

No. 868,045.

PATENTED OCT. 15, 1907.

D. M. WEBSTER.
WATER TUBE BOILER.
APPLICATION FILED APR. 16, 1906.

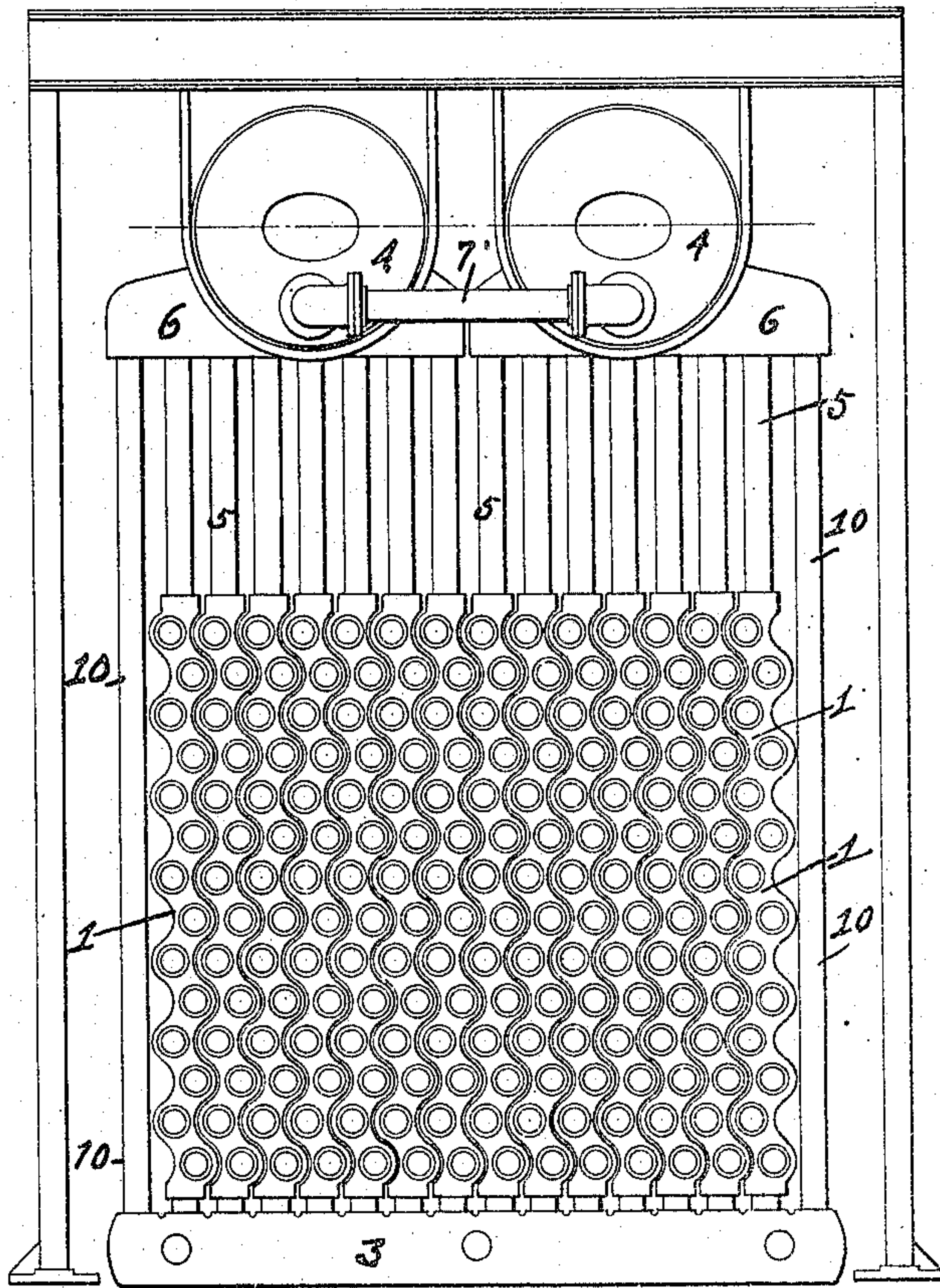


FIG 1

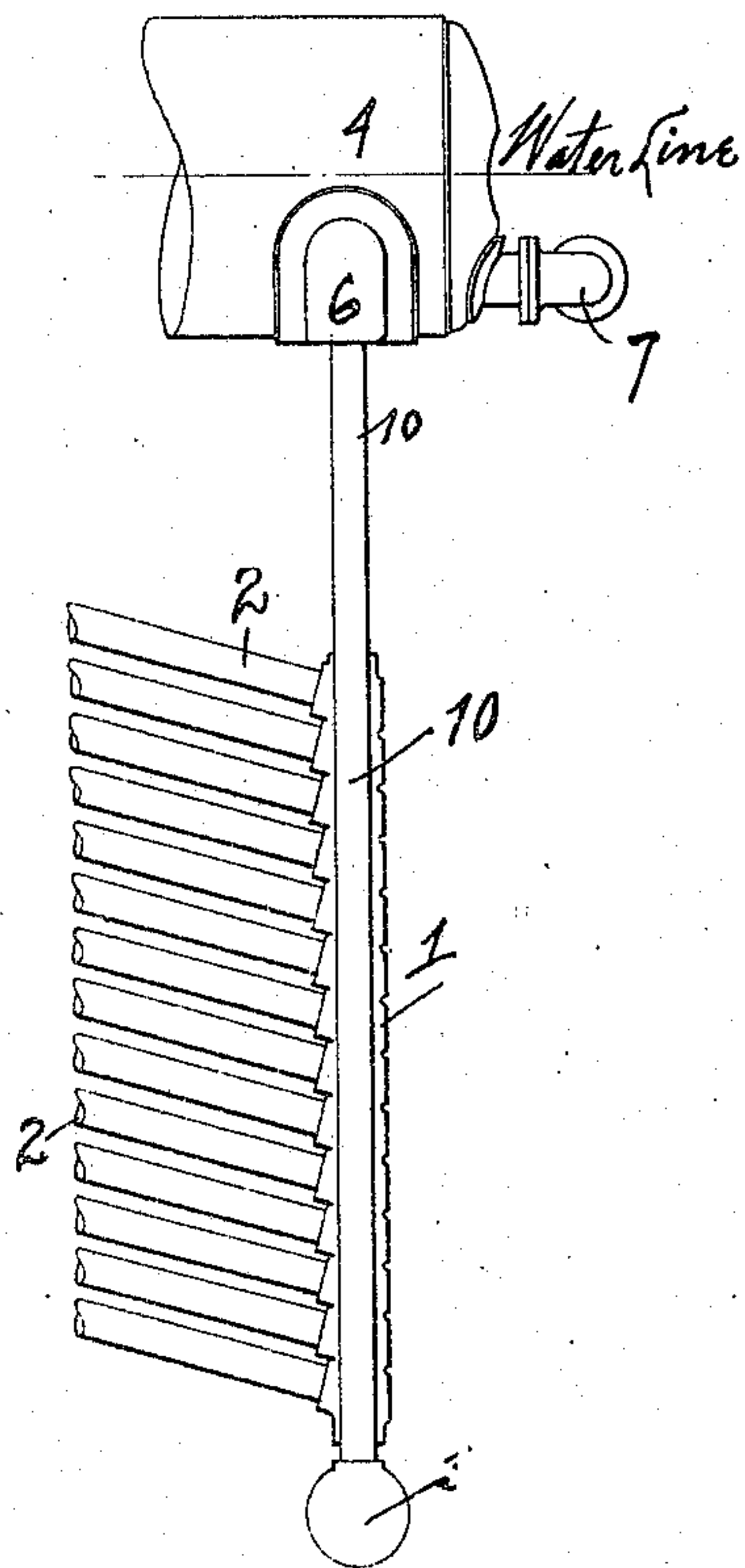


FIG 2

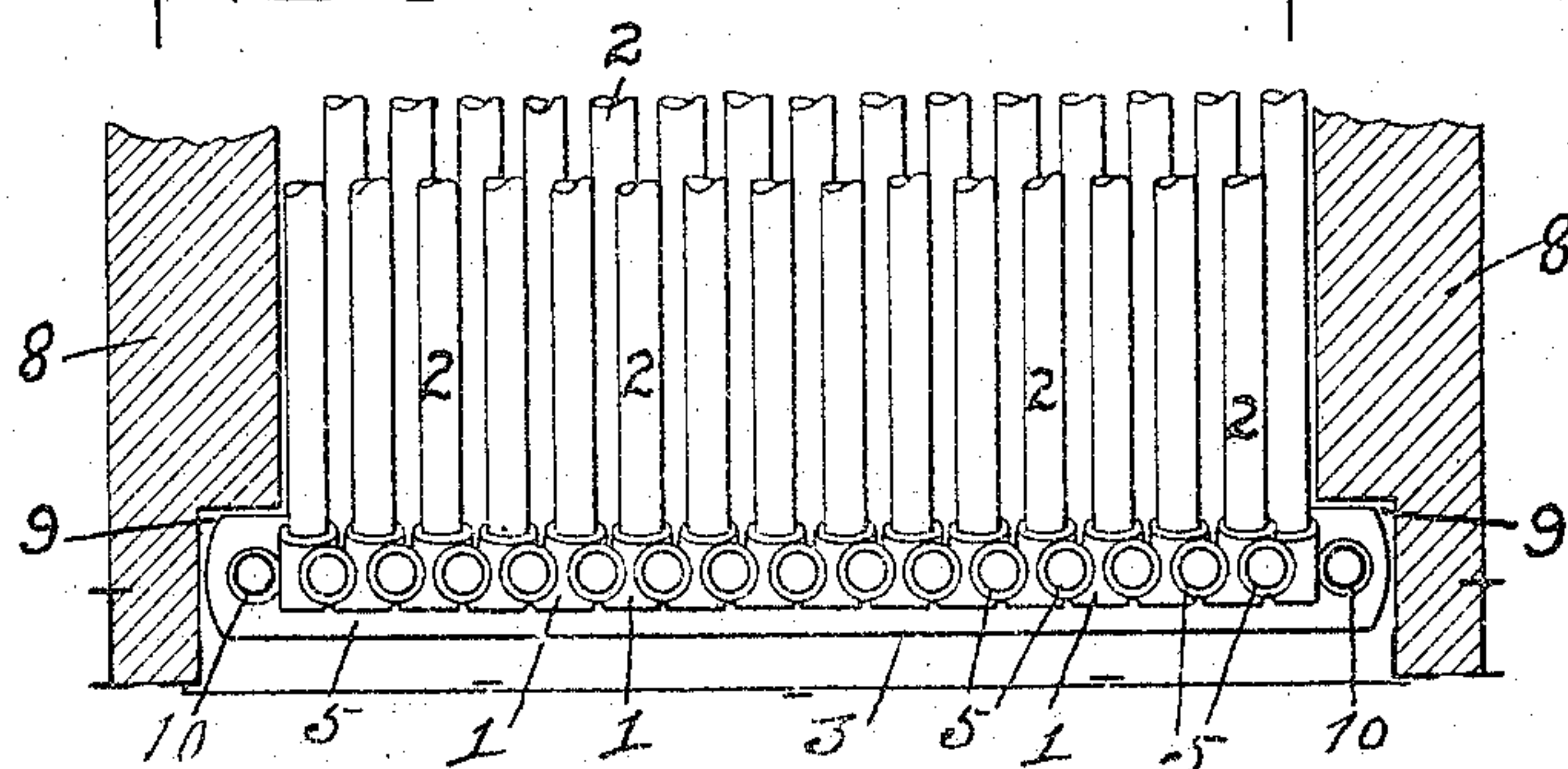


FIG 3

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Witnesses

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UNITED STATES PATENT OFFICE.

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WATER-TUBE BOILER.

No. 868,045.

Specification of Letters Patent.

Patented Oct. 15, 1907.

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To all whom it may concern:

Be it known that I, DANIEL M. WEBSTER, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Water-Tube 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in boilers of the horizontal sectional water tube type. In boilers of this type, particularly where a large number of units or water pipes are employed, the bottom rows of pipes in the manifolds or sections, or those rows lying nearer the mud drum, do not receive a sufficient amount of water in comparison with the amount received in the upper rows of pipes in the manifolds or sections; the result is, that steam pockets will form in the bottom rows of tubes or pipes resulting in a serious damage and loss of efficiency. In other words, the upper rows of water tubes will receive a proportionately large amount of the water from the steam drum or drums and thus will deprive the lower water tubes of the requisite supply of water. This lack of an equalization in the feed of water to the tubes causes said tubes to become overheated and blistered and a consequent decrease to a marked extent in the efficiency of the boiler.

It is the object of the present invention to remedy these serious difficulties by the provision of means for maintaining an equalization in the feed of water to the tubes of each section or manifold, to the end that the lower tubes as well as the upper tubes may receive an adequate supply of water from the steam drums.

Preceding a detail description of the invention, reference is made to the accompanying drawings, of which—

Figure 1, is a rear elevation of a horizontal sectional water tube boiler having my improved equalizing means applied. Fig. 2, is a side elevation of the rear end of the boiler, the water tubes being broken away. Fig. 3, is a top plan view of the rear end of the boiler, the water tubes being broken away, the steam drums and cross boxes being removed and the walls or boiler casing appearing in section.

In a detail description of the invention, similar reference characters indicate corresponding parts.

As hereinbefore stated, my improvements are designed especially for boilers of the horizontal sectional water tube type where a large number of units or water tubes are employed. In the drawings, I have illustrated each section or manifold to consist of fourteen units or water tubes, or fourteen headers each assembled with fourteen units or water tubes. The headers

1 are each united with fourteen inclined water tubes 2, said water tubes being united to the headers, one above the other by expanding them in the staggered form shown. The said headers have their lower ends expanded into the mud-drum 3 at the rear end of the boiler, and it will be observed that the mud drum extends out at both ends beyond the two outer headers. The headers 1 are further connected with the steam drums 4 by means of upright circulating tubes 5 lying at the rear of the boiler and which are expanded into the cross boxes 6 at the rear ends of the steam drums 4 and which communicate with said steam drums. Below the water line in the steam drums there is an equalizing pipe 7 which maintains an equal level of the water in the steam drums when two or more drums are employed; this equal level of water is maintained regardless of any unequal demand that may be made upon one or the other steam drum in supplying the manifolds or sections.

It will be remembered that the headers 1, the down-take or circulating tubes 5, and the mud drum 3 are at the rear end of the boiler, or the lowest point of the inclined water tubes 2. The extreme right and left ends of the cross boxes 6—6 and the extreme right and left ends of the mud drum 3, are connected directly by balance or equalizing pipes 10—10 and these parts are placed in positions which protect them from direct contact with the flame or products of combustion in the nature of escaping gases, and also from the colder temperature. The brick-setting or iron casing 8 at the rear end of the boiler and on each side of the manifolds or sections is provided with inner perpendicular pockets 9 into the lower ends of which are projected the ends of the mud drum, and into the upper ends of which pockets the ends of the distributing boxes 6—6 are projected. Within these pockets 9—9 are placed balance or equalizing pipes 10—10 which lie on the exterior of the sections or manifolds; these down pipes 10—10 form a direct communication between steam drums 4—4 and the mud drum 3, and by reason of their occupying the positions within the pockets 9—9, said pipes are out of the direct draft of the flames and are also protected from contact with the colder air on the exterior of the boiler casing or setting. By thus protecting these balance or equalizing pipes 10—10 from the great heat of the escaping flames and gases, the possibility of the formation of steam pockets therein, and the consequent obstruction of a full and free equalization of water to the lower elements of the manifolds or sections is obviated. And further, by placing the inlet to these balance or equalizing pipes at the extreme ends of the cross boxes 6—6, the lower units or water tubes are enabled to receive their supply of water simultaneously with the feed of water to the upper water tubes and without interfering with the supply of water to the upper water tubes. The equalizing pipes 7 before referred to, as con-

necting the steam drum heads below the water line, may be employed when two or more steam drums are utilized, to act as an equalizing pipe between said steam drums. This pipe is connected to the drum heads sufficiently high to avoid any interference with the downward current in the cross boxes and still maintains a circulation below the water line. The extreme right and left balance or equalizing pipes 10—10 may be connected to the mud drum by a short section or header of a sinuous shape similar to the headers 1 for convenience, or other forms of connection may be made; the form, however, illustrated in the drawings, and consisting in expanding the ends of said equalizing tubes into the mud drum, is thought to be the most preferable form of uniting said pipes with said mud drum.

I claim:

1. In a water tube boiler, the combination with steam drums, cross boxes supporting said drums, a series of sections consisting each of a header and a series of inclined water tubes, a series of vertical circulating tubes connecting the cross boxes with the headers, of a mud drum to which the headers of said sections are connected, a casing having perpendicular pockets into which are projected the ends of the mud drum, and an equalizing pipe within each of said pockets and forming a direct connection between the outer ends of the cross boxes and the ends of the mud drum lying within said pockets, substantially as specified.

2. In a water tube boiler, the combination of steam drums, cross boxes communicating with said drums, a mud drum having its ends in alinement with the outer ends of the cross boxes, a series of headers, vertical circulating tubes connecting the cross boxes and the mud drum through the headers, equalizing pipes connecting the outer ends of the cross boxes with the ends of the mud drum, and a casing having perpendicular pockets into which the ends of the mud drum are projected and in which the outer ends of the cross boxes extend, and in which the equalizing pipes lie, substantially as specified.

3. In a water tube boiler, the combination with steam drums, cross boxes communicating with said steam drums, a series of sections consisting each of a header and a series of inclined water tubes connected therewith by vertical circulating tubes and the intervening cross boxes, of a mud drum having its ends in alinement with the outer ends of the cross boxes and to which the headers of the sections are connected, a casing having perpendicular pockets into which the ends of the mud drum and the outer ends of the cross boxes are projected, and equalizing pipes lying within said pockets and forming a connection between the upper side of the mud drum and the ends of the cross boxes, said equalizing pipes and the ends of the mud drum and cross boxes lying within said pockets in the casing, substantially as specified.

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

DANIEL M. WEBSTER.

Witnesses:

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