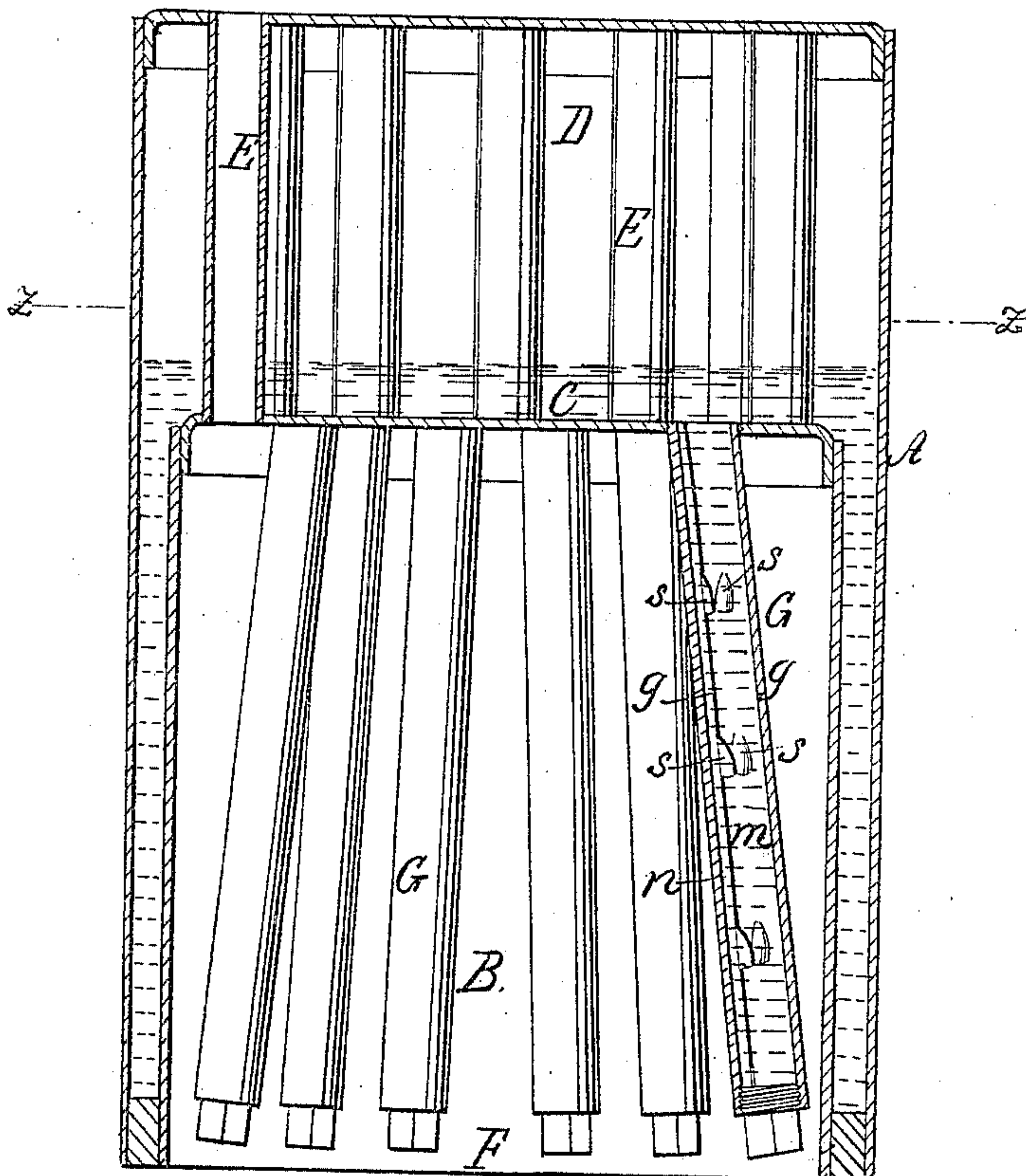
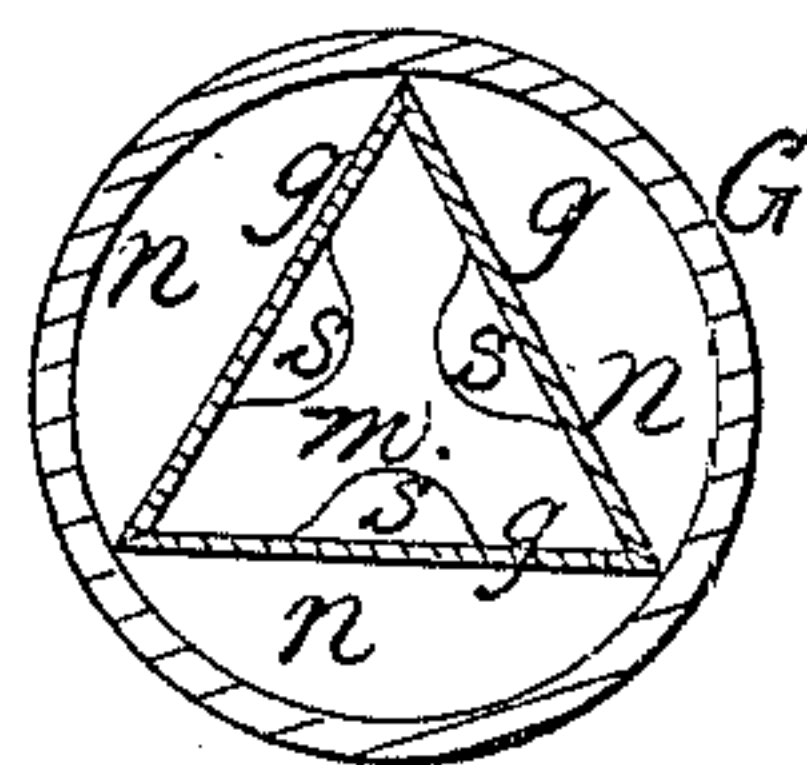


*M. R. Clapp,*  
*Steam-Boiler Water-Tube.*  
*N<sup>o</sup> 61,162.                      Patented Jan. 15, 1867.*

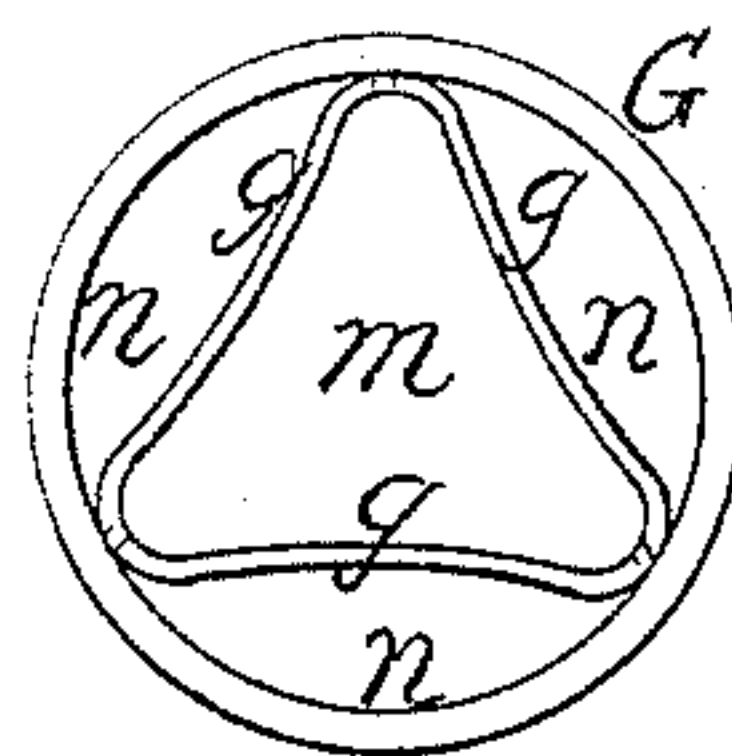
*Fig. 1,*



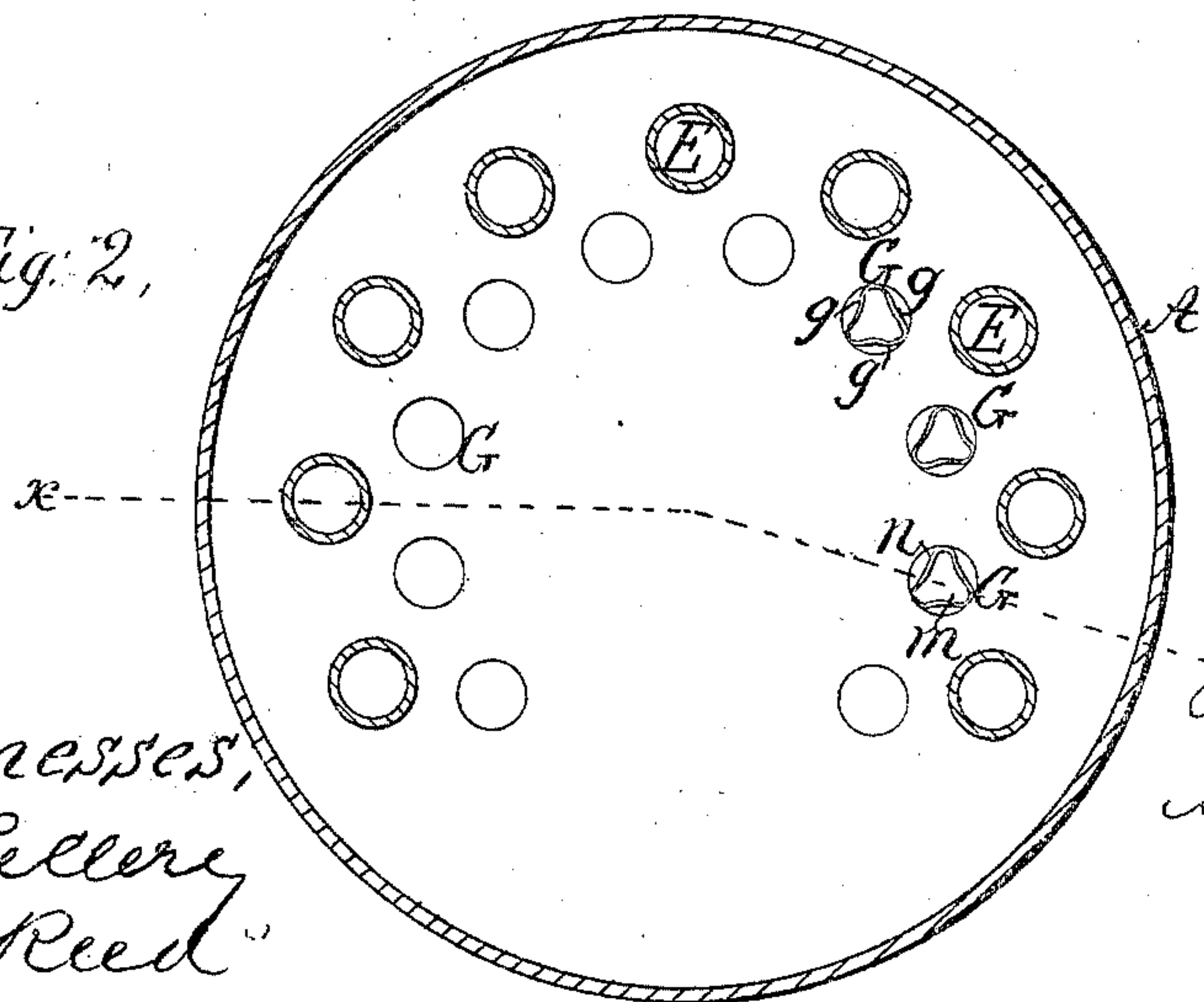
*Fig. 3,*



*Fig. 4,*



*Fig. 2,*



*Witnesses,*  
*A. Sellers*  
*G. W. Reed*

*Inventor*  
*M. R. Clapp*  
*by his attorney*  
*Brann Combs & Co*



# United States Patent Office.

MIRTILLOW R. CLAPP, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND  
E. P. JONES, OF SAME PLACE.

*Letters Patent No. 61,162, dated January 15, 1867*

## IMPROVEMENT IN STEAM GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, MIRTILLOW R. CLAPP, of the city, county, and State of New York, have invented a certain new and useful Improvement on Steam Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification, and in which—

Figure 1 represents a vertical section of a boiler, or main portion of one, having my improvement applied thereto, taken as denoted by the line *x x* in fig. 2.

Figure 2 is a horizontal section of the same through the line *z z* in fig. 1.

Figure 3 is a top view of one of the water and steam-generating tubes constructed according to my improvement; and

Figure 4 a transverse section of the same.

Like letters refer to like parts throughout the several figures.

My invention is more particularly applicable to boilers which have pendent or vertical water tubes descending from a steam-generating chamber above the fire-place down within the latter, and relates more particularly to that construction of water and steam-generating tubes, in which diaphragms are used to isolate the water into thin films or sheets for the more rapid generation of steam, and to establish return passages for water carried up by the steam; and the nature of my invention consists in a novel construction of said tubes, exposed externally to the action of the fire, by providing them with diaphragms having openings in them, inclining downwardly for the purpose of arresting and diverting down into the return passages of the tubes, water lifted by the steam in the course of its formation or ascension within the passages more directly exposed to the action of the fire; and it also consists in a triangular arrangement of diaphragms, which may be loosely fitted in the tubes, whereby the diaphragms are made to retain each other in place; likewise in a peculiar bent construction of the diaphragms at their tops to facilitate the return of water lifted by the steam.

Referring to the accompanying drawing, A represents the outer shell or case of a vertical cylindrical boiler; B the fire-box or chamber; C the crown-sheet to the latter; D the upper steam-generating chamber; E the smoke-flues, and F the level of the fire-grate. Attached to the crown-sheet C, communicating with the chamber D, and projecting downwards into the fire-chamber, preferably in a pendent and inclined or flaring manner, are tubes, G. These tubes are represented as of pocket character, being fitted at their lower ends with solid screw-plugs, but in this respect they may be otherwise constructed; they are thus, however, constructed and the lower portion of the annular space surrounding the fire-box made solid to prevent rapid destruction, and to obviate the necessity of a water base below the grate. Said tubes G are fitted with diaphragms, *g*, extending upwardly within them, for the purpose of isolating the water into films or thin sheets, in close proximity to the heating surfaces of the tubes for the more rapid generation of steam, and return passages, excluded from the direct action of the heat, to convey back or down water lifted up by the steam formed in or by the isolated films or sheets, and to keep up the feed of water to the isolated steam-generating or water spaces. Diaphragm arrangements for these purposes have been variously constructed, and the one portion of my improvements is applicable to different tubular arrangements of such character. This consists in making openings, *s*, in the diaphragms, having at their backs or insides, formed by bending or inclining the metal out of which they are made, a downward direction or tendency from the isolated steam-generating passages, into the return-water ones, so that water lifted up by the steam in the course of its formation and ascension within the former, will be checked from rising, and caused to flow back downwardly into the return-water passages, to take the place of the water that has been converted into steam. Openings of this character thus made in the diaphragms will tend to check turbulent motion of the water in the boiler and restrain foaming. The diaphragms *g* I prefer to make of three strips to each tube, fitting down within and the length of the latter, and of such width as when inserted to bear at their edges one against the other, giving to the return-water passages, *m*, a triangular configuration, and a segmental figure to the isolated water or steam-generating passages, *n*, and serving, the one strip to support the other, and retain in their places the several strips. It is a matter of no small importance, too, that the current caused by the escape of steam should offer no obstruction to the flow of water into the return-water passages at their top, and every facility given for return of water lifted up by the steam. For this purpose the diaphragms are turned or bent at their upper ends so as to lay more against the sides of the tube, and form mouths or

receiving spaces at their junction with each other to the return-water passages, as more clearly represented in fig. 4.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The water and steam-generating tubes *G*, exposed to the action of the fire or heated gases, as specified, and provided with diaphragms *g*, having openings *s* in them, inclining downwardly, substantially as and for the purpose or purposes herein set forth.

2. The construction of the diaphragms *g*, within the tubes *G*, whereby they support or retain each other in place, as described.

MIRTILLOW R. CLAPP.

Witnesses:

A. LE CLERC,

G. W. REED.