

(No Model.)

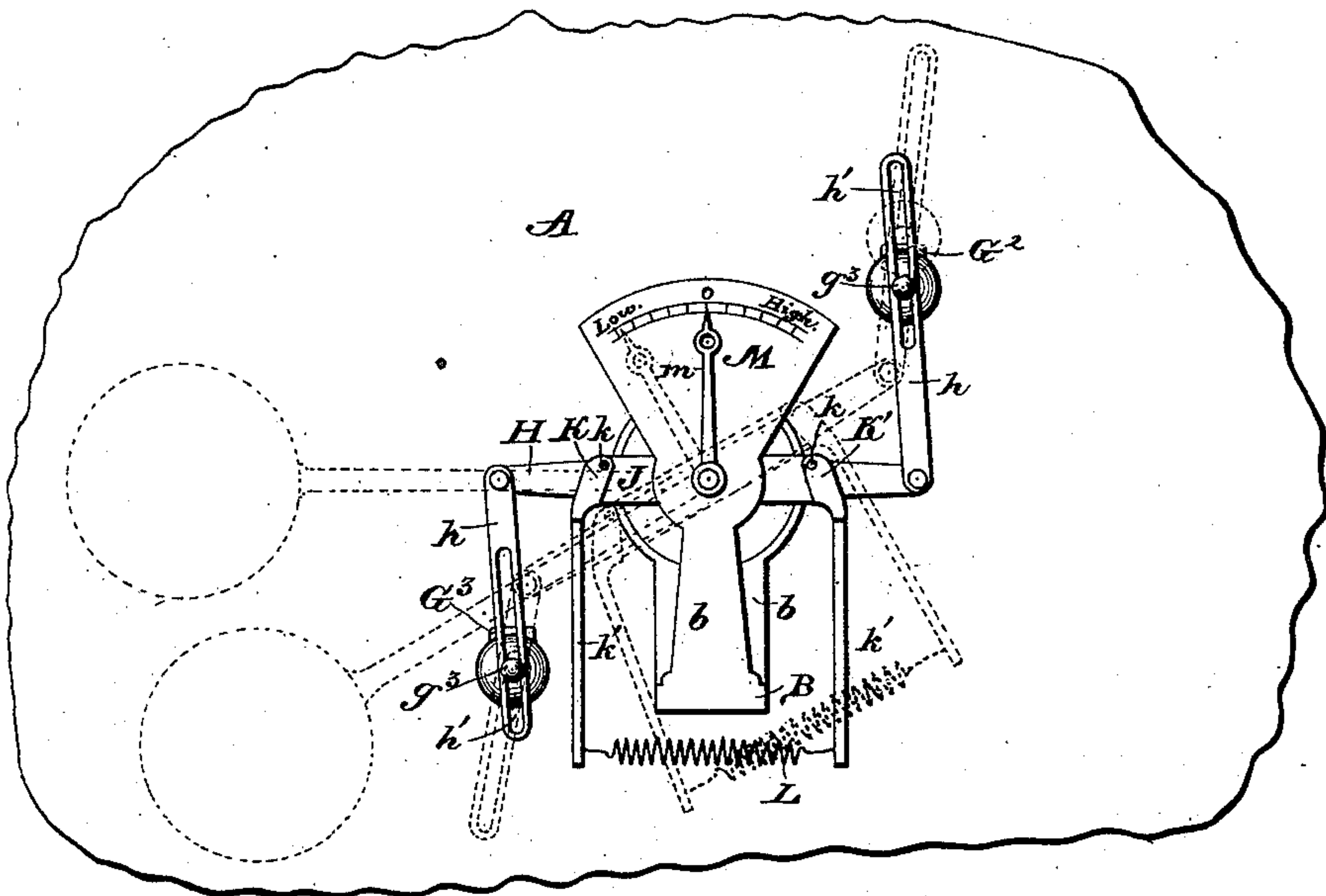
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AUTOMATIC BOILER GAGE AND ALARM.

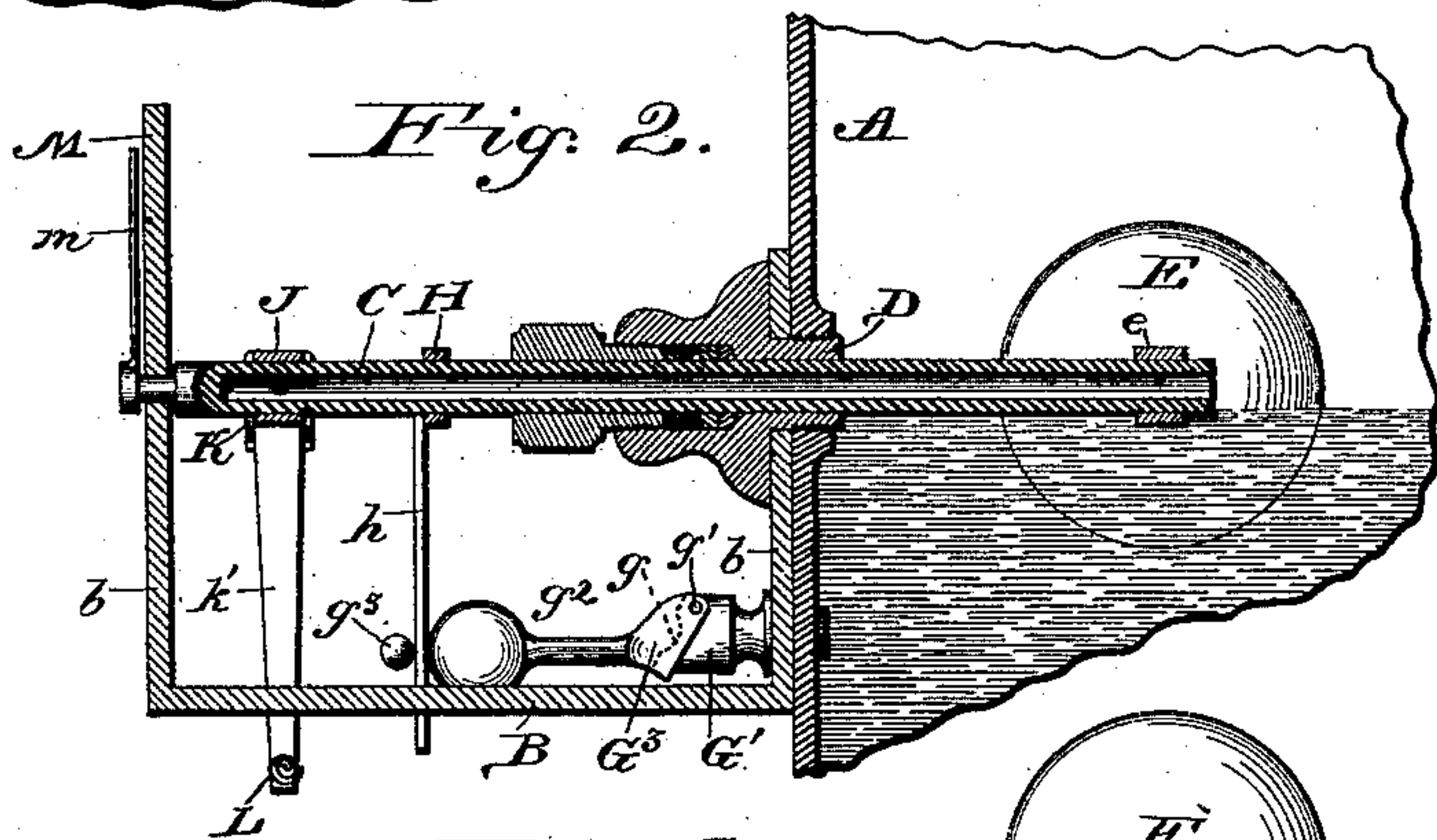
No. 358,289.

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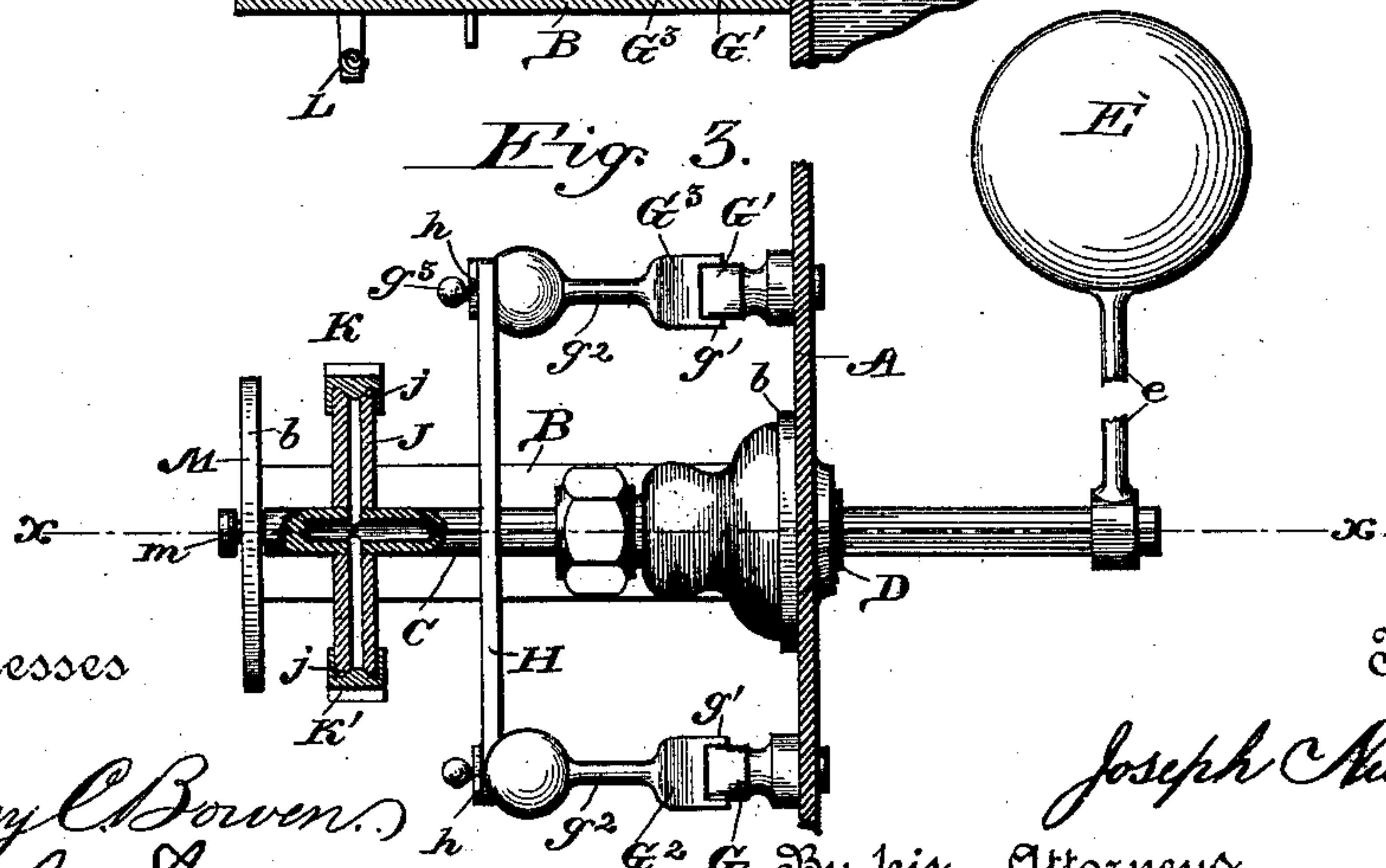
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



Witnesses

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# UNITED STATES PATENT OFFICE.

JOSEPH NURNBERGER, OF CHARLESTON, WEST VIRGINIA.

## AUTOMATIC BOILER GAGE AND ALARM.

SPECIFICATION forming part of Letters Patent No. 358,289, dated February 22, 1887.

Application filed August 27, 1886. Serial No. 212,037. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH NURNBERGER, a citizen of the United States, residing at Charleston, in the county of Kanawha and State of West Virginia, have invented a new and useful Improvement in Automatic Boiler Gages and Alarms, of which the following is a specification.

My invention relates to improvements in automatic boiler gages and alarms; and it consists of the peculiar combination and novel construction and arrangement of the various parts for service, substantially as hereinafter fully described, and particularly pointed out in the claims.

The object of my invention is to provide an improved gage and alarm for steam-boilers of simple and durable construction, which will be automatically operated when the water in the boiler falls below the water-line to sound an alarm, and thus notify the engineer and attendant of the danger, and also to indicate on a dial the height of the water in the boiler.

My invention is very simple in construction, effective and thoroughly reliable in operation, and comparatively cheap and inexpensive of manufacture.

In the drawings hereto annexed, Figure 1 is a front elevation of my invention attached to a steam-boiler. Fig. 2 is a vertical sectional view through the gage and alarm on the line  $x x$  of Fig. 3; and Fig. 3 is a top plan view, partly in section.

Referring to the drawings, in which like letters of reference denote corresponding parts in all the figures, A designates the shell of a steam-boiler of any approved pattern, to which my improved gage and alarm is to be applied, my invention being applicable to any and all classes of boilers. To the outer shell of the boiler is affixed a bracket, B, which projects outwardly from the same, and is rigidly affixed thereon by any preferable means. This bracket may be of any desired form, and it has vertical arms  $b$  at its extremities, in which is journaled a tubular hollow rock-shaft, C. This rock-shaft passes through the arm  $b$  of the bracket that is affixed to the boiler, and also through a bushing, D, that is screwed or otherwise secured in the boiler-shell and in communication with the steam-space therein.

E designates a float, which is preferably a hollow spherical shell of copper, or it may be made of other material and shape, as may be found most convenient; and this float rests upon the water and rises and falls therewith. To this float E is secured or affixed in any suitable manner an arm or lever,  $e$ , and to the outer extremity of this arm the inner end of the tubular rock-shaft C is secured, the inner end of the said rock-shaft opening through the arm or lever  $e$ , so that the steam in the steam-space of the boiler will enter the tubular shaft very freely and readily, as is obvious.

It will be seen that when the water rises or falls in the boiler the float will be moved in a corresponding direction and move the arm or lever  $e$ , which, being rigidly connected or affixed to the rock-shaft, will cause the latter to turn or oscillate in its bearings.

G and G' designate two or more valve-shells, which are preferably made cylindrical in form and exteriorly threaded, and they are screwed into suitable threaded openings formed in the shell A of the boiler, so that the steam or water therein will readily enter the said shells. The outer extremities of the valve-shells are formed with valve-seats  $g$ , which may be inclined or vertical, as preferred, and on these seats rest the valves G<sup>2</sup> and G<sup>3</sup>, which are pivoted to the shells at  $g'$ , and are normally closed on their seats to prevent the escape of the steam and water from the boiler. These valves have rods or arms  $g^2$ , to which are attached weights having at their ends headed pins  $g^3$ .

H designates an arm or lever that is rigidly affixed to the rock-shaft C and turns or moves with the latter. To the ends of the lever H are pivoted links  $h$ , having slots  $h'$ , in which work the pins  $g^3$ , as shown in Fig. 1. By this construction it will be seen that the lever H can move for a limited distance before actuating the valves G<sup>2</sup> and G<sup>3</sup>.

To the outer extremity of the tubular rock-shaft is secured or affixed in any suitable manner a shell, J, which moves or turns therewith, and this shell is in communication with the chamber or passage in the said tubular rock-shaft, so that the steam admitted to the shaft will enter the shell J. The outer extremities of the shell J are formed with valve-seats  $j$ , on which rest the valves K and K', which are



pivoted to the shell J at  $k$ , and have their lower ends extended beneath the shell to form the arms or stems  $k'$ , the arms or stems of the valves K being connected by a coiled spring, 5 L, which normally draws the said stems of the valves together, and thereby keeps the valves upon their seats, to prevent the escape and waste of the steam through the tubular rock-shaft and the valve-shell J.

10 M designates a dial, which is provided with a series of graduations or scales upon one face, and is affixed to the bracket B or other convenient place, and over this dial travels an indicator or pointer,  $m$ , that is rigidly affixed 15 to and turns with the tubular rock-shaft, so as to indicate to the engineer or attendant the height of the water in the boiler.

This being the construction of my improved gage and alarm for steam-boilers, the operation is as follows: The float is elevated with 20 the water when the latter is at the water-line, so as to keep the arm H normally in a horizontal position to keep the valves  $G^2$  and  $G^3$  closed, and the valves K are normally closed 25 on their seats by the spring L, so that the steam and water in the boiler is prevented from escaping. When the water falls below the water-line, the float descends with it, and thereby lowers the arm  $e$  and oscillates the 30 tubular rock-shaft, to turn the arm H thereon and lower one end thereof and elevate the other end, thereby actuating the valve  $G^2$  and raising it off its seat to permit the steam to escape, which thereby sounds the alarm and 35 notifies the engineer of the condition of the boiler. Should the water continue to fall still lower, the arm  $k'$  of the valve K will be brought in contact with the bracket B, thereby raising the said valve K and permitting a double 40 quantity of steam to escape. When the water rises above the water-line, the float ascends, thereby oscillating the rock-shaft in the opposite direction to open the valve  $G^3$  and permit water to escape, which notifies the engineer of the condition of the boiler. 45 Should the water continue to rise, the arm  $k'$  of the valve K', coming in contact with the bracket B, will cause the said valve K' to be raised, thereby permitting a double quantity of water to escape. Simultaneously with the oscillation of 50 the tubular rock-shaft the pointer  $m$  traverses the dial and indicates thereon the height of the water in the boiler.

In practice the valves  $G^2$   $G^3$  on the boiler 55 may be dispensed with and the device used with the valves K K' alone, or vice versa, and, if preferred, the valves  $G^2$  and K may be arranged to operate simultaneously to give the alarm in case of lower water, and the valves  $G^3$  60 and K' in case of too much water.

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

1. The combination of a float, a rock-shaft connected with the float, the valve-shells arranged at different elevations and communicating with the steam and water space of the boiler, the valves normally seated on the seats of the shells, and connections intermediate of the rock-shaft and the valves to actuate the 70 latter independently of each other, substantially as described.

2. The combination of a float, a fixed bracket-plate, a hollow rock-shaft journaled in the bracket-plate and connected with the float, the 75 transverse valve-shell affixed to the rock-shaft and in communication with the longitudinal passage therein, the valves  $G^1$   $G^2$ , arranged at different elevations and having their shells communicating with the water and steam space 80 of the boiler, connections intermediate of the said valves and the rock-shaft for operating the valves according to the elevation of the float, and the connected valves K K', normally closing the openings in the transverse valve-shell of the rock-shaft, substantially as described, for the purpose set forth. 85

3. The combination of a float having an arm, the rock-shaft connected to the arm and having a lever or arm rigidly affixed thereto, the 90 valve-shells entering the boiler and in communication therewith, the valves pivoted to the shells and normally seated thereon, and the links intermediate of the valves and the arm of the rock-shaft, substantially as described. 95

4. The combination of a float, a tubular rock-shaft connected with the float and in communication with the boiler, a fixed bracket in which the rock-shaft is journaled, the hollow valve-shell carried by the rock-shaft and in 100 communication therewith, and the valves pivoted on the shell and normally seated on their seats, substantially as described.

5. An improved automatic gage and alarm for steam-boilers, comprising a float having an 105 arm or lever, a bushing, a tubular rock-shaft passing through the bushing and connected with the float, a fixed bracket in which the rock-shaft is journaled, the valve-shells G, entering the boiler, the valves normally seated 110 on the shells, connections intermediate of the rock-shaft and the valves, a dial, a pointer carried by the shaft and traversing the dial, the valve-shell J, affixed to and in communication with the tubular rock-shaft, the valves pivoted 115 to the shell J, and the spring connecting the valves, substantially as described, for the purpose set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses. 120

JOSEPH NURNBERGER.

Witnesses:

D. E. BLAKE,  
R. ALESHIRE, Jr.