

W. S. BELT.  
Improvement in Low-Water Registers  
for Steam-Boilers.

No. 130,786.

Patented Aug. 27, 1872.

Fig. 1

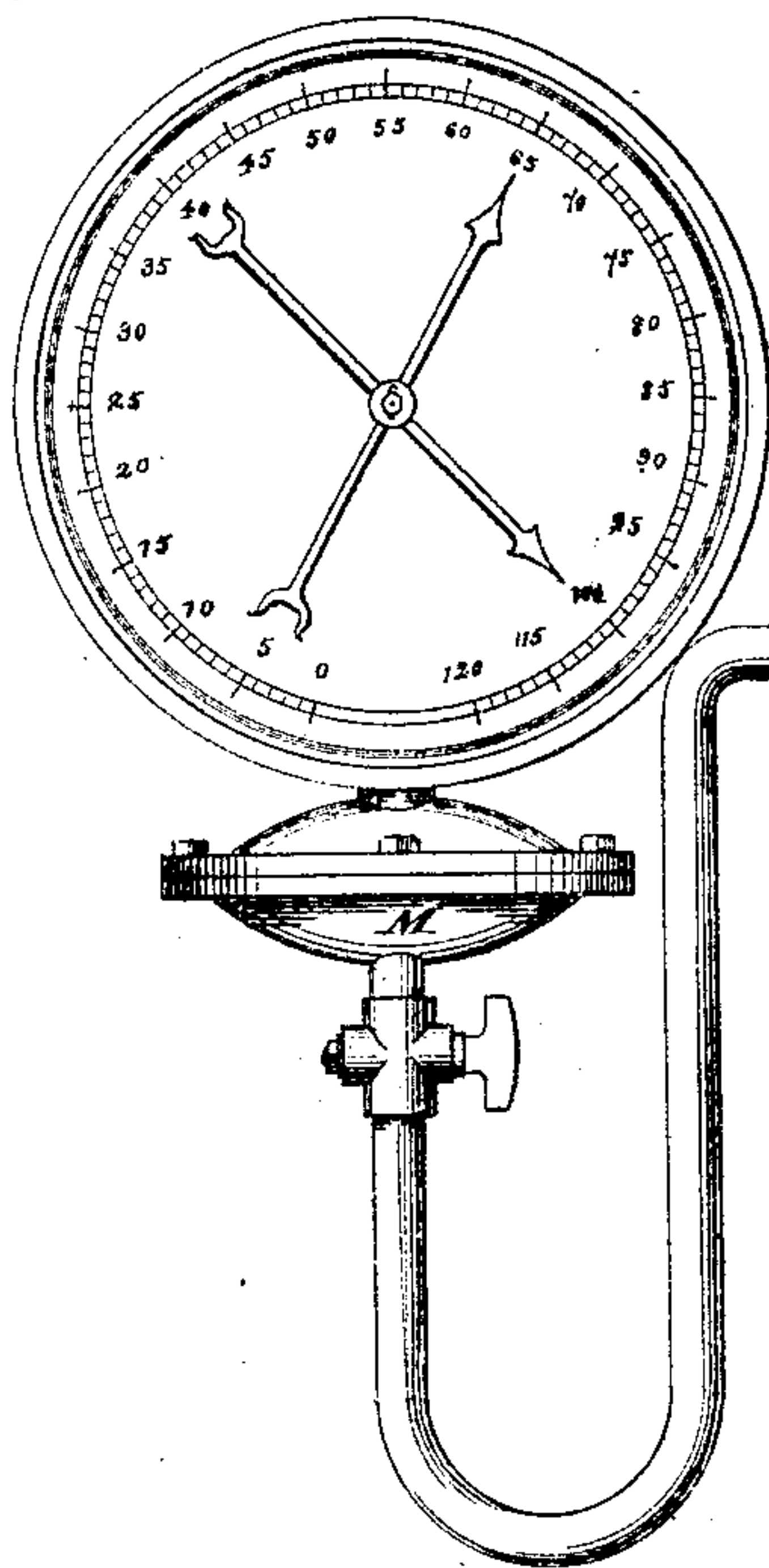
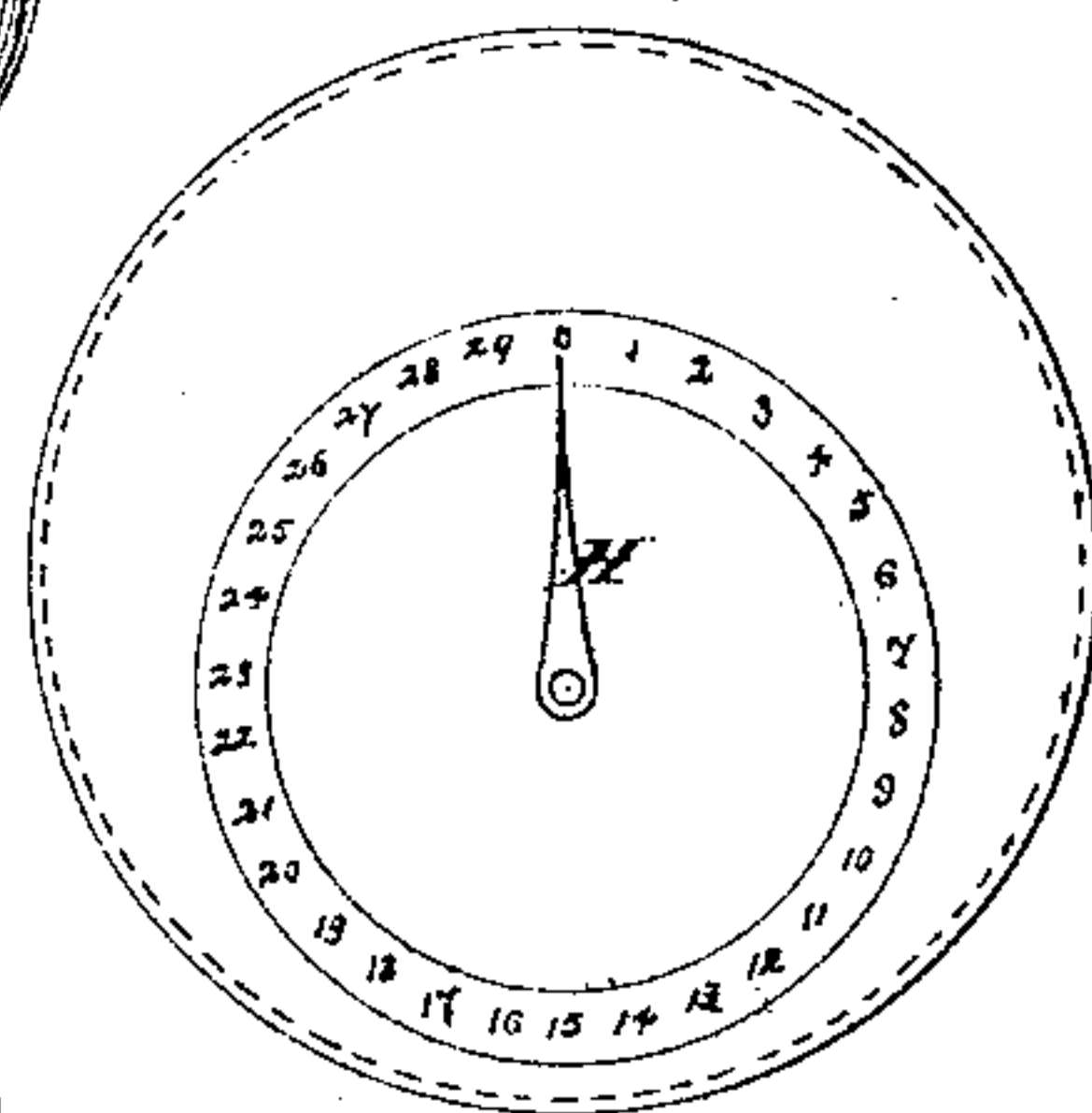


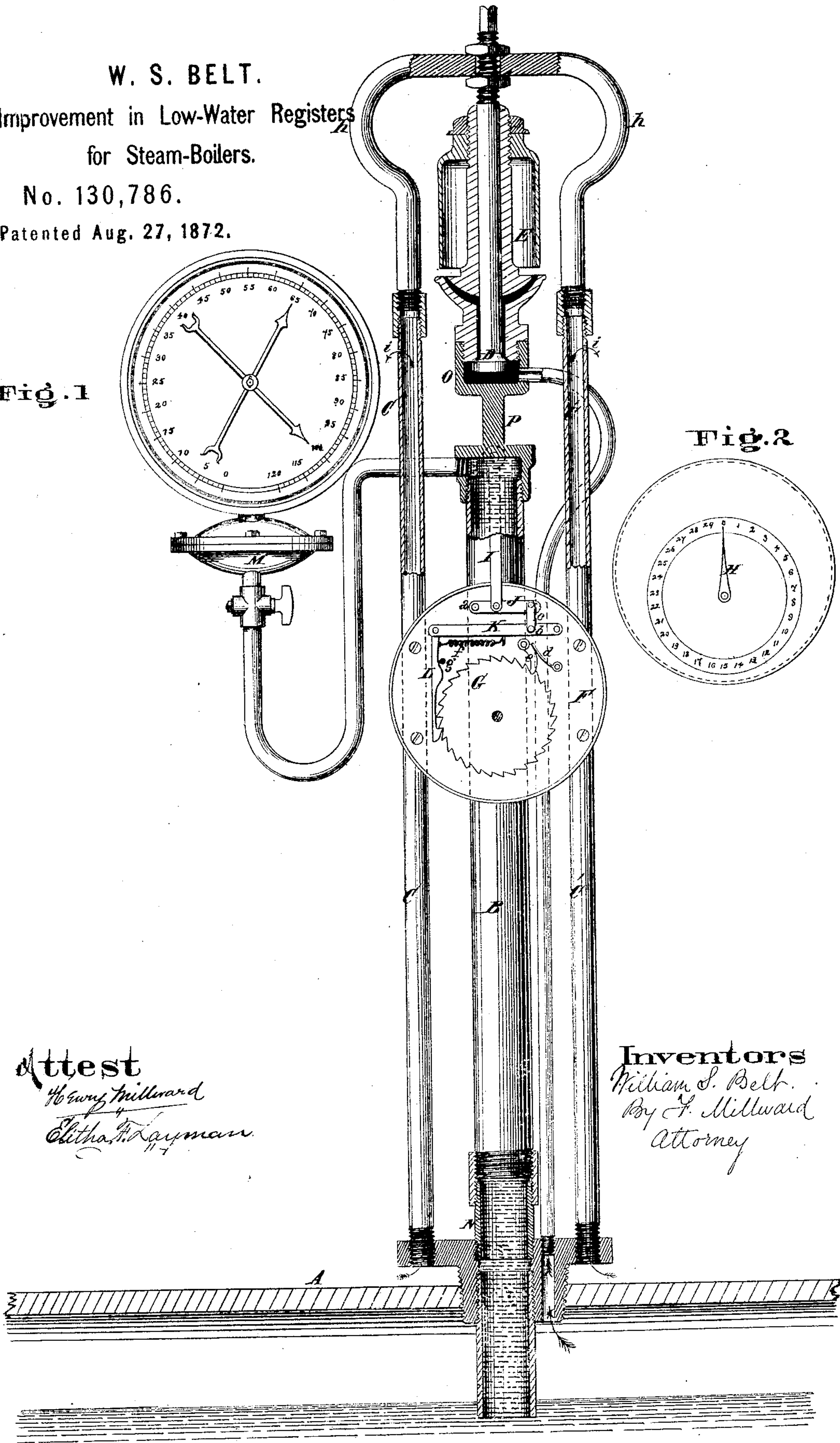
Fig. 2



Attest

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# UNITED STATES PATENT OFFICE.

WILLIAM S. BELT, OF CINCINNATI, OHIO.

## IMPROVEMENT IN LOW-WATER REGISTERS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. 130,786, dated August 27, 1872.

### SPECIFICATION.

I, WILLIAM S. BELT, of Cincinnati, Hamilton county, State of Ohio, have invented certain new and useful Improvements in Low-Water Indicators for Steam-Boilers, of which the following is a specification:

#### *Nature and Objects of Invention.*

My invention relates to the expansion-tube class of indicators; and consists, first, in a certain construction of this apparatus for registering by which no more than one time can be recorded for each alarm, no matter what may be the extent of the expansion of the tube; second, in a certain construction of the expansion tube and connection with the whistle and boiler, by which the temperature of the tube is reduced to the lowest possible point when occupied by water; third, in a certain construction of the device for sustaining the valve of the whistle, by which the extreme contraction of the expansion tube, when the boiler is cold, is provided for.

#### *Description of the Accompanying Drawing.*

Figure 1 is an elevation, partly in section, of an apparatus embodying my invention attached to a steam-boiler. Fig. 2 is a face view of the registering-dial.

#### *General Description.*

A is the top of the boiler; B, the expansion tube; and C C', the side rods which sustain the alarm-valve D of the whistle E. To the side rods C C' a case or box, F, is secured, in which is journaled a revolving wheel, G, cut with ratchet-teeth on its periphery. The outside of the case F is fitted with a dial of numbers, which is traversed by a finger, H, secured to the wheel G. At the outside of the expansion tube B, near the top, a rod, I, is fastened, which communicates, through multiplying-levers J K, with the pawl L, which operates the wheel G. The levers J K are fulcrumed at a b, respectively, and are linked together by a strap, c. A spring-pawl, d e, prevents backward movement of the wheel G. The pawl L is kept against the wheel G by spring f, except when elevated excessively by

a great degree of expansion of tube B. In the latter event it is forced off the wheel by stud-pin g, and the registering of more than one notch is prevented. At each elevation of the tube B, occasioned by low water in the boiler, the finger H moves, by the means described, and counts one upon the dial, and thus an inspector can determine the frequency of low-water occurrences. The register must be so secured that it cannot be tampered with. To the top of the expansion tube a diaphragm steam-gage is fitted, the chamber M of which forms an air-vessel for the reception of air from the tube B. This provision enables the water to rise in tube B when the steam is first raised, while at the same time the only appliance used to permit it is an ordinary pressure-gage, which has a separate and distinct office to fill—that of indicating steam-pressure. A metallic nipple, N, composed of a material having the least possible heat-conducting power is interposed between the boiler and tube B, and the steam-chamber O of the whistle is separated from the expansion tube by a coupling having a long narrow neck, P. By reason of this provision of coupling P and nipple N, of the character described, so little heat is communicated to the tube B, either from the boiler-plate A or steam-chamber O, that, when occupied by water, it is so contracted that a great degree of expansion is certain when it is occupied by steam; thus a wide opening of the valve is secured. The rods C C', near the top at h, are bent or bowed in the form of semicircles, to permit of their "giving way" by springing when a great contraction of pipe B takes place on the boiler becoming cold; thus a heavy strain on the small valve-fastenings is prevented. The rods C C' are hollow, as shown, and a free circulation of air is secured by their being left open at the bottom and pierced at the side i at the top. This prevents, in a great measure, the expansion of these rods when steam occupies the tube B and heats the indicator.

The steam-gage shown attached to the indicator, and one which I prefer in all cases, is of the "recording" description, having an extra finger for recording the maximum pressure reached.

*Claims.*

1. In combination with the tube B, wheel G, rod I, and levers K L, the pawl L and stud-pin *g*, as described, and for the purpose stated.

2. In the described combination with the steam-chamber O and tube B, the non-conducting nipple N and connecting-coupling having a narrow neck, P, as and for the purpose specified.

3. In combination with the tube B, the hol-

low perforated rods C C' *i*, formed with curved sides *h*, for the support of the whistle-valve, all substantially as and for the purposes specified.

In testimony of which invention I hereunto set my hand.

W. S. BELT.

Witnesses:

FRANK MILLWARD,  
J. L. WARTMANN.