


Fig. 9.

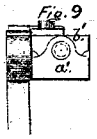


Fig. 10.

Fig. 11.

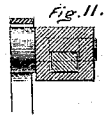


Fig. 12.

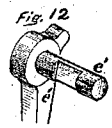


Fig. 13.

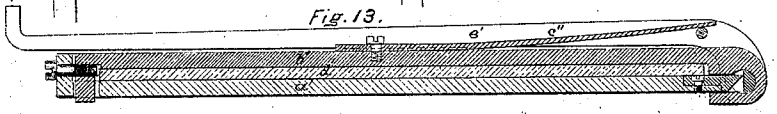
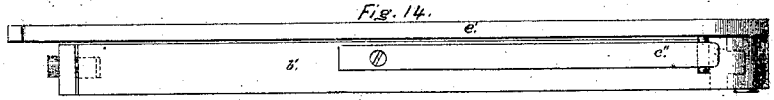


Fig. 14.



Inventor. C. B. Richards

Witnesses. Geo. F. Stone. Edw. J. Murphy

Fig. 15.

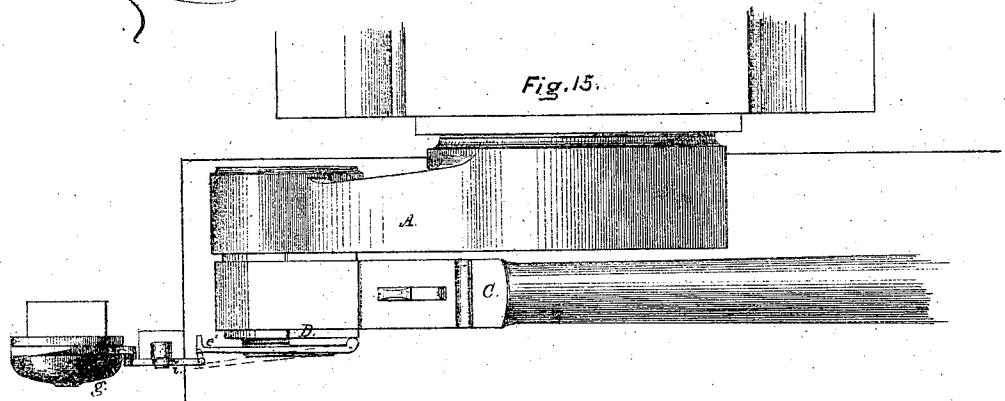
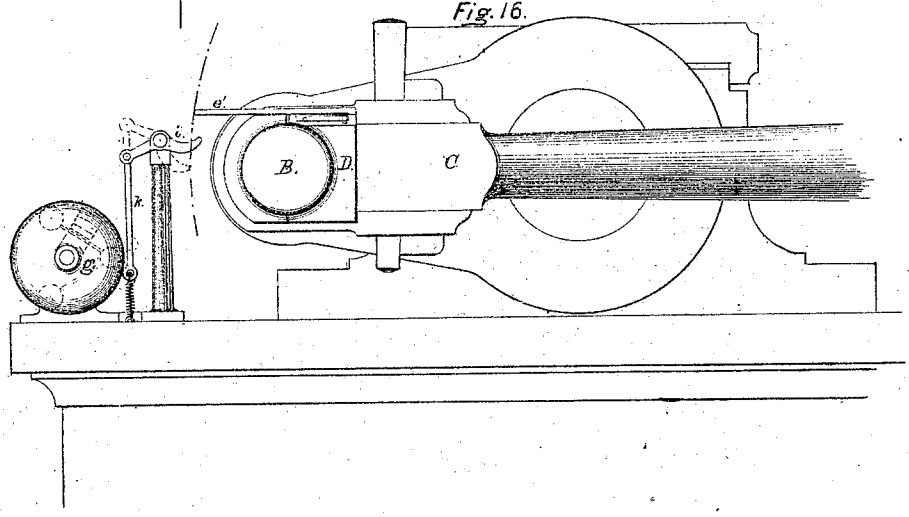


Fig. 16.



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Sheet 3.

Appliance for the Bearings of Mechanical Movements.

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Fig. 17.

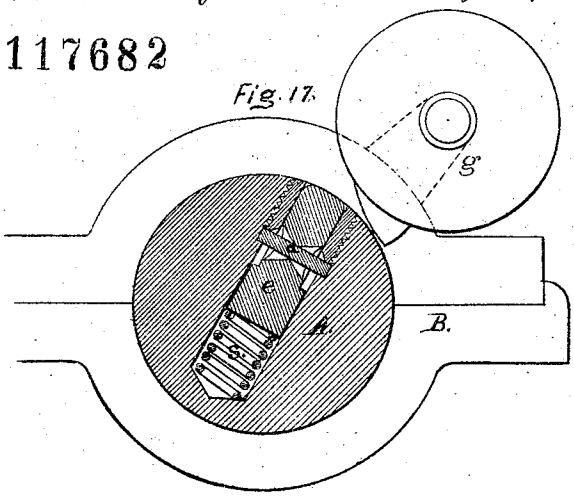


Fig. 18.

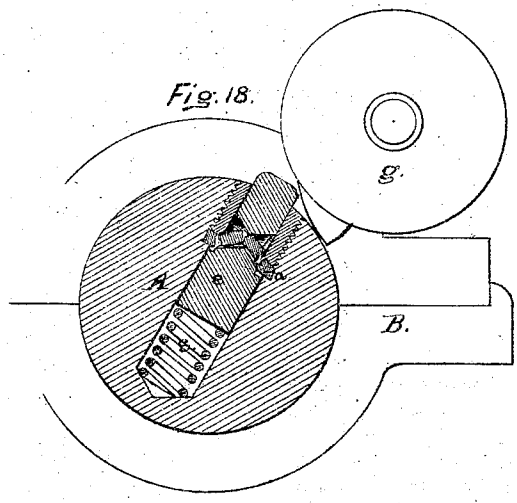


Fig. 19

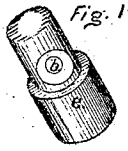


Fig. 20.

Witnesses
Geo. F. Stone.
Edw. J. Murphy

Inventor.
C. B. Richards

Fig. 21.

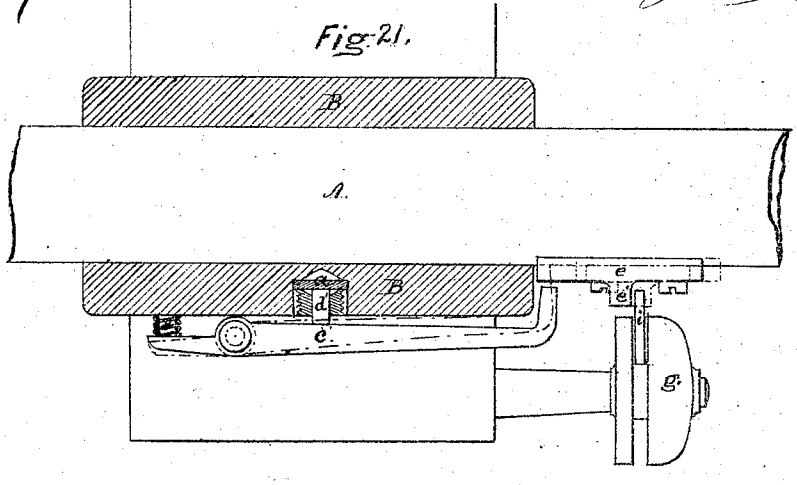
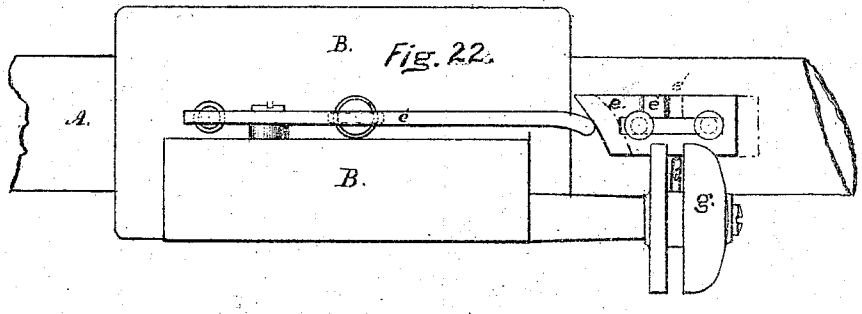


Fig. 22.



UNITED STATES PATENT OFFICE.

CHARLES B. RICHARDS, OF HARTFORD, CONNECTICUT.

IMPROVEMENT IN BEARINGS FOR MACHINERY.

Specification forming part of Letters Patent No. 117,682, dated August 1, 1871.

To all whom it may concern:

Be it known that I, CHARLES B. RICHARDS, of the city of Hartford, in the State of Connecticut, have invented a new and useful Appliance for the Bearings of Mechanical Movements; and I do hereby declare the following, taken in connection with the accompanying drawing, to be a full, clear, and exact description of the same.

My invention is applicable to nearly all kinds of machinery with moving parts, and is a device for calling attention to undue heating caused by excessive friction, its object being to lessen the danger of injury to the bearing-surfaces which might result from neglect of the attendant to oil them at proper intervals. My said invention consists in the application to the moving parts of machinery, at or immediately adjacent to the places where friction occurs, or to the stationary parts on which the moving pieces directly bear, of a thermostat or heat-indicator, which is combined with an alarm-bell or other apparatus for attracting attention in such a manner as to constitute a heat-alarm appliance; and in order that the giving of the alarm may be more certain and persistent, my invention further consists in so combining the heat-indicator and the alarm-bell with the machinery to which the invention is applied that the moving parts of the said machinery shall be made to give motion to the alarm apparatus at times determined by the action of the heat-indicator, substantially as hereinafter explained, whereby the action of the alarm appliance is made positive, and will go on so long as the machinery moves and heating occurs, not being dependent on a force so limited in its duration as that of a wound-up spring or weight.

In order the more fully to set forth the nature and scope of my invention, I have illustrated and will now describe several different applications of some of its numerous modifications.

Figure 1 is a longitudinal section through the axis of a thermostat and its case, which constitute a heat-indicator. Fig. 2 is a cross-section of the same at line X X in Fig. 1; Fig. 3, a central vertical section of an alarm-bell apparatus; and Fig. 4, a horizontal section of the same at line Y Y, Fig. 3. Fig. 5 is a side elevation, and Fig. 6 an end view of a portion of a line of shafting and its journal-box and hanger with my invention applied thereto.

In all the figures above named the same part is indicated by similar letters of reference.

The thermostat of Figs. 1 and 2 is virtually a Bréguèt's thermometer of large dimensions, and consists of a compound ribbon formed of two closely-united strips, *a* and *b*, of different metals of unequal expansibility by heat, *a* being the most expansible. This compound ribbon is made into a helical coil, one end, *c*, of which is fastened to a tubular metallic case, *d*, which surrounds the coil, while the other end is free to turn and carries an arm, *e*. The case *d* can be fastened by its flange *f* to a shaft or journal-box. An increase of temperature of the compound helix causes it to uncoil slightly, while a decrease of temperature has the opposite effect. The ringing or alarm apparatus consists of a gong-bell, *g*, and a striker, *i*, supported by a plate, *h*. There is nothing peculiar in its construction except that the striking-lever *i* has two heads, *k* and *l*, and that a part of the said lever, which projects beyond the periphery of the bell *g*, is so shaped that any moving piece passing tangent to the bell at that place in either direction will cause the head *l* to strike, while a counteracting spring, *m*, tends to force the head *k* against the bell. In Figs. 5 and 6, *p* is a portion of shafting, and *r* the bearing-box of a hanger which supports the shaft. *g* is the bell of the above-described ringing apparatus. Its plate *h* is bolted to the shaft *p*. The axes of the bell and shaft are parallel, and the whole bell apparatus rotates with the shaft. The protruding part of the striking-lever *i* is at the part of the bell's edge furthest from the center of the shaft *p*. The case *d* of the thermostat lies lengthwise on the bearing-box *r*. The arm *e* hangs downward, and is furnished at its lower end with a hook, *s*, which, when the arm is in its normal position, clears the striker *i*, but when the arm is swung inward nearer to the shaft, as shown by the broken lines at *e'*, then, as the shaft rotates, the protruding part of the striker *i* will strike the hook *s* and be forced inward, swapping out again after it has passed, which action rings the bell.

The operation of my invention in the applica-

tion just described is as follows: While the bearing is properly lubricated and in good running condition all the parts will be cool, and the arm *e* of the thermostat will remain in its normal position, namely, swinging outward; but if, by deficiency of lubrication, or by becoming out of line, or from any other cause, undue friction be created at the bearing, all the parts will then grow warm, and the increased temperature is communicated to the coil of the thermostat; this will uncoil slightly and swing the arm *e* inward, causing the hook *s* to ring the bell *g* at each revolution of the shaft *p*. After the cause of heating has been removed and the parts have cooled, but not until then, the arm *e* will again take its normal position and the bell cease to ring.

Fig. 7 is a longitudinal section of a thermostat or heat-indicator differing in construction from the one before described. Fig. 8 is a plan, and Fig. 9 an end view of the same. Figs. 10 and 11 are cross-sections of the same at *x* and *y*, respectively; and Fig. 12, a perspective view of the spindle *c'* and a portion of the arm *e'*.

b' is a bar of steel, to one end of which is attached one end of a bar, *a'*, of brass. Its other end carries a short spindle, *c'*, whose middle part is so cut away as to form a flat surface, passing through the axis. The bar *a'* lies under *b'*, and its free end is provided with a knife-edge, *a''*, which touches the flat part of *c'* at a point below the axes. One end of *c'* carries an arm, *e'*. A spring, *c''*, tends to turn the spindle *c'* so that its flat part presses against the knife-edge *a''*.

Figs. 13 and 14 show views (corresponding respectively to Figs. 7 and 8) of a heat-indicator, which differs from the one described in this, that the knife-edge *a''* of the bar *a'* touches the spindle *c'* above the axis instead of below. The position of the arm *e'* is also different, and there is a strip, *d'*, of wood or other heat non-conducting material between the bars *a'* and *b'*. In these thermostats, if the parts are heated, the bar *b'* expands more than *a'*, and, pressing harder against the flat part of the spindle *c'*, swings the arm *e'* in the direction shown by the arrows.

Figs. 15 and 16 illustrate the application of my invention to the crank-pin bearing of a steam-engine, showing, respectively, a plan and front elevation of the parts of an engine directly connected with and adjacent to the crank.

A is the crank; B, the crank-pin; C, the connecting-rod; D, the crank-pin box or brass. The heat-indicator last described is applied to the box D by the brass bar of the thermostat, being soldered to face of the upper edge of the box-flange. The arm *e'* of the thermostat extends forward beyond the end of the connecting-rod, and, when in its normal position, clears the end of a lever, *i*, which communicates, by a rod, *k*, with an alarm-bell, *g*. When the crank-pin box becomes hot the arm *e'* is swung outward, and its end will then strike the end of the lever *i'* at each revolution of the engine. Instead of the lever *i'* being connected by a rod with the alarm-bell it may be so connected with the two wires of an electro-magnetic alarm-bell that, when moved by the arm *e'*, it will close the circuit of the wires at each evolution of the engine, and produce an alarm at some distant point where the alarm apparatus may be located.

Fig. 17 and 18 show a shaft and bearing-box with my invention applied in another manner.

A is the shaft, shown in section, and B the bearing-box, on which is fixed the bell apparatus first described. The heat-indicator consists of a plunger, *e*, which, when all the parts are cold, is held in place by a bar, *a*, of fusible alloy or other material, which is stiff when cold, but soft, weak, or flexible when warm. The plunger *e* is inserted in a hole drilled transversely in the shaft A. S is a spring which forces *e* outward. The plunger *e* is shown in perspective by Fig. 19. It is perforated transversely at *b*. The fusible bar *a* is secured within the hole in the shaft A by a screwed bushing. It traverses the perforation in the plunger *e*, and, when cold, so holds it against the spring *s* that no part of the plunger protrudes beyond the surface of the shaft, as shown in Fig. 17; but when the shaft becomes hot the fusible bar will bend or melt and allow the spring *s* to force out the plunger *e*, whose end will then ring the bell *g* at each turn of the shaft A, as shown in Fig. 18. Fig. 20 shows the bar *a* in perspective.

Fig. 21 is a partial longitudinal section of a bearing-box with a modification of my invention. Fig. 22 is a side elevation of the same.

A is the shaft, and B the box. *g* is the bell of the bell apparatus first described, which is fastened to the flange of the box A. *a* is a bar of fusible alloy, like that shown in Fig. 20. It is fastened across a hole in the side of the box B, and sustains the pressure, through a plunger, *d'*, of a lever, *c*, which is pressed by a spring, *s*. The longer bent arm of the lever *c* extends beyond the end of the box B into such a position as to nearly touch, at each turn of the shaft A, a bevel-ended slide, *e*, which is so attached to the shaft that it is free to move lengthwise. A projection, *e'*, in the slide lies so as to clear the striker *i* of the bell *g* when the slide is in its normal position; but when the box B becomes hot and the fusible detent *a* melts, then the outer end of the lever *c* will be forced down by the spring *s* against the shaft A, and the slide *e* will come in contact with it and be wedged endwise to the right, as shown by the broken lines, so that the projection *e'* will come in line with the striker *i* and ring the bell *g* at each turn of the shaft. When the parts become cool a new fusible bar may be substituted for the one which has been melted.

Having described several methods of putting my invention into practice, I do not wish to be understood to limit my claim of invention to any of the details of the described apparatus; but

I claim—

1. The combination, with the moving parts of machinery, and with the stationary parts on which these rub, of a heat-indicator or thermostat, and an alarm-bell, or its equivalent, substantially as and for the purpose set forth.

2. The combination, with the moving parts of a machine and the adjacent stationary parts thereof, of a heat-indicator and an alarm apparatus in such a manner that the moving parts of the machine will be brought into connection with the alarm apparatus and produce the movements thereof at times determined by the action of the heat-indicator, as described, for the purpose specified.

In testimony whereof I have hereunto set my hand this 26th day of May, 1871.

C. B. RICHARDS.

Witnesses:
R. J. GATLING,
J. H. BODWELL.