

No. 724,613.

PATENTED APR. 7, 1903.

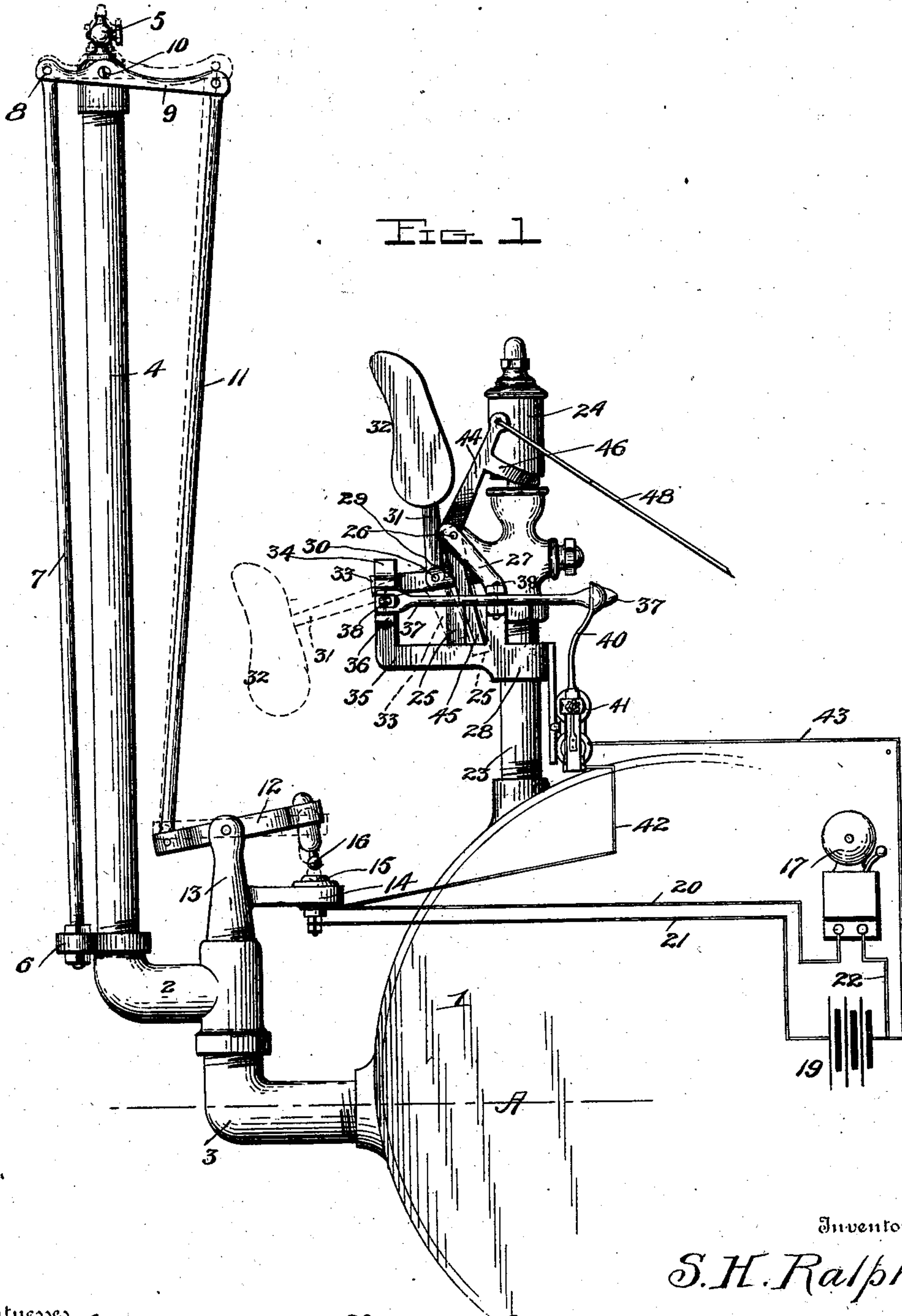
S. H. RALPH.

LOW WATER ALARM FOR STEAM BOILERS.

APPLICATION FILED JULY 31, 1901. RENEWED JUNE 19, 1902.

NO MODEL

3 SHEETS—SHEET 1.



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Witnesses

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FIG. 2

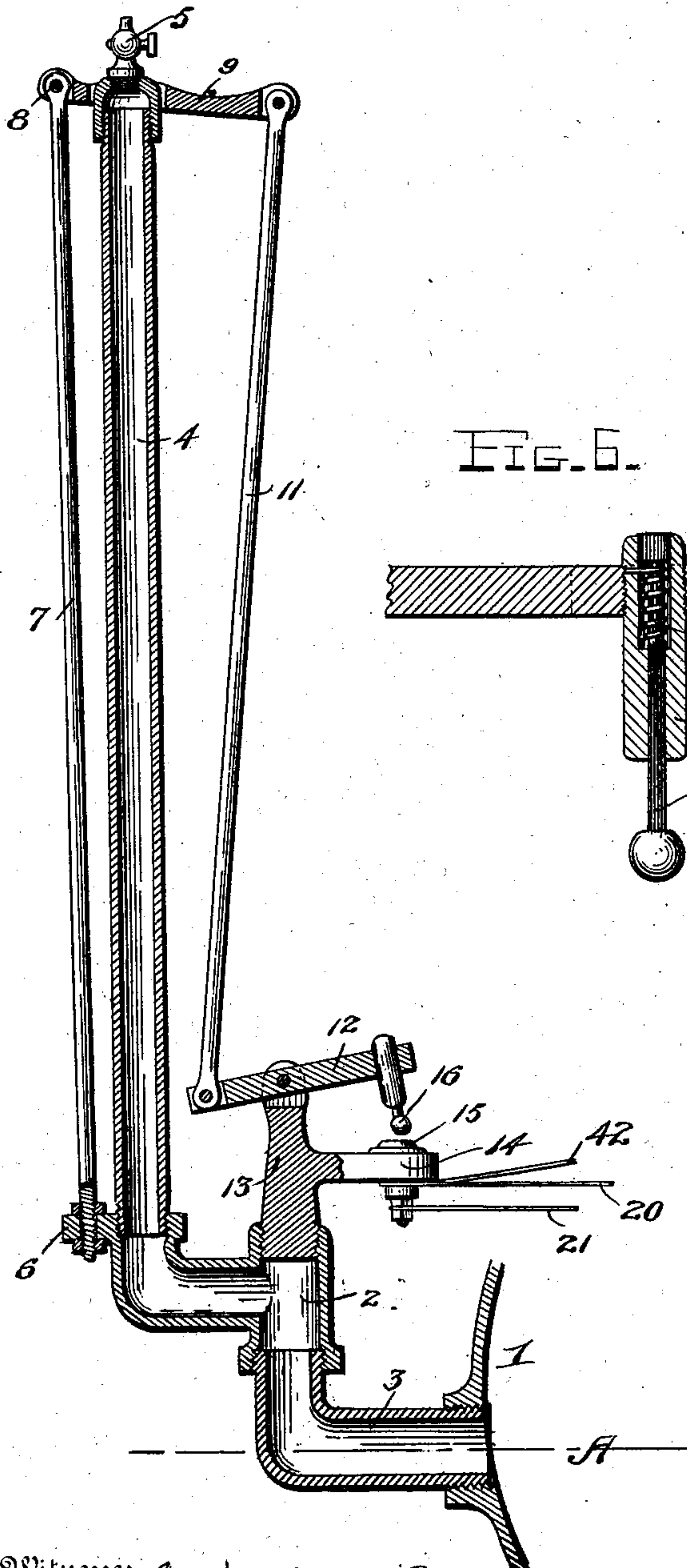


FIG. 6.

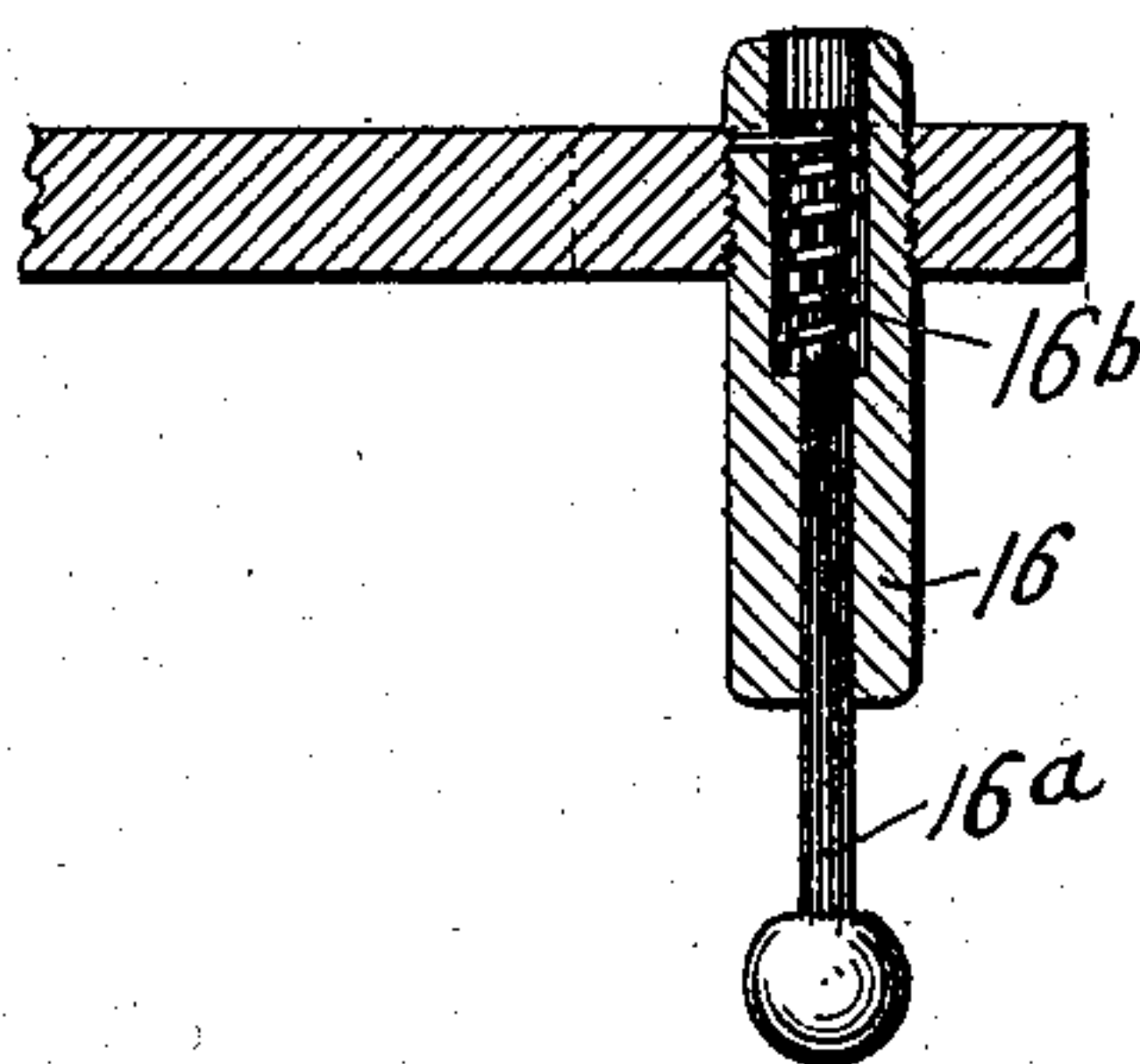
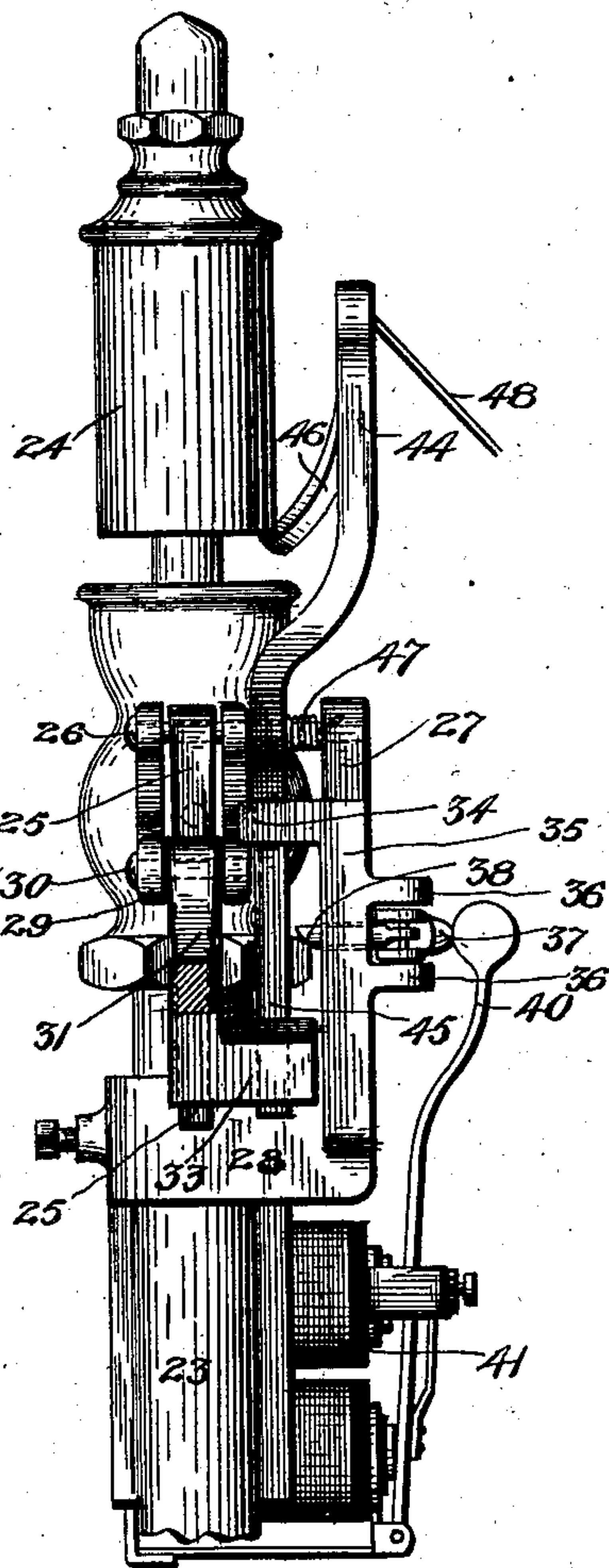


FIG. 5



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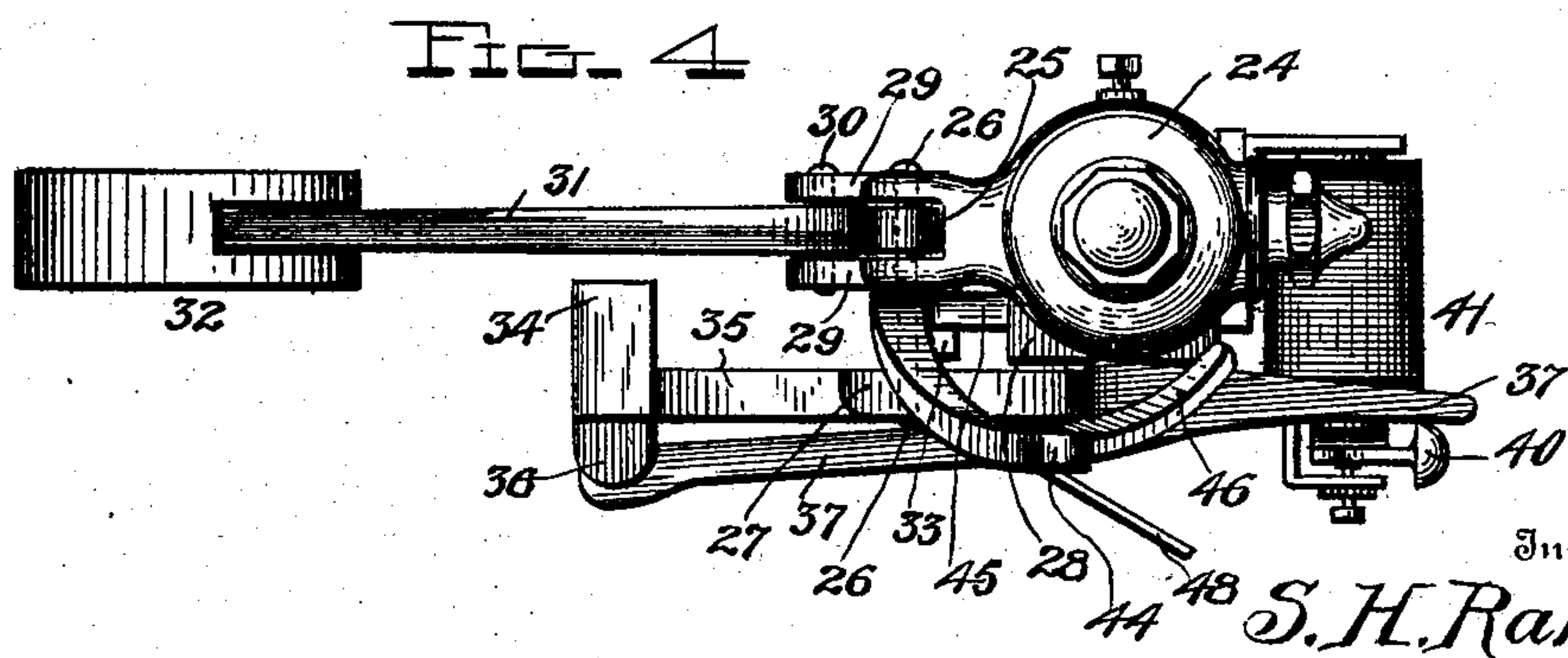
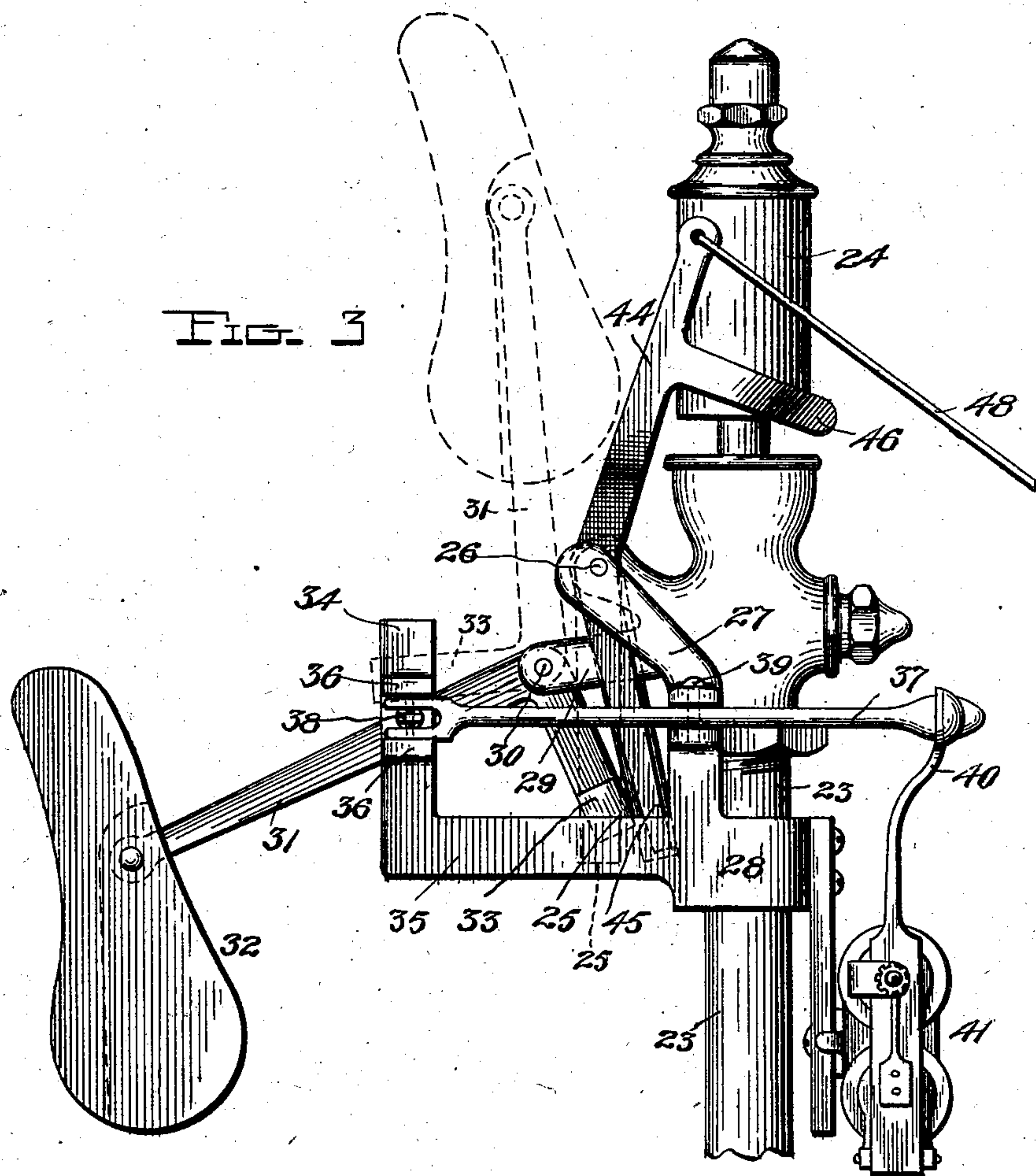
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

STEPHEN H. RALPH, OF MARION, INDIANA.

## LOW-WATER ALARM FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 724,613, dated April 7, 1903.

Application filed July 31, 1901. Renewed June 19, 1902. Serial No. 112,313. (No model.)

*To all whom it may concern:*

Be it known that I, STEPHEN H. RALPH, a citizen of the United States, residing at Marion, State of Indiana, have invented certain new and useful Improvements in Low-Water Alarms for Steam-Boilers; and I do 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 low-water alarms for steam-boilers.

The object of the invention is to provide a device of the character described which shall be simple of construction, durable in use, and comparatively inexpensive of production and by means of which when the water lowers to a certain position within the boiler one or more alarms will be sounded, one by the action of steam upon the whistle and one by the closing of a bell-circuit, which latter may be arranged at a point remote from the steam-boiler and its whistle, so that the superintendent or officer of the factory may be notified of the condition of the water within the boiler, although his office may be quite a distance therefrom and out of hearing distance from the whistle.

A further object of the invention is to provide for the operation of the parts by the expansive action of a pipe heated by the live steam passing thereinto from the boiler when the water falls below a predetermined level.

With these and other objects in view the invention consists of certain novel features of construction, combination, and arrangement of parts, as will be hereinafter more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a front elevation of my improved low-water alarm, showing in full lines the parts set in position for operation when the water within the boiler has lowered below the desired level and showing in dotted lines the position of the parts after they have been tripped. Fig. 2 is a longitudinal sectional view through the expansion-pipe and connected parts, and Figs. 3, 4, and 5 are detail views of the whistle and its operating mechanism on an enlarged scale. Fig. 6 is a detail sectional view of the circuit-closing finger.

Referring now more particularly to the drawings, the numeral 1 designates the shell of the boiler; 2, a hollow angular arm connected to said boiler by a short elbow-pipe or nipple 3.

4 denotes a steam-expansion pipe connected at its lower end with the hollow angular arm and provided at its upper end with a petcock or valve 5.

Adjustably secured at its lower end to a lug 6, projecting from the hollow angular arm, is a rod 7, which is pivoted at its upper end, as at 8, to one end of an oscillating yoke or lever 9, fulcrumed at 10 to the upper end of the pipe 4 and jointed at its opposite end to the upper end of a connecting-rod 11. The lower end of this connecting-rod is pivoted to one end of an operating-lever 12, fulcrumed to a bracket 13, carried by the hollow angular arm 2. This bracket is provided with a lug or arm 14, carrying a circuit connector or closing device 15, which lies in the path of movement of a finger 16, mounted upon the free end of the lever 12. The rod 7 forms a fixed connection between the hollow angular arm 2 and the oscillating yoke or lever 9, whereby when the pipe 4 expands under the action of the live steam from the boiler entering the same the said yoke or lever 9 will be caused to tilt upward at its free end, thereby drawing upon the rod 11 to move the lever 12 and bring the finger 16 into engagement with the circuit-closing device 15.

The numeral 17 designates an electric bell of ordinary construction, and 19 a battery, which may be disposed at suitable points more or less remote from the boiler and steam-expansion pipe and are connected with each other and with the circuit-closer 15 through the medium of the conducting-wires 20, 21, and 22.

23 represents a steam-conducting pipe which supports a steam-whistle 24 of any ordinary or preferred construction, and 25 represents the valve-lever of the whistle which controls the flow of steam from the pipe 23 thereto. This lever is fulcrumed upon a pivot-pin 26, carried by one of the arms 27 of a bracket 28, adjustably mounted on the pipe 23, and swings between two lugs 29, projecting laterally from the valve-chamber or casing of the whistle 24. Between these two lugs extends



a pivot-pin 30, upon which is mounted a bell-crank lever 31, to one arm of which is connected a drop-weight 32, the other arm of which is provided with a stop-lug 33. When the lever 31 is disposed in its normal vertical position, as shown in full lines in Fig. 1, the said stop 33 abuts against a stop-lug 34 upon the upper end of a right-angular arm 35, projecting from the bracket 28, and prevents said lever from swinging in one direction—that is, in a direction toward the whistle 24—past the perpendicular. The arm 35 is provided with two guide-lugs 36, between which fits and slides one of the ends of a pivot trip device 37, which carries a trip pin or detent 38, which is adapted when the parts are set in position for operation to lie in the path of movement of the stop-lug 33 and prevent the lever 31 from swinging downward under the action of the weight 32 to operate the whistle-valve lever 25.

The pivoted trip device or detent-lever 37 is pivoted by a pin 39 to the arm 27 of the bracket 28, and its opposite free end lies within the path of movement of a vibrating trip-hammer 40. This trip-hammer 40 is operated through the medium of an electromagnet 41 and is connected with the circuit-closing device 15 and battery 19 by the circuit-wires 42 and 43.

44 represents a resetting-lever pivoted upon the pin 26 and provided with two angular arms 45 and 46, which are adapted to engage, respectively, with the stop-lug of the bell-crank lever and the trip device to restore the same from the dotted-line to the full-line position shown in Fig. 1 after the operation of the whistle to set the parts for further use. The arm 45 thus swings the bell-crank lever 31 upwardly, forcing the lug 33 past the trip pin or detent 38, which is retracted or forced outward under pressure to allow said lug 33 to pass and occupy the space between said pin or detent and the stop-lug 34. As the lug 33 swings past the pin 38 the arm 46 of the lever 44 comes into contact with the under side of the free end of the trip or detent lever 37, thus raising said free end of the detent-lever and projecting the pin 38 again beneath the lug 33 and at the same time resetting the lever 37 to coact with the vibrating hammer 40. The resetting-lever is restored to its normal position by a retracting-spring 47 and has connected thereto an operating cord or chain 48, leading downward to a convenient point, whereby it may be manipulated to reset the parts in the manner stated.

The mode of operation is as follows: Assuming the water to be at a certain level in the boiler, or rather above a certain point, which I have indicated in Figs. 1 and 2 at A, should in the generation of the steam the water lower below this point live steam from the boiler will immediately flow into the pipe 4 and will heat the same and cause it to expand, thereby operating the yoke or lever 9, drawing upon the rod 11 to vibrate the lever

12, causing the finger 16 to be brought into contact with the circuit-closing device 15 and to close the circuit to cause the operation of the vibrating hammer of the bell 8 and the vibrating hammer of the trip device actuating the whistle. The action of this latter hammer on the trip-lever causes the detent-pin to be withdrawn from engagement with the stop-lug of the bell-crank lever, leaving the latter free to drop down by gravity under the action of the drop-weight and to press against the valve-lever of the whistle, whereby steam is allowed to pass from the pipe 23 to the whistle 24 to cause the latter to sound an alarm. To reset the parts of the whistle for further operation, the parts (or chain) are pulled downward to swing the resetting device, the arms of which engage the bell-crank lever to restore it to its normal position and the vibrating trip device to reset the detent-pin to hold the weighted bell-crank lever in proper position for further operation.

If it should be desired to test the action of the alarm without interfering with the water-level in the boiler, this may be accomplished by simply opening the petcock 5, whereupon the cool water contained therein will be forced out and hot water from the boiler will take its place, causing the expansion of the pipe and the operation of the alarm in the manner heretofore described.

By reference to Fig. 6 it will be seen that the finger 16<sup>a</sup> is slidably mounted in a cylinder 16 and is normally pressed outward on a protracting-spring 16<sup>b</sup>. This spring forms a cushion which allows the finger to yield when pressing too forcibly on the circuit-closer 15 on an undue expansion of the pipe 4, whereby injury to said circuit-closer 15 is effectively prevented.

From the foregoing description, taken in connection with the accompanying drawings, the construction, mode of operation, and advantages of my invention will be readily understood without requiring an extended explanation.

The device is exceedingly useful for the purpose for which it is desired and can be produced at a comparatively low cost.

Changes in the form, proportion, and minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

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

1. In a low-water alarm, the combination with a boiler and an alarm device, of a hollow angular arm connected with the boiler, a steam-expansion pipe supported by said arm, a bracket also supported by said arm and carrying a circuit-closer, electrical connections between the circuit-closer and alarm device, vibrating levers mounted upon the expansion-pipe and bracket, a rod connecting said levers, a contact-piece carried by the vibrating



lever upon the bracket adapted to engage said circuit-closer, and a rod connecting the hollow angular arm with one of the vibrating levers upon the expansion-pipe, substantially as described.

2. In a low-water alarm, the combination of a steam-expansion pipe, a circuit-closer actuated thereby, a steam-whistle, a weighted lever for operating the valve of the whistle to sound an alarm, a detent for holding said lever in normal position, means for releasing said detent, and electrical connections between said means for releasing the detent and circuit-closing device, substantially as described.

3. In a low-water alarm, the combination of an expansion-pipe, an electric circuit-closer operated thereby, a steam-whistle, means for operating the steam-valve of the whistle, a detent for maintaining said operating means in normal position, means for retracting the detent to release the valve-operating means, electrical connections between the circuit-closing device and said means for retracting the detent, and a resetting device for restoring the valve-operating means and detent to their normal positions, substantially as described.

4. In a low-water alarm, the combination of a steam-expansion pipe, a circuit-closer actuated thereby, a steam-whistle having a lever for operating the valve thereof, a pivoted bell-crank lever for operating said valve-lever, a drop-weight carried by said bell-crank lever, a detent for holding the bell-crank lever out of engagement with the valve-lever, a vibrating trip for retracting said detent, a vibrating hammer for operating the trip device, electrical connections between the circuit-closer and vibrating hammer, and a resetting device for restoring the bell-crank lever and trip device to their normal positions, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

STEPHEN H. RALPH.

Witnesses:

H. E. MEINERT,  
J. H. ROHTEST.