(No Model.) 2 Sheets—Sheet 1.

# W. H. RODGERS.

## INDICATOR FOR BOILER FEED.

No. 382,732. Patented May 15, 1888.

Fig. 1

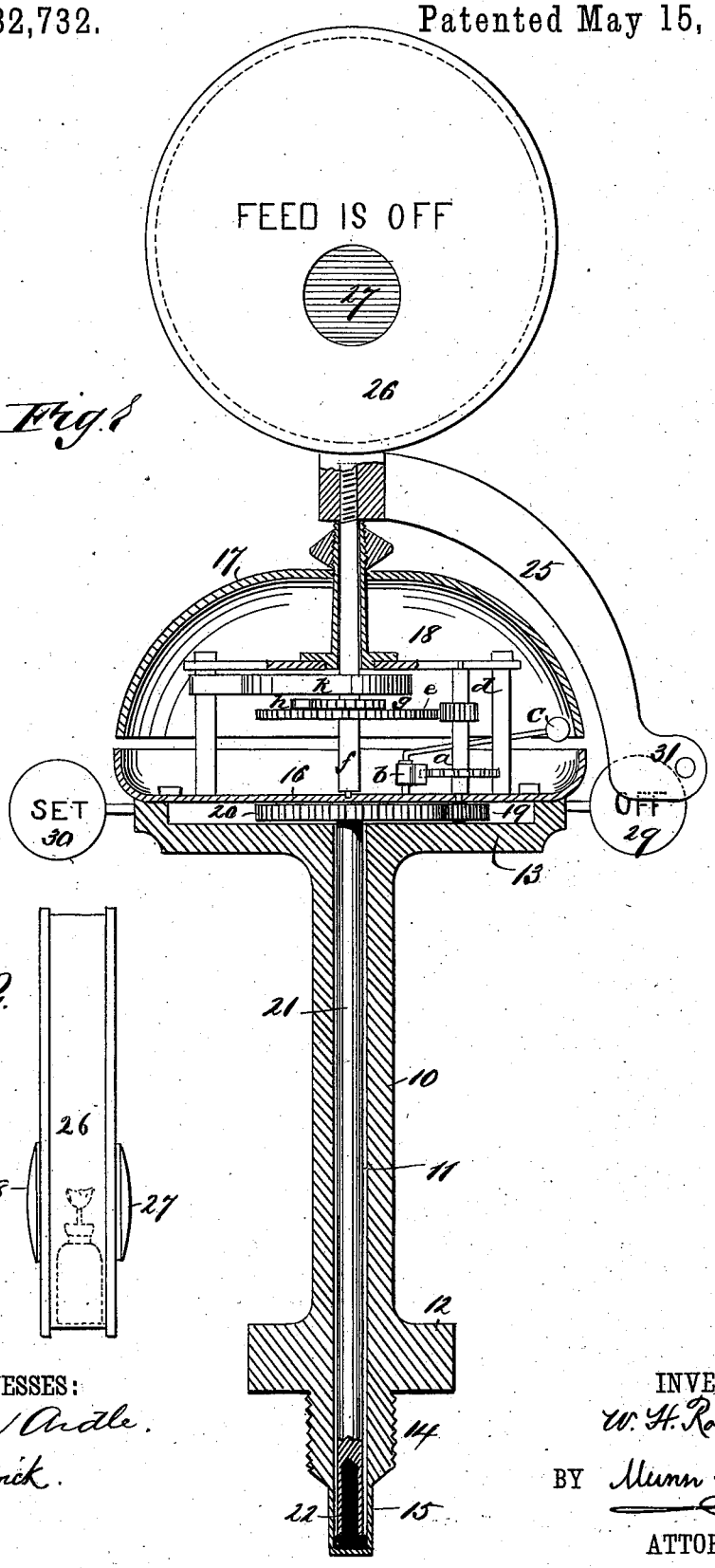


Fig. 2.




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(No Model.) 2 Sheets—Sheet 2.

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## INDICATOR FOR BOILER FEED.

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Fig. 3.

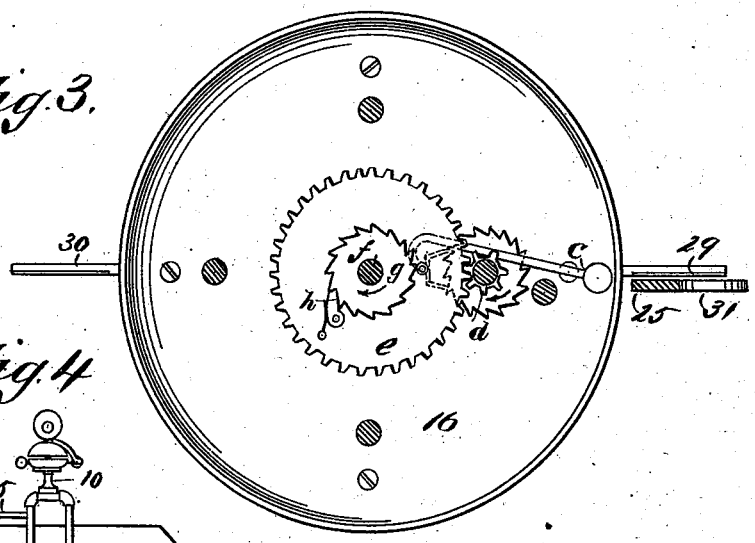



Fig. 4

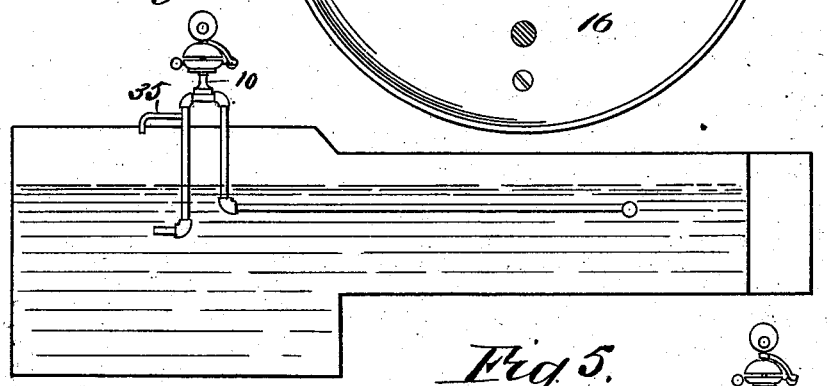
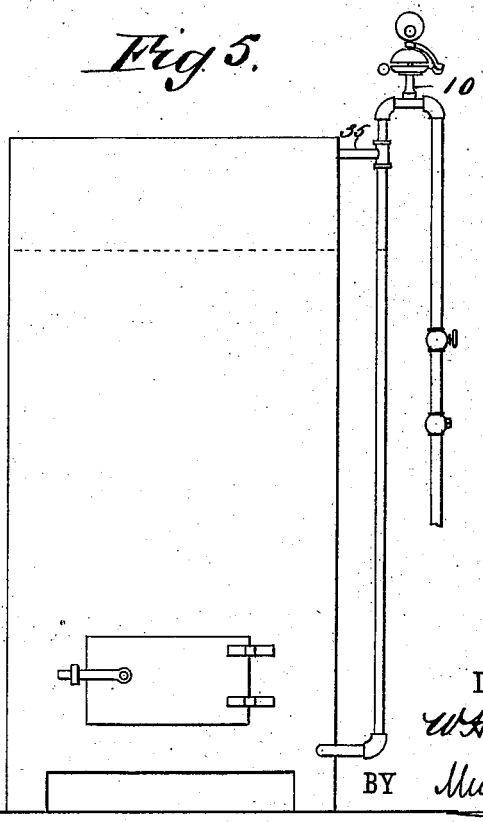



Fig. 5.

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INVENTOR:

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# UNITED STATES PATENT OFFICE.

WILLIAM HENRY RODGERS, OF WHITESTONE, NEW YORK.

## INDICATOR FOR BOILER-FEEDS.

SPECIFICATION forming part of Letters Patent No. 382,732, dated May 15, 1888.

Application filed June 10, 1887. Serial No. 240,697. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM HENRY RODGERS, of Whitestone, in the county of Queens and State of New York, have invented a new and Improved Indicator for Boiler-Feed Pumps and Injectors, of which the following is a full, clear, and exact description.

This invention relates to an indicator for boiler-feed pumps and injectors, the object of the invention being to provide for the display of a visual signal, and for the sounding of an alarm in case the feed pump or injector ceases to work from any cause whatever; and this object I attain by means of an alarm mechanism which is normally held set by a fusible plug, two signal-disks being arranged in connection with the alarm mechanism, which disks are so mounted that when the pump or injector is working the safety-disk will be exposed and the danger-disk covered; but when the pump has ceased to work the safety-disk will be covered and the danger disk or signal will be displayed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a central sectional elevation of my improved indicator. Fig. 2 is an edge view of the lamp preferably employed in connection therewith. Fig. 3 is a cross-sectional view taken on line *x x* of Fig. 1. Fig. 4 is a view of the indicator as it appears when arranged in connection with a horizontal boiler, such as that of a locomotive, the boiler being shown in central longitudinal section; and Fig. 5 is a view of the indicator as it appears when arranged in connection with an upright boiler.

In constructing such an indicator as the one illustrated in the drawings above referred to, I provide a post or standard, 10, that is formed with a central bore, 11, and with a lower hexagonal flange, 12, and an upper flange, 13. Below the flange 12 the standard 10 is threaded, as shown at 14, and below the threaded portion 14 the diameter of the downwardly-extending projection is materially decreased in order to form a thin wall tube, 15, the bottom of which tube is also thin, this thin wall tube being provided so that the material contained therein will be the more readily affected by changes of temperature.

To the flange 13, I connect a cup-shaped plate, 16, which, together with a bell, 17, forms the casing for an alarm-train, 18, the driving-gear of which is mounted below the plate 16, this gear being shown at 19 and in a position to be engaged by a gear, 20, that is carried by a shaft, 21, said shaft 21 being mounted in the bore 11 of the post or standard 10.

The lower end of the shaft 21 is formed with a cavity in which there is placed a plug, 22, that is made of an alloy which melts at a comparatively low temperature, and in practice I prefer to employ an alloy consisting of the following ingredients which are combined in substantially the proportions given in the table in which they are named: lead, six parts; bismuth, seven parts; cadmium, one part; gallium, one five-hundredths part.

The alloy made by the combination of the above-named ingredients will melt at a temperature of 220° Fahrenheit.

The shaft 21 does not extend quite to the bottom of the extension 15, and the metal of which the plug 22 is formed holds or solders the shaft 21 to the walls and bottom of the said extension as long as the temperature is below 220° Fahrenheit, or as long as the feed is on.

Any of the ordinary forms of alarm-trains could be used in connection with my indicator; but I prefer to employ such a train as that illustrated in the drawings above referred to, wherein *a* is the escapement-wheel, *b* the escapement-lever, which carries a bell-hammer, *c*, the post of the escapement-wheel *a* being provided with a pinion, *d*, that is engaged by a gear, *e*, carried by the main post *f*, the gear *e* being loosely mounted upon said post. Above the gear *e* there is mounted a ratchet, *g*, which is engaged by a pawl, *h*, carried by the gear *e*. A spring, *k*, is fixed to the post *f* and to one of the posts of the main frame of the train, the arrangement being such that if the post *f* be turned in the direction of the arrow shown in connection therewith in Fig. 3 the spring will be wound up. The post *f* extends out through a central opening formed in the bell 17, and to this extending end there

is fixed a lever, 25, and a lamp, 26, said lamp having a white lens, 28, and a red lens, 27.

Disks 29 and 30 are connected to opposite sides of the flange 13, and upon one of these disks there is printed the word "Set" and upon the other the word "Off." At the lower end of the lever 25 there is a flattened handle, 31, which when against either of the disks 29 or 30 will partially conceal said disk.

In attaching the indicator to the boiler it is connected to the delivery-pipe, as illustrated in Figs. 4 and 5, the indicator being preferably located in close proximity to the steam-gage, and, in order that the plug 22 may be subjected to the action of the heat, if for any cause whatever the feed should cease to act, I arrange a pipe, 35, which leads to the delivery-pipe from the space occupied by the live steam above the water in the boiler.

Such being the general construction of my improved indicator, the operation is as follows: At times when the water is being regularly fed through the delivery-pipe the plug 22 will be kept at a temperature below 220° Fahrenheit, for water, no matter how hot it is when fed to the boiler, can never reach said temperature; but the moment the feed is cut off the radiated heat will act to raise the temperature about the plug 22, and said plug will fuse or melt, and in melting will release the shaft 21 and permit the spring *k* to advance the alarm-train, thus actuating the hammer *c* and ringing the bell 17. As the spring *k* acts as above described, the lever 25 will be thrown from the position in which it is shown in Fig. 1 to a position so that its flattened handle will be in advance of the disk 30 and the danger-disk 29 will be exposed, at the same time the position of the lamp will be reversed and its red lens exposed to view. When it is again desired to set the alarm, the feed is put on, the lever 25 is returned to the position in which it is shown in Fig. 1, and in so returning acts to wind the spring *k*.

From the above description it will be seen that a double danger-signal is provided for, a visual signal being displayed, which would be likely to attract the attention of the engineer in case the audible signal was not heard by him. In fact the indicator prevents all possible chance of an accident from low water while the engineer is in sight or hearing of the indicator, for immediately upon the stoppage of the feed the visual signal is displayed and the audible signal is sounded.

It will, of course, be understood that by lengthening the post or standard *a*, or by connecting the pinion 19 and the gear 20 by proper intermediate gearing, the indicator may be located in any position desired.

Now, although I have described a specific signaling apparatus, it will, of course, be understood that the arm or lever 25 could be connected so as to operate a steam-whistle or gong, or any other form of signal desired.

The same indicator is used as a low-water indicator and alarm by placing it in the water-space at the lower gage-cock in a short pipe with the elbow looking upward. As long as water is in the pipe the temperature about the plug 22 will be less than 220° Fahrenheit, because the water in said pipe has no circulation and will lose its heat by radiation; but as soon as the water-level is low enough to allow steam into said horizontal pipe the temperature will rise and melt the alloy 22 and give the alarm on a whistle which is actuated by the lever 25, for steam will circulate where water will not, and water is a poor conductor of heat.

There must be no check-valve between the boiler and the indicator, or the water in the delivery-pipe will not fall to the same level as that in the boiler, on which depends the quick and satisfactory working of the indicator.

To reset the low-water indicator or alarm, the feed pump or injector is started, and when the water rises in the boiler to the height of lower gage the indicator can be reset. The alloy will become solidified, as there is no circulation, and the pipe will lose several degrees of heat by radiation, when the indicator can be reset.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with a signaling apparatus, of a rotary shaft connected with the signaling apparatus and a fusible plug for locking the said shaft, substantially as described.

2. The combination, with a signaling apparatus, of a rotary shaft connected with the signaling apparatus, a tube surrounding the said shaft, and a fusible plug for locking the shaft to the tube, substantially as described.

3. The combination, with a signaling apparatus, of a rotary shaft formed with a recessed lower end and arranged in connection with the signaling apparatus, a tube surrounding the shaft and arranged to enter the feed-pipe of a boiler, and a fusible plug fitted within the recess at the lower end of the shaft and arranged to lock the shaft to the inclosing-tube, substantially as described.

4. The combination, with a signaling apparatus, of a rotary shaft, 21, connections between the shaft 21 and the signaling apparatus, a tube arranged in connection with the shaft and formed with exceedingly thin walls at its lower end and bottom, and a plug of fusible metal fitted within the lower end of the shaft and arranged to prevent the said shaft from turning, which thin-walled portion is arranged for connection with the feed-pipe of a boiler, substantially as described.

5. The combination, with a visual and audible signaling apparatus, of a rotary shaft, 21, connected to said apparatus, a thin-walled tube within which the lower end of the shaft rides, said tube being rigidly connected to the case of the signaling apparatus, and a fusible plug fitted within a recess formed at the lower

end of the shaft and arranged to prevent the shaft from turning in the said tube, which tube is arranged for connection with the feed-pipe of a boiler, substantially as described.

6. The combination, with a visual and audible signal, of a post or standard, 10, upon which the signaling apparatus is mounted, a threaded projection, 14, formed in connection with the post and arranged for connection with the feed-pipe of a boiler, a contracted extension, 15, extending downward from the threaded portion 14, a shaft, 21, connected to the signaling apparatus and formed with a recess in its lower end, and a fusible plug, 22, fitted within said recess and against the inner face and bottom of the thin-walled tube, substantially as described.

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Witnesses:
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GRAFTON D. BECK.