

No. 754,837.

PATENTED MAR. 15, 1904.

R. W. BARTON.  
STEAM-BOILER.

APPLICATION FILED MAR. 2, 1903.

NO MODEL.

Fig-1.

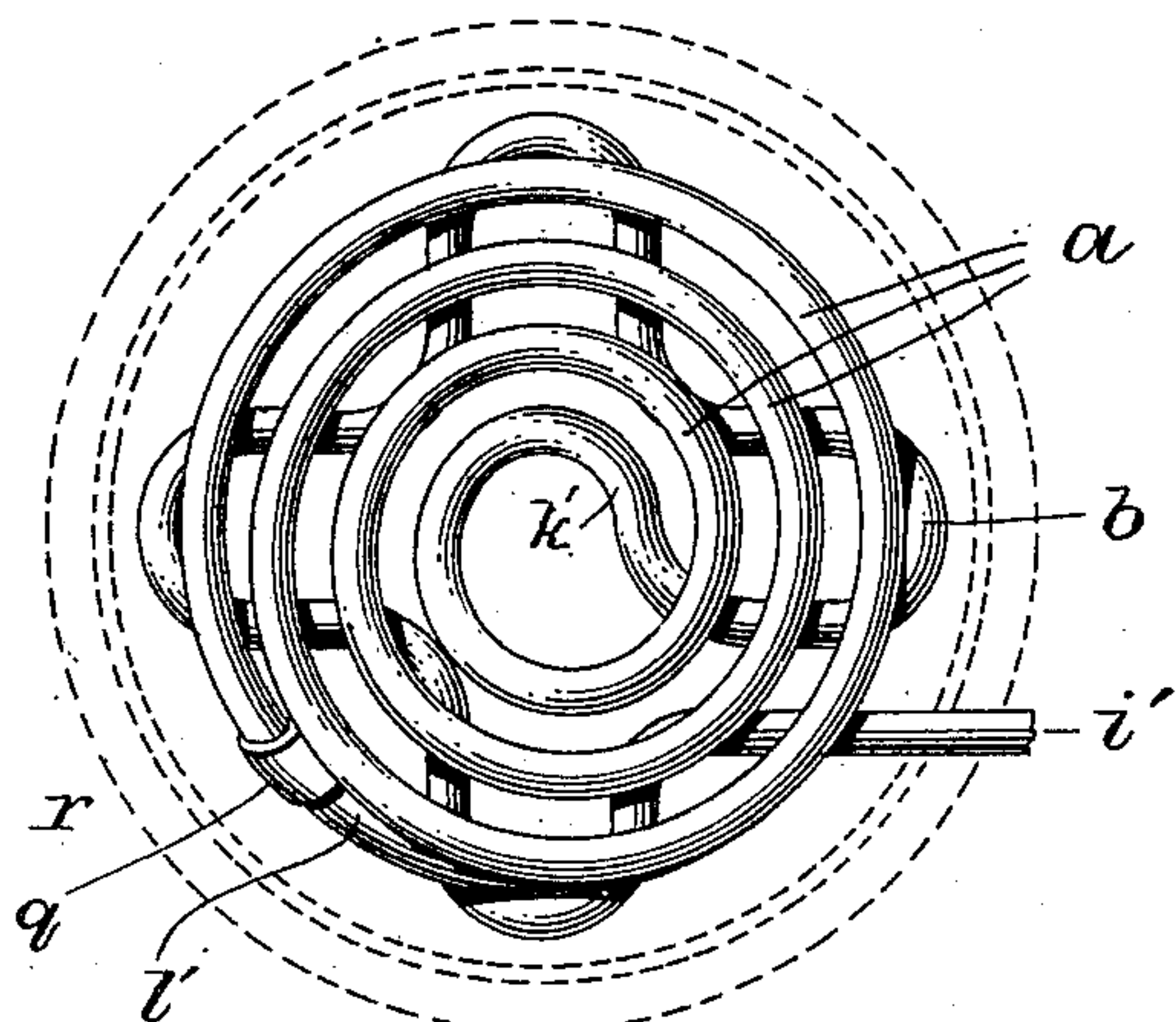
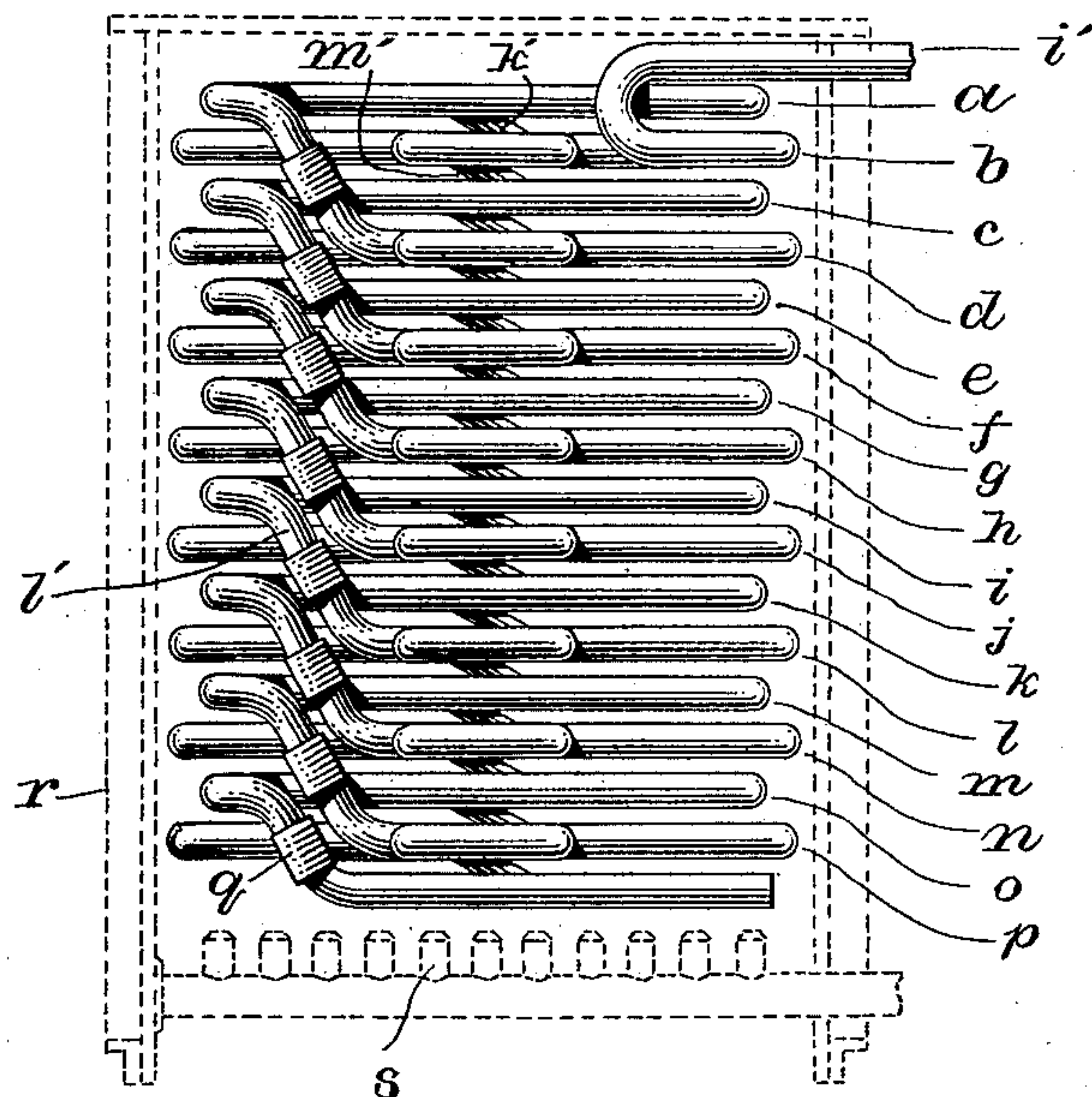


Fig-3.

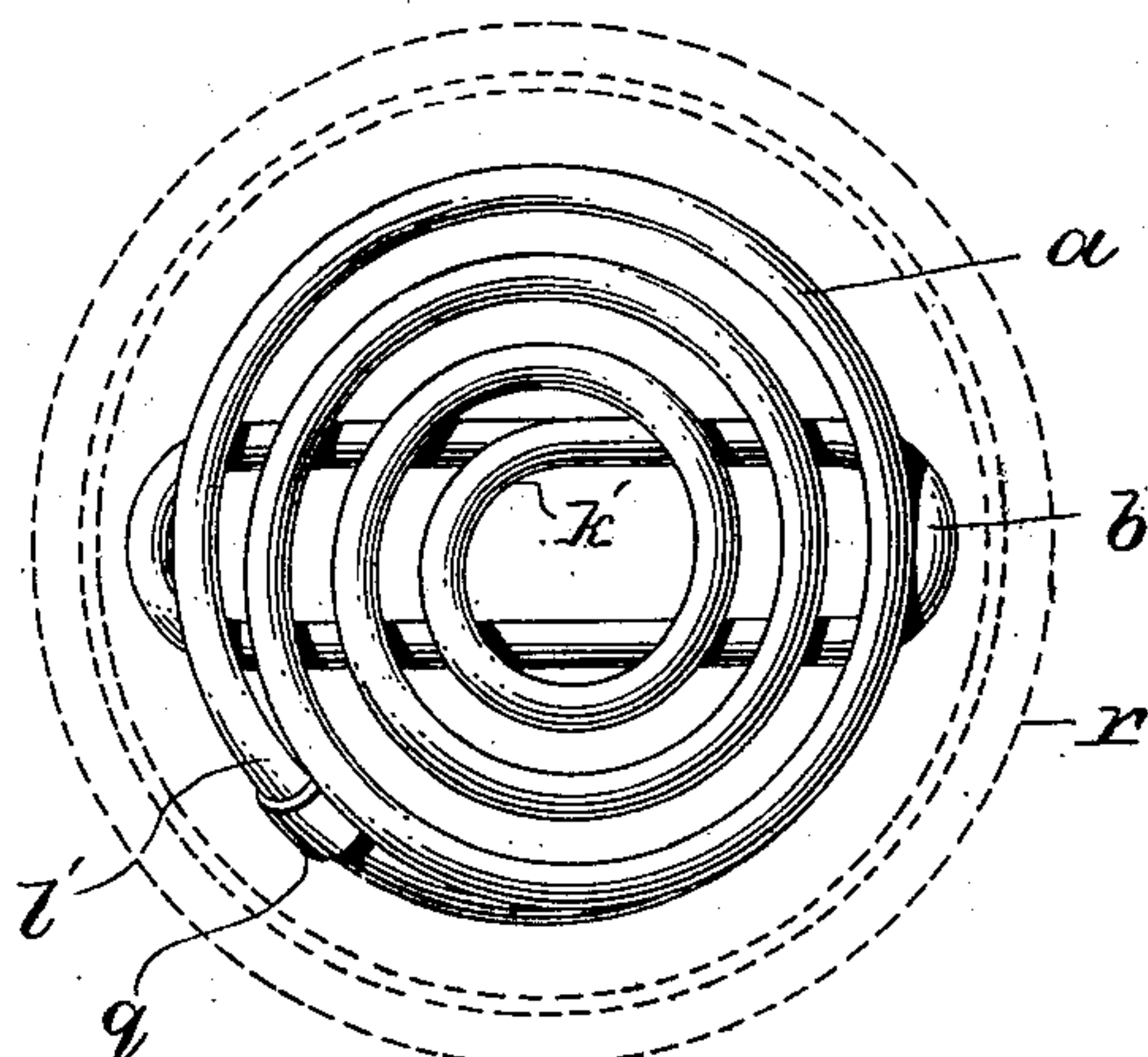
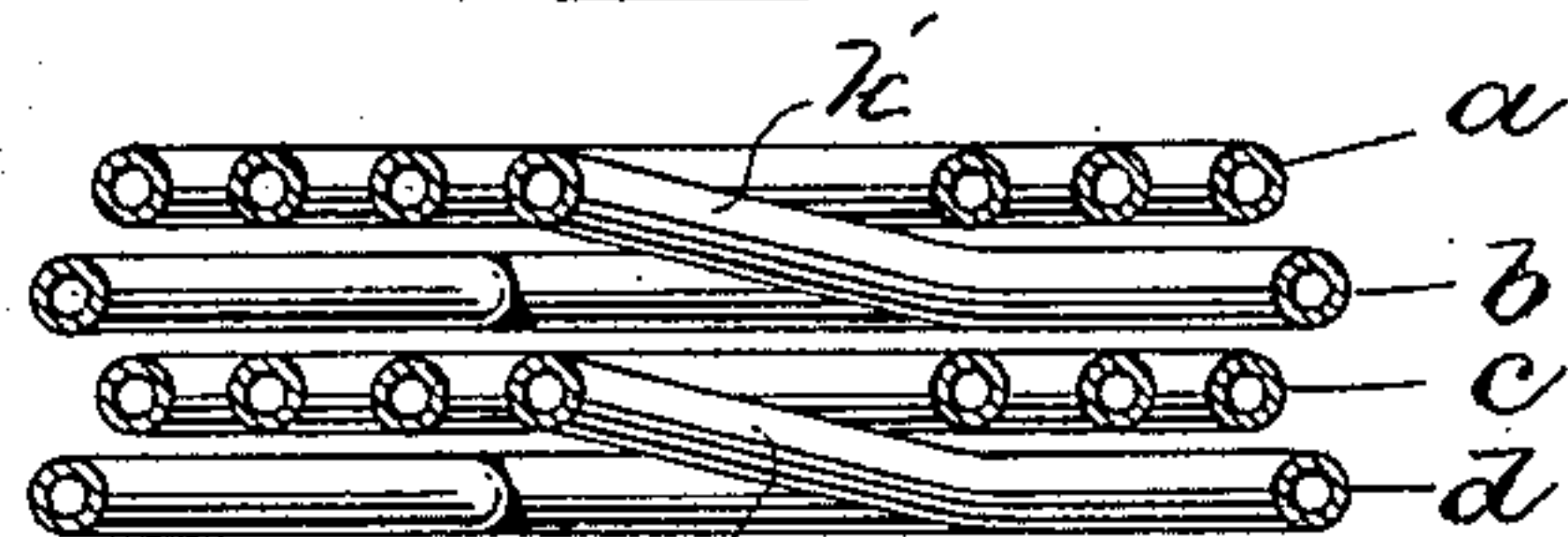


Fig-4.

Fig-2.



Inventor

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Witnesses

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# UNITED STATES PATENT OFFICE.

ROBERT W. BARTON, OF CHICAGO, ILLINOIS.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 754,837, dated March 15, 1904.

Application filed March 2, 1903. Serial No. 145,751. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT W. BARTON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-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.

My invention relates to improvements in steam-boilers of the type known as "flash-boilers;" and it consists in the combination and arrangement of devices hereinafter described and claimed.

This invention is an improvement on the steam-boiler described and claimed in Letters Patent of the United States, No. 719,420, granted to me February 3, 1903.

In the device of my invention a quantity of water within the boiler commensurate with the amount of steam that is being involved is always assured. The boiler employs water-tubes which are coiled in layers, each layer being preferably flat. The boiler is composed of units of these coils, each unit comprising a pair of coils, the lowermost of which is in more direct connection with the source of feed-water supply, while the uppermost of which is in more direct connection with the engine or that instrumentality to which the steam is to be supplied. These units are preferably assembled in vertical line and are so joined in succession that the top layer of one unit is in connection with the bottom layer of the unit immediately adjacent. In this manner a series of traps are provided which always entail the presence of water within the boiler, it obviously being impossible, assuming that the water-feed mechanism is in working order, to have to have the boiler dry. The water is supplied to the tubes and travels toward the bottom of the boiler a distance commensurate with the steam that is being consumed.

By the device of the invention the action of gravity is only partially effective upon the water within the boiler, it requiring pressure controlled by suitable feed-water-regulating means to effect the flow of the water.

In the construction of my invention the coils of each unit are so wound that the inlet for the water is located at the outer portion of the lowermost coil, the water finding its passage through the coil as it follows the course thereof toward its center, where a branch connection is encountered, which leads the water to the upper coil of the unit, the water then circulating from the center of the upper coil toward the other periphery thereof, where it finds its way to the bottom coil of the unit next beneath. A source of heat is located at the bottom of the boiler to heat the tubes, so that as the water is forced downwardly by the pressure it will encounter the hot tubes and be flashed into steam. Any suitable form of thermal regulator is desirably employed for regulating the degree of heat applied to the boiler, while any suitable form of feed-water regulator may be employed for controlling the flow of water into the boiler.

The object of my present improvement is to so construct and arrange the respective coils of the respective units of the boiler that each coil forms a spacer for those next adjacent thereto, and each coil is more directly exposed to the action of the heat from the furnace or burners than heretofore and the efficiency of the boiler therefore increased.

In the accompanying drawings, Figure 1 is a side elevation of a boiler embodying my invention. Fig. 2 is a vertical sectional view of the same. Fig. 3 is a plan view of the same. Fig. 4 is a similar view showing a modification.

In Fig. 1 is illustrated a boiler having eight units formed in the manner that has been specified, there being included in these eight units sixteen layers of pipe. The top boiler unit, comprising the layers of pipe *a* and *b*, is first in the series. The second unit comprises the pipes *c* and *d*, the third *e* and *f*, the fourth *g* and *h*, &c. The water is caused to be contained in the lower layer of each unit before it finds access to the upper layer of the same unit. In this way the water that is pumped through feed-water connection *i* finds its way to the lower layer *b* of the upper unit, the water circulating from outer portions toward



the center of the layer *b*, from whence it is forced up the inclined connection *k* to the upper layer of pipe in the upper unit, the water then circulating from the center toward the outer edge of the upper coil. After the water has finished its course through the upper coil it follows the inclined connection *l* to the outer portion of the lower coil *d* of the next boiler unit, it thereupon circulating toward the center of the coil, whereafter it follows the inclined connection *m* to the upper coil *c* of the second unit. The pressure at which the water is forced into the boiler is slightly in excess of the steam-pressure at the point of the steam's application. The flow of the water and the downward extent of such flow is regulated by the pump-pressure and the feed-water regulator *n*, which may be of any desired construction, as understood by those skilled in the art. The manner in which the water and the resulting steam find passage toward the bottom of the boiler will be readily understood. The steam issues from the upper coil *o* of the bottom set and finds its way through the steam-supply pipe *p*.

It will be seen that by the improved form of boiler herein disclosed the coils may be very closely associated, the connections between the adjacent units enabling a large boiler capacity within a very comparatively small space. The different units of the boiler are preferably separately formed, so that they may be replaced from time to time and enabling them to be readily united. The adjacent ends of the outer coils of adjacent units are preferably provided with right and left hand threads united by couplers *q*, that are threaded correspondingly, these couplers readily connecting the units and permitting the separation thereof. The entire structure may desirably be contained within a cylindrical containing-casing *r* for confining the heat emanating from the burners *s*. The burners *s* may have the heat due throughout varied by any suitable form of thermal regulator well understood by those skilled in the art.

The respective coils of the units of the boiler are dissimilar in form. Each upper coil is spiral in form and each lower coil is angular in form, so that portions of the respective coils are angularly disposed. Each coil lies in planes that intersect those of the next adja-

cent plane, and each coil of the superposed series constituting the boiler forms a spacer for those next adjacent thereto, the result being that though the respective coils are in mutual contact each alternate coil is dissimilar from the next in series both in form and arrangement, and spaces are formed between the coils, whereby each is more directly exposed to the heat than heretofore and a better circulation of the heated air from the heater between the coils of the boiler is secured and the efficiency of the boiler correspondingly increased.

I do not desire to limit myself to the construction of the boiler here shown and described, as it is obvious that modifications may be made therein without departing from the spirit of my invention and within the scope of the appended claims.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A boiler of the class described, comprising superimposed units, each of which is composed of an angularly-formed coil and a spirally-formed coil, one spacing the other from the next adjacent coil of the next adjacent unit, and connections between the respective units to establish communication between them, said connections including means to prevent the passage of water by gravity through the coils, a water-feed connection to the lower coil of the uppermost unit and a steam-discharge connection to one of the lower units.

2. A boiler of the class described, comprising superimposed units, each of which is composed of dissimilarly-formed coils, one spacing the other from the next adjacent coil of the next adjacent unit, and connections between the respective units to establish communication between them, said connections including means to prevent the passage of water by gravity through the coils, a feed-water connection to the upper unit, and a steam-discharge connection to one of the lower units.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ROBERT W. BARTON.

Witnesses:

MILLARD E. MOGG,  
WM. A. THIRLWALL.