

No. 719,420.

PATENTED FEB. 3, 1903.

R. W. BARTON.
STEAM BOILER.

APPLICATION FILED OCT. 18, 1902.

NO MODEL.

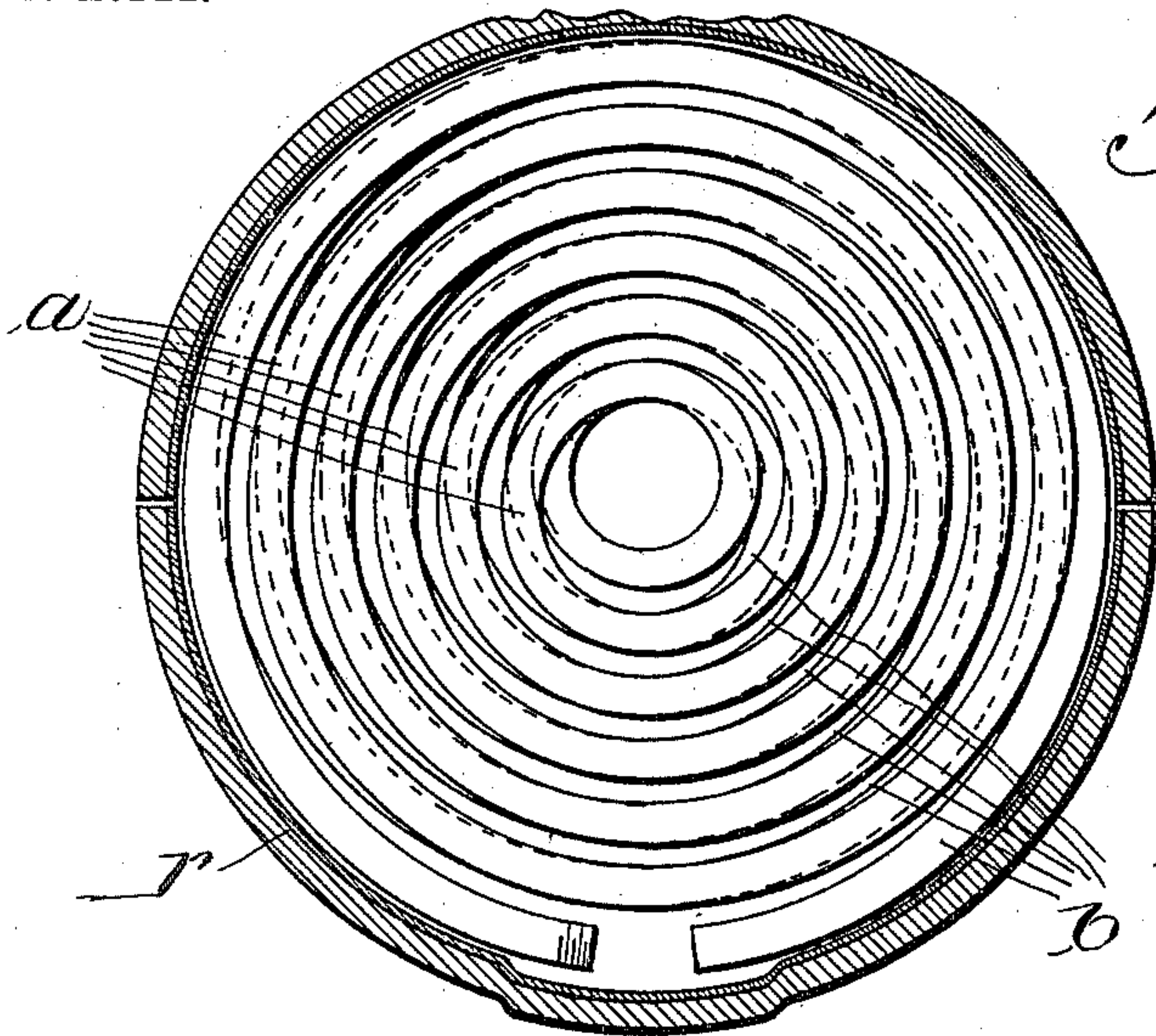


Fig. 1.

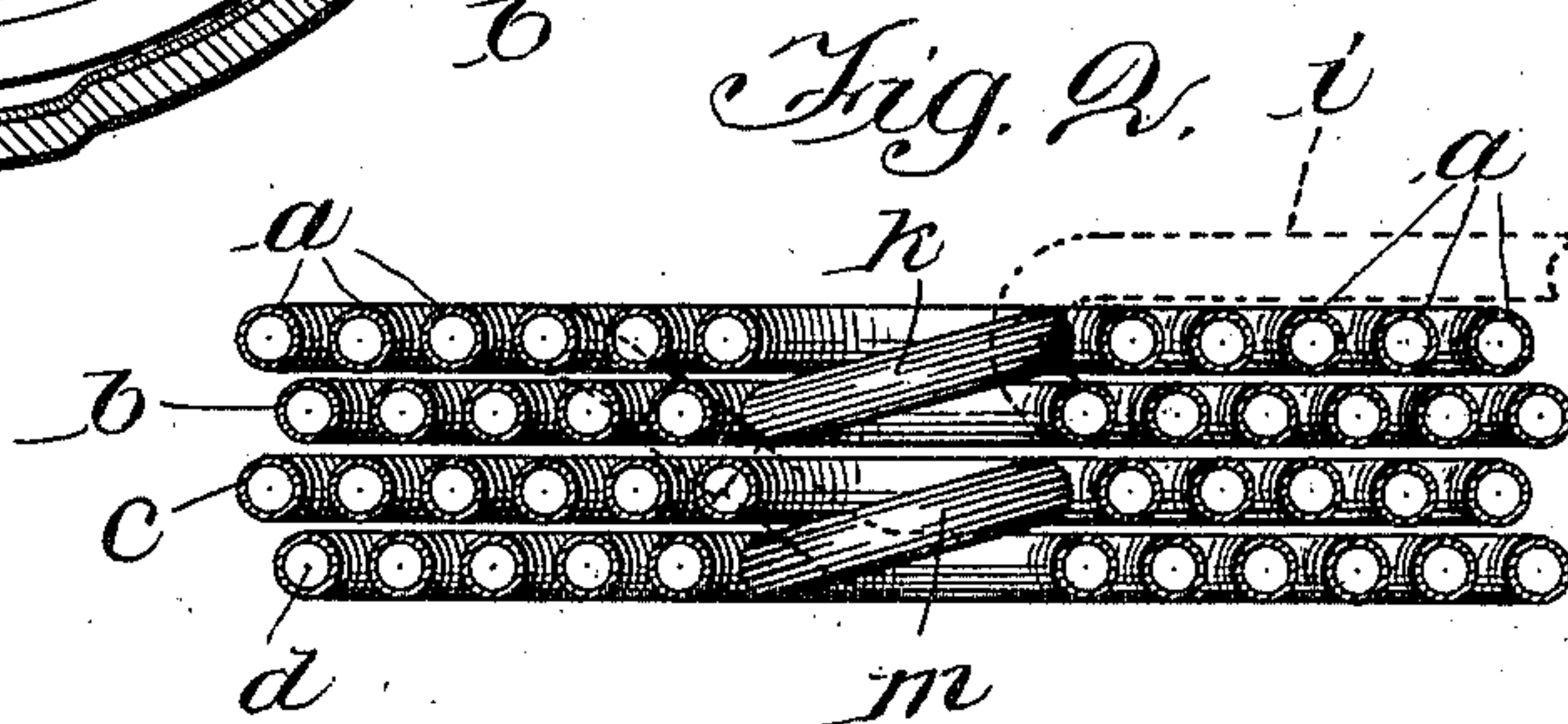
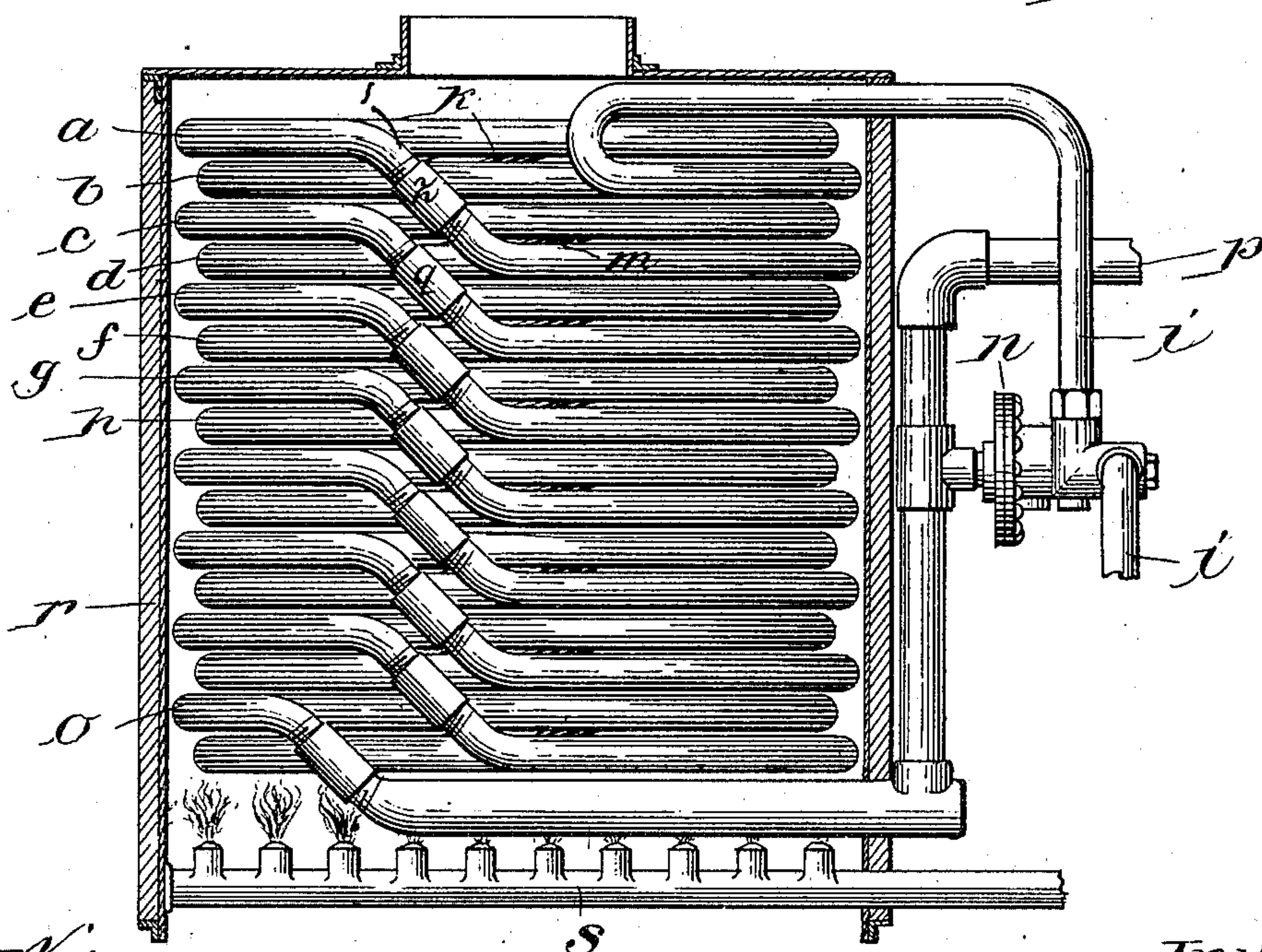


Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

ROBERT W. BARTON, OF CHICAGO, ILLINOIS, ASSIGNOR OF FIFTY-ONE ONE-HUNDREDTHS TO EVERT RICH, OF CHICAGO, ILLINOIS.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 719,420, dated February 3, 1903.

Application filed October 16, 1902. Serial No. 127,535. (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 a certain new and useful Improvement in Steam-Boilers, (Case No. 3,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to steam-boilers, and has for its object the provision of improved construction thereof, whereby the most effective boiler may be secured within a minimum space.

The type of boiler to which my invention relates is known as the "flash boiler."

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, preferably, in circular spirals, the coils being disposed 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 feed-water mechanism is in working order, 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 spiral 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 spirally 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.

I will explain my invention more fully by reference to the accompanying drawings, illustrating the preferred embodiment thereof, in which—

Figure 1 is a plan view of a detached boiler unit. Fig. 2 is a vertical elevation, partially in section, of two adjacent boiler units, some of whose connections are diagrammatically indicated by dotted lines. Fig. 3 is a vertical elevation of a boiler constructed in accordance with the invention, its casing being shown in section.

Like parts are indicated by similar characters of reference throughout the different figures.

In Fig. 3 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 spirally 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 spirally 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 dotted lines in Fig. 2 diagrammatically illustrate the manner of the connection of the outer portion of the upper layer of one of the units with the outer portion of the bottom layer of the adjacent unit.

It is obvious that changes may be made in the boiler shown without departing from the spirit of my invention, and I do not, therefore, wish to be limited to any particular details of construction.

I have shown the inner or central portions of the coils of pipe of each unit to be continuous by having these coils of pipe integrally formed out of one continuous length. I do not wish to be limited to such a construction, however. The outer portion of the upper coil of each unit with the outer portion of the lower coil of the adjacent unit is preferably secured by right and left hand threads upon these end portions and the correspondingly-threaded coupling-sleeve. I do not wish to be limited, however, in all embodiments of the invention to these precise structural characteristics illustrated.

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

1. A steam-boiler composed of a plurality of units, each formed of two coils of pipe, the central or inner portion of the lower coil of each unit being continuous with the central or inner portion of the upper coil of each unit, while the outer portion of the upper coil of each unit is continuous with the outer portion of the lower coil of the adjacent unit, substantially as described.

2. A steam-boiler composed of a plurality of units, each formed of two coils of pipe, the central or inner portion of the lower coil of each unit being continuous with the central or inner portion of the upper coil of each unit, while the outer portion of the upper coil of each unit is continuous with the outer portion of the lower coil of the unit next below, substantially as described.

3. A steam-boiler composed of a plurality of separable units, each formed of two coils of pipe, the central or inner portion of the lower coil of each unit being continuous with the central or inner portion of the upper coil of each unit, while the outer portion of the upper coil of each unit is continuous with the outer portion of the lower coil of the adjacent unit, substantially as described.

4. A steam-boiler composed of a plurality of separable units, each formed of two coils of pipe, the central or inner portion of the lower coil of each unit being continuous with the central or inner portion of the upper coil of each unit, while the outer portion of the upper coil of each unit is continuous with the outer portion of the lower coil of the unit next below, substantially as described.

5. The combination with a feed-water pipe, of a coil of pipe to which the feed-water is supplied, a steam-supply pipe, and a second coil of pipe in connection therewith and located above the first aforesaid coil of pipe, the connections of the said pipes being with the outer portions of the said coils, while the said coils are continuous at their central portions, substantially as described.

6. The combination with a feed-water pipe, of a coil of pipe at the outer portion of which the said feed-water pipe is connected, a second coil of pipe located above the first coil of pipe, these coils of pipe being continuous at their inner or central portions; a third coil of pipe, the second and third coils of pipe being continuous at their outer portions; a fourth coil of pipe interposed between the first and third coils of pipe, the third and fourth coils of pipe being continuous in their inner or central portions, and a steam-pipe in connection with the said fourth coil of pipe and thereby with the remaining coils of pipe, substantially as described.

In witness whereof I hereunto subscribe my name this 13th day of October, A. D. 1902.

ROBERT W. BARTON.

Witnesses:

GEORGE L. CRAGG,
AMY D. RUSSELL.