No. 835,920. PATENTED NOV. 13, 1906.

C. STEINHAUSER.

WATER INDICATOR.

APPLICATION FILED NOV. 22, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

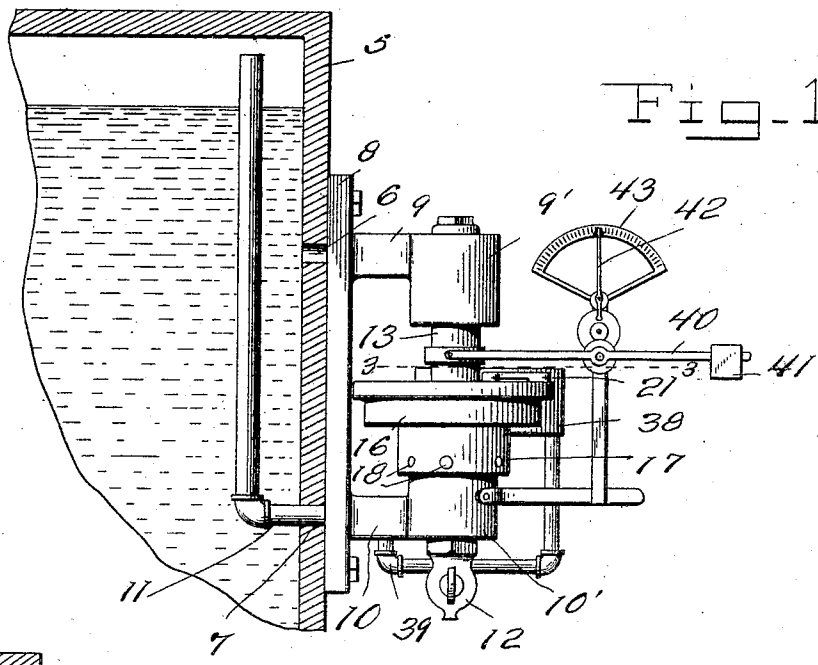


Fig. 2.

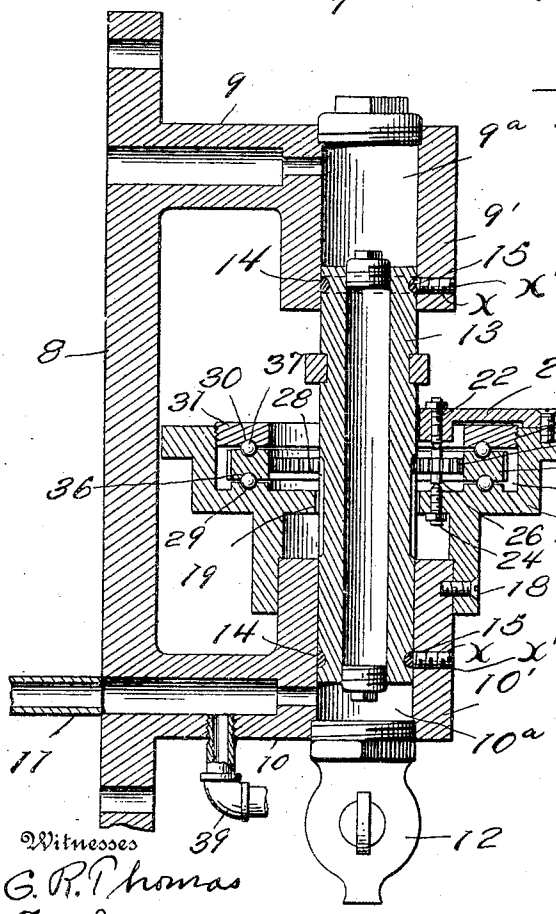
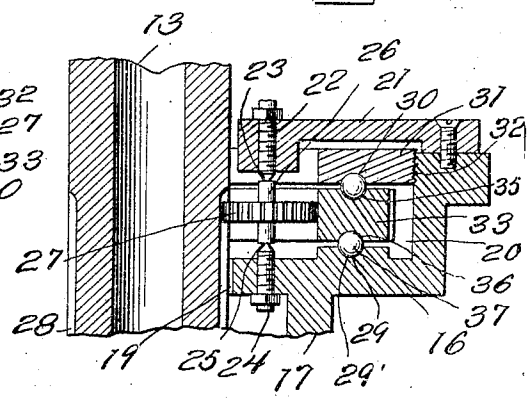


Fig. 6.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

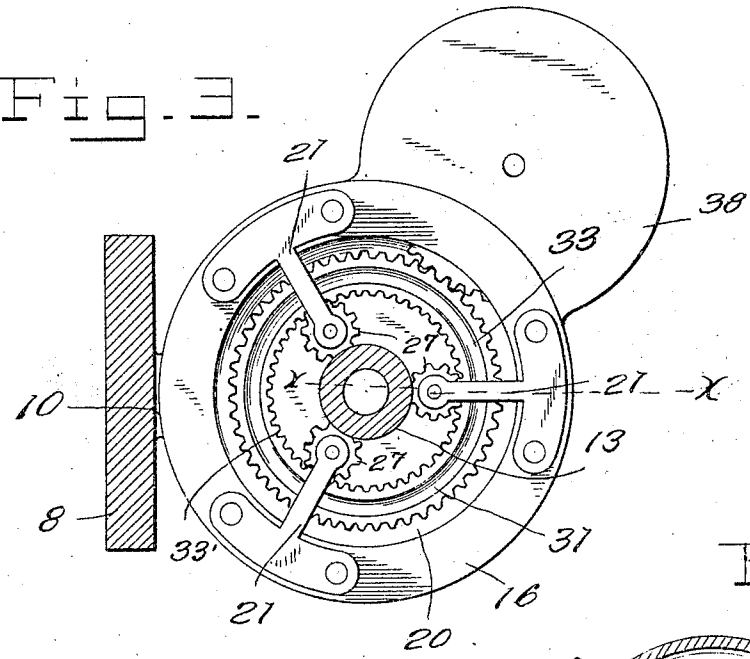


Fig. 5.

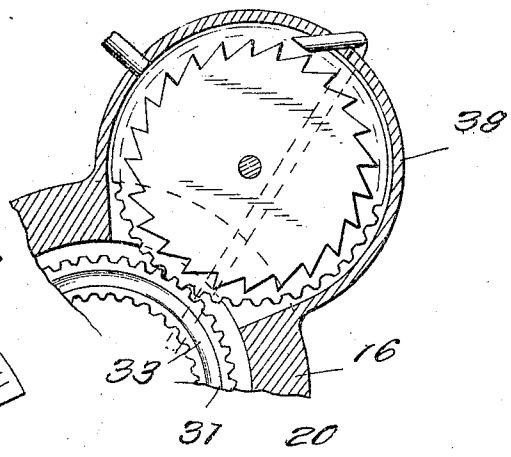
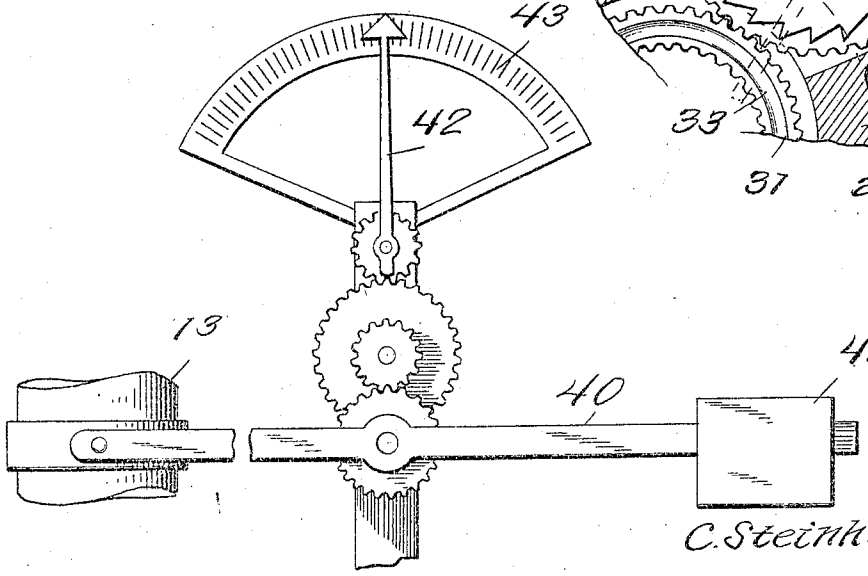


Fig. 4.



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UNITED STATES PATENT OFFICE.

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WATER-INDICATOR.

No. 835,920. Specification of Letters Patent. Patented Nov. 13, 1906.

Application filed November 22, 1905. Serial No. 288,603.

To all whom it may concern:

Be it known that I, CARL STEINHAUSER, a citizen of the United States, residing at Wilkinsburg, in the county of Allegheny, State of Pennsylvania, have invented certain new and useful Improvements in Water-Indicators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to indicators, and more particularly to water-indicators and steam-boilers, and has for its object to provide an indicator designed to eliminate fragile portions, such as the glass tube of water-gages, and to correctly indicate the amount of water in the boiler.

Other objects and advantages will be apparent from the following description.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a side elevation of the present indicator complete. Fig. 2 is a vertical section of Fig. 1 and a portion of a boiler to which the indicator is connected. Fig. 3 is a transverse section on line 3 3 of Fig. 1, showing the gears and turbine in top plan. Fig. 4 is an enlarged detail of the indicator and a portion of the slide; and Fig. 5 is a detail, partly in section, showing the connection of the turbine and the internal gear. Fig. 6 is a detail sectional view of one of the radial arms and an adjacent portion of the casting taken on line $x\,x$ of Fig. 3.

Referring now to the drawings, there is shown a boiler 5, to which there is secured a plate 8, having outwardly-extending upper and lower pipes 9 and 10, respectively, connected therewith. The pipes have vertically-extending enlarged heads 9′ and 10′, respectively, at their outer ends and at their inner ends communicate with upper and lower openings 6 and 7, formed through the plate.

The opening 6 communicates with the interior of the boiler below the normal water-level thereof, while a pipe 11 communicates with the opening 7 and extends upwardly within the boiler to a point adjacent to the top thereof and into the steam-space.

Vertical passages 9^a and 10^a are formed through the heads 9′ and 10′, respectively, and the latter is threaded at its outer end for the reception of a cock 12, provided to permit of cleaning of the indicator. The heads 9′ and 10′ lie in spaced relation, as shown, and a hollow cylindrical slide 13 has its end portions slidably engaged in the passages 9^a and 10^a, these passages being of a shape and size to snugly receive the slide. Circumscribing grooves 14 are formed in the end portions of the slide and lie at all times within their respective passages, and a quantity of mercury 15 is disposed in each of these grooves to form a seal.

A casting 16 is provided with a depending flange 17, which surrounds the upper portion of the head 10′ and which is held thereupon by suitable fastening devices 18. The casting extends horizontally and has a vertical passage 19 formed therethrough in which the slide 13 moves, and in its upper face the casting has a circular recess 20 surrounding the slide and lying concentric therewith.

Openings X are formed in each of the heads 9′ and 10′ and communicate with the passages 9^a and 10^a thereof, and through these openings X the mercury may be introduced into the grooves 14, as will be understood. After the introduction of the mercury the openings X are filled by plugs X′, as shown.

Inwardly-extending radial arms 21 are secured to the casting outwardly of its recess and at their inner ends have engaged therein vertical screws 22, provided with conical lower ends 23, similar screws 24 being engaged in the casting beneath the screws 22, the screws of the two series registering in pairs for engagement of their conical ends in similarly-formed recesses 25 in the trunnions 26 of horizontal pinions 27, which mesh with longitudinal gear-teeth formed, as shown at 28, by grooving the slide. The slide is thus arranged for rotation with the pinions 27, and the grooves are of such a length that the teeth of the pinions coming into engagement with the ends thereof limit the sliding movement of the slide and prevent disengagement of the ends of the slide from the passages 9^a and 10^a.

A circular ball-raceway 29 is formed upon the bottom of the recess 20, its groove 29′ registering with a groove 30, formed in an annular plate 31, engaged in the upper portion of the recess 20 and having threads at its outer periphery shown at 32 as meshing with threads formed within the recess at the upper portion thereof.

An internally-geared member 33 is dis-

posed between the plate 31 and the raceway 29, extending horizontally, and surrounding the pinions 27 and the teeth 33′ of this gear mesh with the pinions for rotation thereof. In its upper and lower surfaces the gear 33 has grooves 35 and 36, respectively, which register with the grooves 30 and 29′ for the reception of balls 37.

A steam-turbine 38 is connected with the gear 33 for rotation thereof and is connected with the pipe 10, as shown at 39, for the reception of steam therefrom. The slide 13 is thus constantly revolved to maintain the surface of this slide in a loose relation to the inner surfaces of the passages 9^a and 10^a, and thus facilitate longitudinal movement of the slide 12 in the passages. It will thus be seen that the slide 13 will receive thereupon the weight of a column of water extending to the the water-level within the boiler, the steam-pressure on both ends of the slide being the same.

A centrally-pivoted bar 40 has one of its ends connected with the slide for movement therewith vertically; but to permit of rotation of the slide with respect to the bar, and at its opposite end the bar has a weight 41 of a weight to exactly balance the slide. An indicator-hand 42 is arranged for movement over a scale 43 and is connected with the bar 40 for movement over the scale when the bar is moved.

It will be seen that when the water is above the level of the opening 6 the upper end of the slide 13 will be subjected to a pressure equal to the weight of the water plus the steam-pressure within the boiler, while the lower end of the slide will be subjected to the steam-pressure only. By reason of the turbine and its connection with the slide the latter is kept in constant motion, so that stopping of the slide in its sockets will be prevented, and by reason of the pressure of the water upon the slide under the above-recited conditions this slide will be depressed. As the water level falls the slide will rise by reason of constant reduction of weight of water upon its upper end, and, as will be readily understood, this movement of the slide will cause the hand 42 to move over the scale 43, thus indicating the water-level in the boiler.

What is claimed is—

1. An instrument of the class described comprising upper and lower pipes adapted for connection with the water and steam spaces of a boiler respectively, said pipes having vertically-alining heads at one end provided with sockets opening through their inner ends and communicating with the passages of the pipes, a slide engaged at its ends in the sockets for vertical and rotary movement, means for rotating the slide, an indicator connected with the slide for movement when the slide is moved vertically, and a balance for the slide.

2. An instrument of the class described comprising upper and lower members having registering sockets in their mutually-adjacent faces, said members having passages communicating with the sockets at the outer ends thereof, a slide engaged in the sockets for vertical and rotary movement therewithin, said slide having gear-teeth thereupon, pinions meshing with the gear-teeth, an internal gear surrounding the pinions and meshing therewith, means for supporting the pinions and internal gear, means for driving the internal gear to rotate the pinions and slide, an indicator connected with the slide for movement when the slide is moved vertically, and a fluid-conductor communicating with the socket of the lower member and extending above the upper member.

3. The combination with a boiler, of upper and lower socketed members connected therewith for the reception of water and steam respectively from the boiler into their sockets, said sockets opening through the mutually-adjacent faces of the members, a slide engaged in the sockets for vertical and rotary motion therewithin, a balance for the slide, means for revolving the slide, sealing material surrounding the slide within the sockets, and an indicator connected with the slide for movement when the slide is moved vertically.

4. In an indicator, the combination with members, of a slide mounted in the members for sliding and rotary motion with respect thereto, an indicator connected with the slide for movement when the slide is moved longitudinally, said slide having spaced longitudinal grooves therein forming teeth, pinions meshing with the teeth, and means for revolving the pinions to rotate the slide, said pinions being arranged for engagement of their teeth with the ends of the grooves to limit the sliding movement of the slide.

In testimony whereof I affix my signature in presence of two witnesses.

CARL STEINHAUSER.

Witnesses:
JULIUS BAUER,
JULIUS J. BRICKNER.