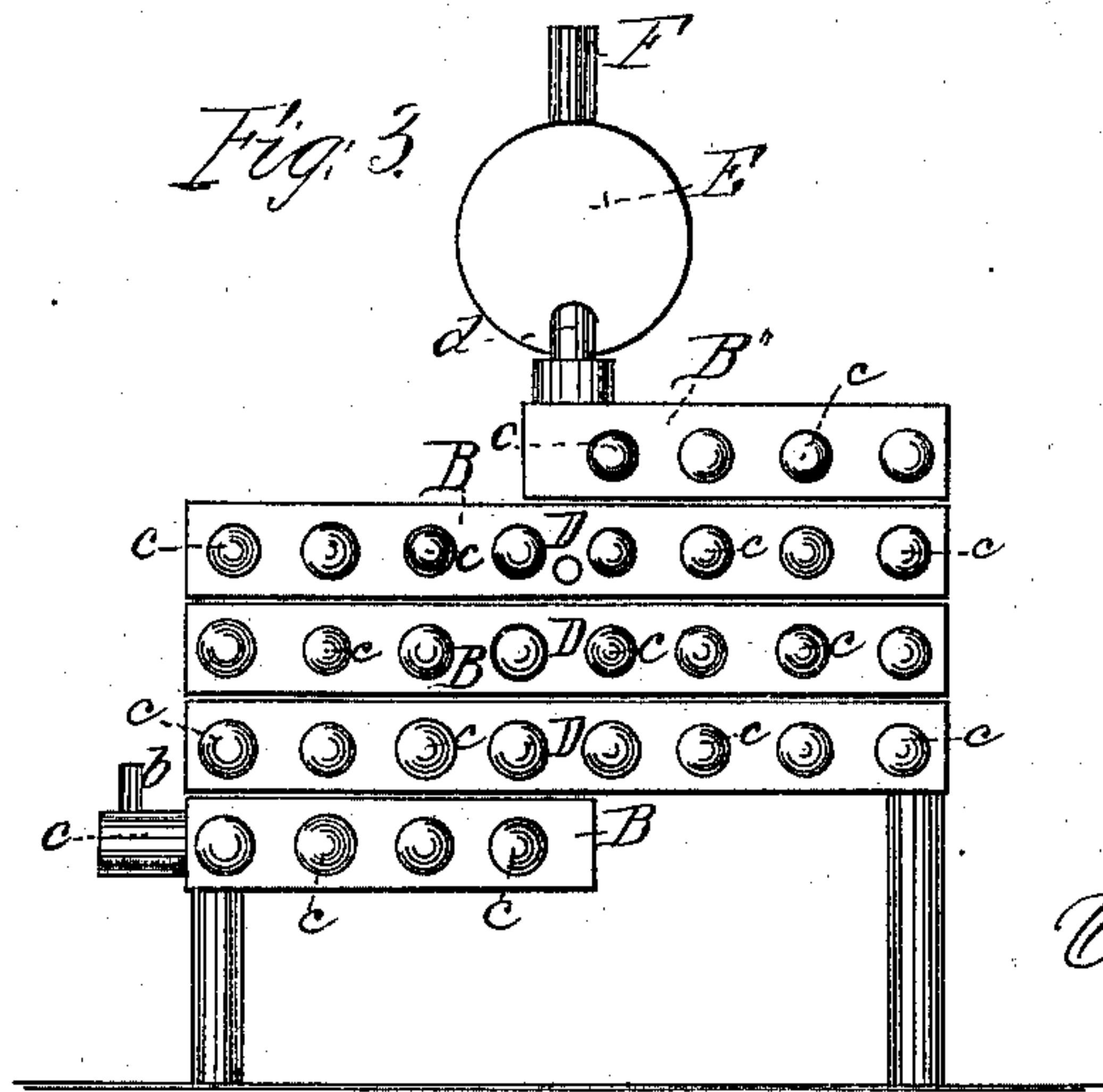
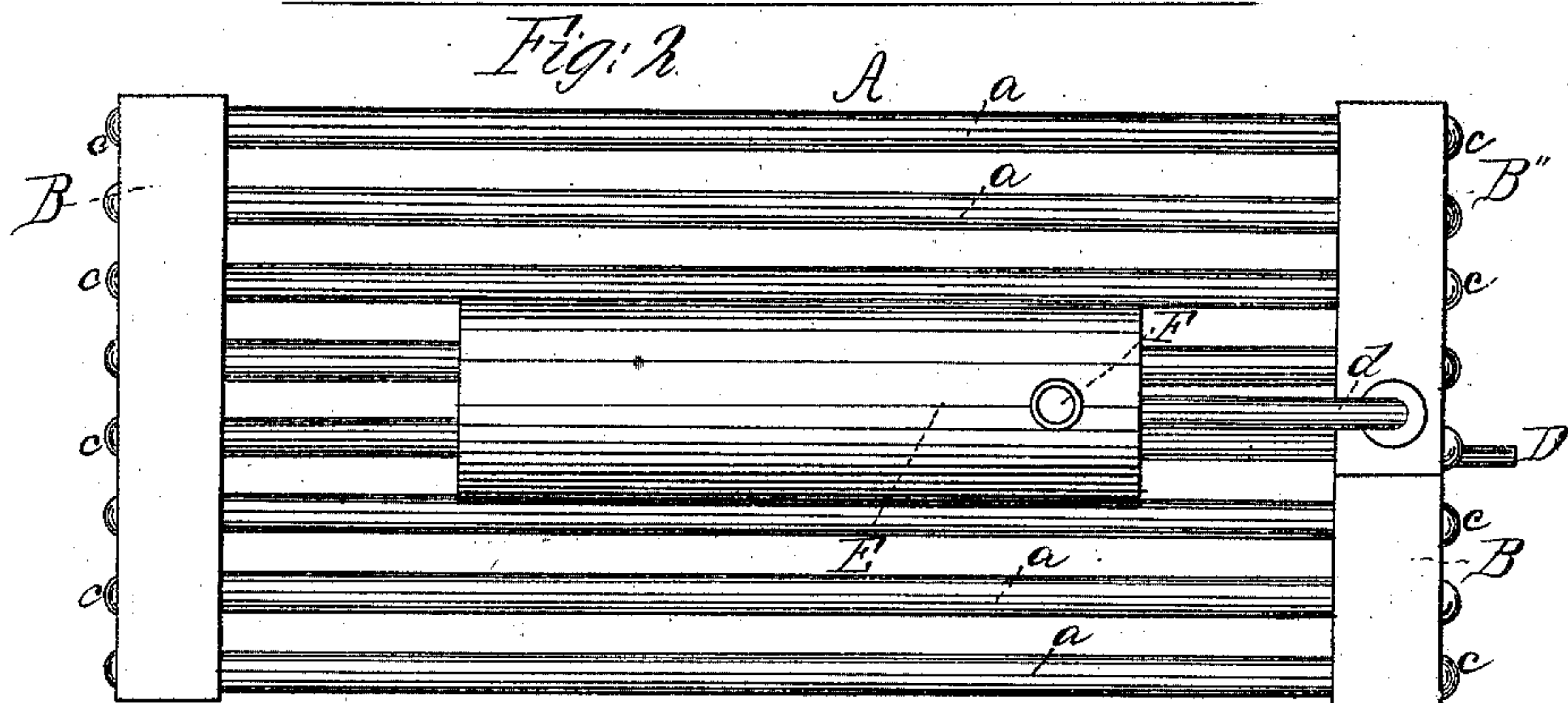
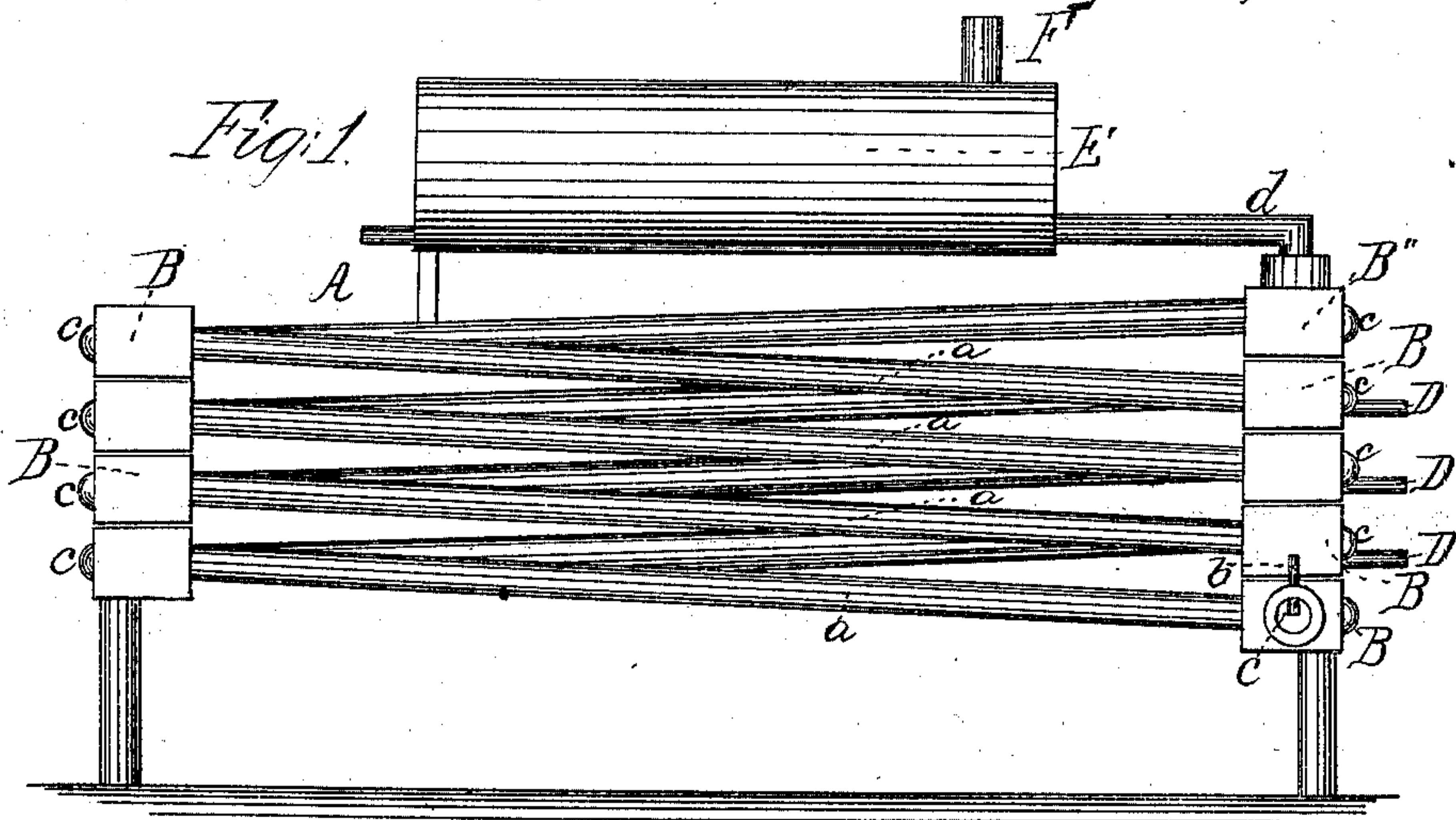


*C. O. Winegar,*  
*Sectional Steam Boiler.*  
*N<sup>o</sup> 67,935.      Patented Aug. 20, 1867.*



*Witnesses:*  
*Geo. A. Spring*  
*Chas. Smith*

*Inventor:*  
*Chas. O. Winegar*



# United States Patent Office.

CHARLES O. WINEGAR, OF DRYTOWN, CALIFORNIA.

*Letters Patent No. 67,935, dated August 20, 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, CHARLES O. WINEGAR, of Drytown, county of Amador, State of California, have invented certain new and useful improvements in "Steam-Generators;" and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention or improvements without further invention or experiment.

The nature of my invention is to provide a steam-generator to take the place of the ordinary steam-boiler, so constructed and arranged as to supply the necessary quantity of steam without the danger from explosions so incident in the use of the cylindrical or tubular boiler. In order to accomplish this, I employ a series of longitudinal pipes or tubes, both ends of which are inserted in oblong water-chests placed transversely with the tubes, each series of tubes having independent chests placed one upon the other. The lower tier of tubes is composed of but one-half the number, and one-half the length of chest at the end where the water is supplied to the generator, and terminates at the top in the same manner, giving an inclination to one-half of the tubes alternately. A steam-drum is placed upon the top of the uppermost tier, connected to the upper or short chest. The chests are pierced for plugs opposite the ends of each tube.

To more fully describe my invention, reference is had to the accompanying drawing and letters marked thereon, of which—

Figure 1 is a side sectional elevation.

Figure 2, a plan.

Figure 3, an end view.

Similar letters indicate like parts in each of the figures.

A represents my steam-generator, to be placed in a furnace of masonry, and the whole may be enclosed with the exception of the front ends, which may be left open for the purpose of testing the height of water in the tubes or water-chests. *a a a* are a series of longitudinal pipes or tubes of any desired size and thickness. Each end of the tubes is inserted in water-chests *B B B B*, placed transversely to them, every layer of tubes being supplied with one at each end, so that one chest rests on top of another to the desired height. The lower and upper ones, *B'* and *B''*, are only one-half the length of *B B*; consequently, commencing at the bottom of the generator, in the front end, they contain but half the number of tubes, and terminate at the top on the opposite side with the same number, forming a regular upward angle of inclination alternately upon each side. A communication only is had between the chests of the tubes. *C* is the induction or supply-water pipe, placed in the end of the lower chest *B'*, and may be provided with a stop-cock, *b*. Gauge-cocks *D D D* are placed in the front of the chests *B B B*, to ascertain the height of water in the steam-chests and tubes. Plugs *c c c c* are placed in the chests, opposite each end of all of the tubes, for the purpose of cleaning the tubes from debris or scale, but these should not be removed when the generator is in operation. Near the inner end of the upper chest *B''* is placed an escape pipe, *d*, which may be provided with a stop-cock. This pipe leads into the head of a steam-drum, *E*, placed over the tubes, from whence the supply of steam is taken through an escape pipe, *F*.

The manner of operating my steam-generator may be described as follows, to wit: The water is admitted to the pipes or tubes through the lower water-chest *B'*, and passes up the incline tubes contained in that chest to the lower chest *B*, at the other end, and fills the remaining number of tubes, which are doubled by the length of the chest, and are placed at an incline toward the chest above *B'*, and so on until the desired height of water is attained. The lower tubes and chests, being more directly exposed to the hottest part of the fire, should be kept full of water, but the water should not be allowed to rise above the cocks in the succeeding chests, as it would occupy the place intended for steam; neither should the water fall much below the cocks, as the steam might become dry or superheated, and thus injure the machinery to which it is to be applied. The lower tubes and chest, being constantly supplied with cold water by the pump, will keep them from being injured by the heat of the furnace, and the water be constantly converted into steam and ascend through the tubes into the steam-chest at the top of the generator, from whence it is directed to the engines. The chest being constructed separate, will prevent the water from being forced from the lower tubes to the upper ones by the steam, as would be the case if the chests were connected by any other means than by the tubes.

Although I have described connecting each tier of tubes to separate chests at both ends, I am aware that

the several tiers of tubes may be connected to separate chests at one end only, to prevent straining the tubes when heated unequally, and under some circumstances it may be best to make them in that way.

I have not as yet determined what pump will be the best to use in connection with my generator, but think that any device may be employed for keeping up a constant and regular supply, to be ascertained, in all cases, by the gauge-cocks in the water-chests.

For constructing the tubes and water-chests, good boiler iron should be used of the strength and thickness employed in the manufacture of tubular boilers.

What I claim as my invention and improvements in steam-generators is—

Connecting each series of tubes to separate and independent chests at both ends, so that each series of tubes can expand and contract without straining the others or being strained themselves.

I also claim arranging the tubes in each tier, so as to form a connection between all the chests and all the tubes used, substantially as described.

CHAS. O. WINEGAR. [L. S.]

Witnesses:

GUS. A. MOUNTZ,

C. W. M. SMITH.