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Patented Nov. 13, 1900.

F. E. & F. O. STANLEY.  
TUBULAR STEAM BOILER.  
(Application filed May 24, 1899.)

(No Model.)

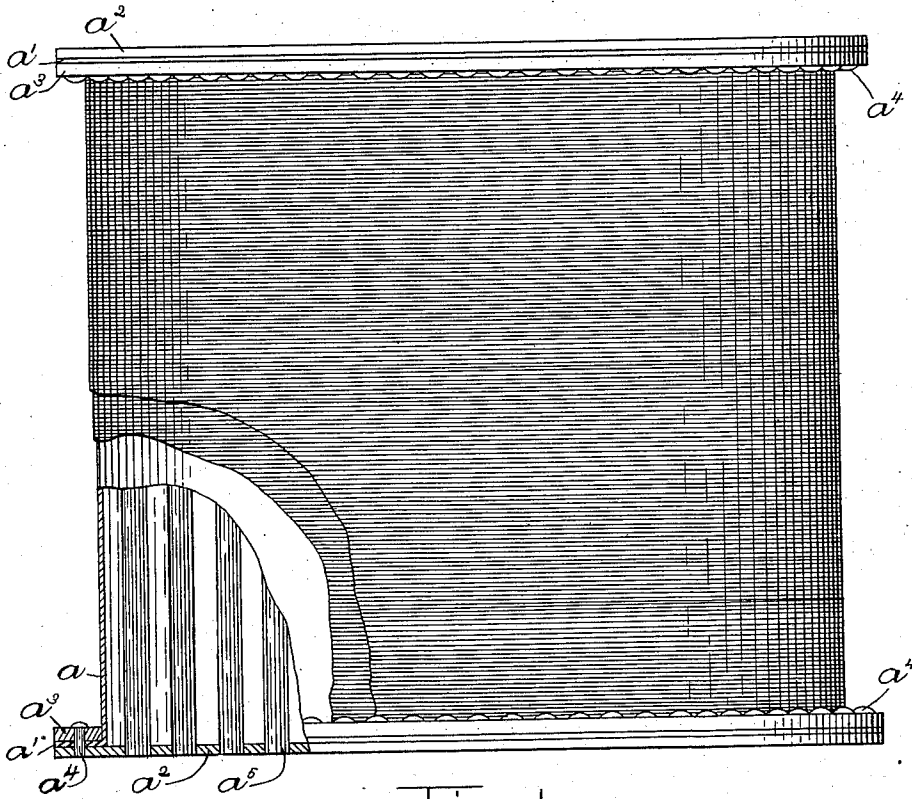


Fig-1-

Witnesses:

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# UNITED STATES PATENT OFFICE.

FRANK E. STANLEY AND FREELAN O. STANLEY, OF NEWTON, MASSACHUSETTS, ASSIGNORS TO THE STANLEY AUTOMOBILE COMPANY, OF NEW YORK.

## TUBULAR STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 661,561, dated November 13, 1900.

Application filed May 24, 1899. Serial No. 718,082. (No model.)

*To all whom it may concern:*

Be it known that we, FRANK E. STANLEY and FREELAN O. STANLEY, of Newton, county of Middlesex, and State of Massachusetts, have invented an Improvement in Tubular Steam-Boilers, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention relates to improvements in boilers, and has for its object to make a boiler light in weight, permanently packed at the joints, and capable of withstanding an excessive internal pressure.

In making our improved boiler we provide for the effectual closing of the seams at the ends by using soft metal for the shell of the boiler, stiffening the same by flanging the ends outwardly, and making use of the soft-metal flanges as packings by interposing them under compression between flat heads and clamping-rings. Such soft metal, however, while it is effectual in securing the desired close joints at the ends and while it is stiffened by the end flanges, is not of such a character that it will alone resist the internal pressure to which the boiler is subjected. To overcome this, we use a seamless shell and strengthen it between the flanges by wrapping the same with piano-wire in one, two, or more courses. By this means we secure the advantages of a shell of light thin material, employing metal soft enough for the flanges to constitute a packing, which insures a most perfect and durable joint, while securing also great strength capable of resisting any desired internal pressure.

The use of a seamless shell is important, as the application of the wire under great pressure would tend to force one edge under the other if a lap-joint were used, while a butt-joint is lacking in strength, liable to open, and difficult to seal.

The construction of the boiler is illustrated in the figure of the drawing, showing the same partly in section.

The body or shell  $a$ , as shown, has three layers of wire wrapping and the flanges  $a'$  on the ends, which are clamped between the flat heads  $a^2$ , and rings  $a^3$ , surrounding the shell, rivets  $a^4$  serving to secure the desired com-

pression of the flanges between the rings and heads and to connect the heads, rings, and flanges together, so as to form tight joints capable of remaining sealed under heavy internal pressure. The rings  $a^3$  are of any suitable material and size and are applied to the body portion before flanging the same, and the heads  $a^2$  are then applied and the parts then tightly riveted together.

We find in practice that the soft-metal flanges serve admirably as packing material between the heads and rings and that when compressed between them by the riveting of the parts together they will effectually close the joint between the heads and rings, so as to seal the same against any required degree of pressure, and that this seal is permanent in character, avoiding any necessity of using and renewing packing or tightening the joints from time to time. We therefore secure both an effectual connection of the heads to the shell and the sealing of the joints by the same means to an extent resisting heavier pressures than ordinary boilers can carry and are enabled to do so by the use of a soft-metal shell, which it is possible to employ owing to the use of the wire winding. The rings  $a^3$  are made of such strength as to not only secure the desired compression of the packing-flanges, but also to maintain the cylindrical form of the shell and preserve the heads flat, thus imparting rigidity to the whole structure.

The tubes  $a^5$  are applied and secured as usual and may be made of the same material as the shell.

Without limiting ourselves to the precise construction shown, we claim—

1. A steam-generator having flat heads of hard metal, vertical tubes, a seamless soft-metal body suitably reinforced by wire winding and with flanges at the ends, and rings between said flanges, the rings and heads riveted together upon the flanges, whereby the latter constitute soft-metal packings between the rings and heads and also the means of connection between the heads and body, substantially as set forth.

2. The combination in a steam-generator of a soft-metal seamless shell having flanges integral therewith, a wire wrapping around

the shell, flat heads upon which the flanges  
bear, vertical tubes, rings between which and  
the heads the flanges extend, and rivets ex-  
tending through the heads and rings and  
5 compressing the flanges to form tight pres-  
sure-resisting joints between the heads and  
flanges, substantially as described.  
In testimony whereof we have signed our

names to this specification in the presence of  
two subscribing witnesses.

FRANK E. STANLEY.  
FREELAN O. STANLEY.

Witnesses:

B. J. NOYES,  
E. E. WALKER.