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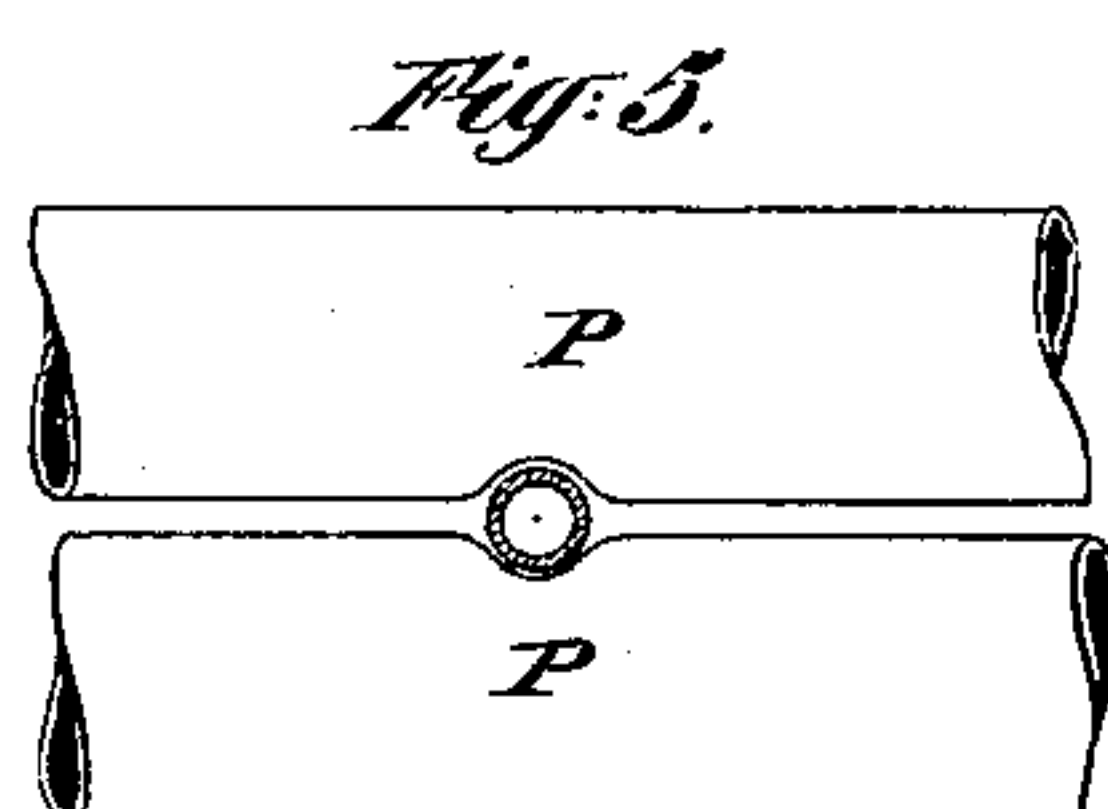
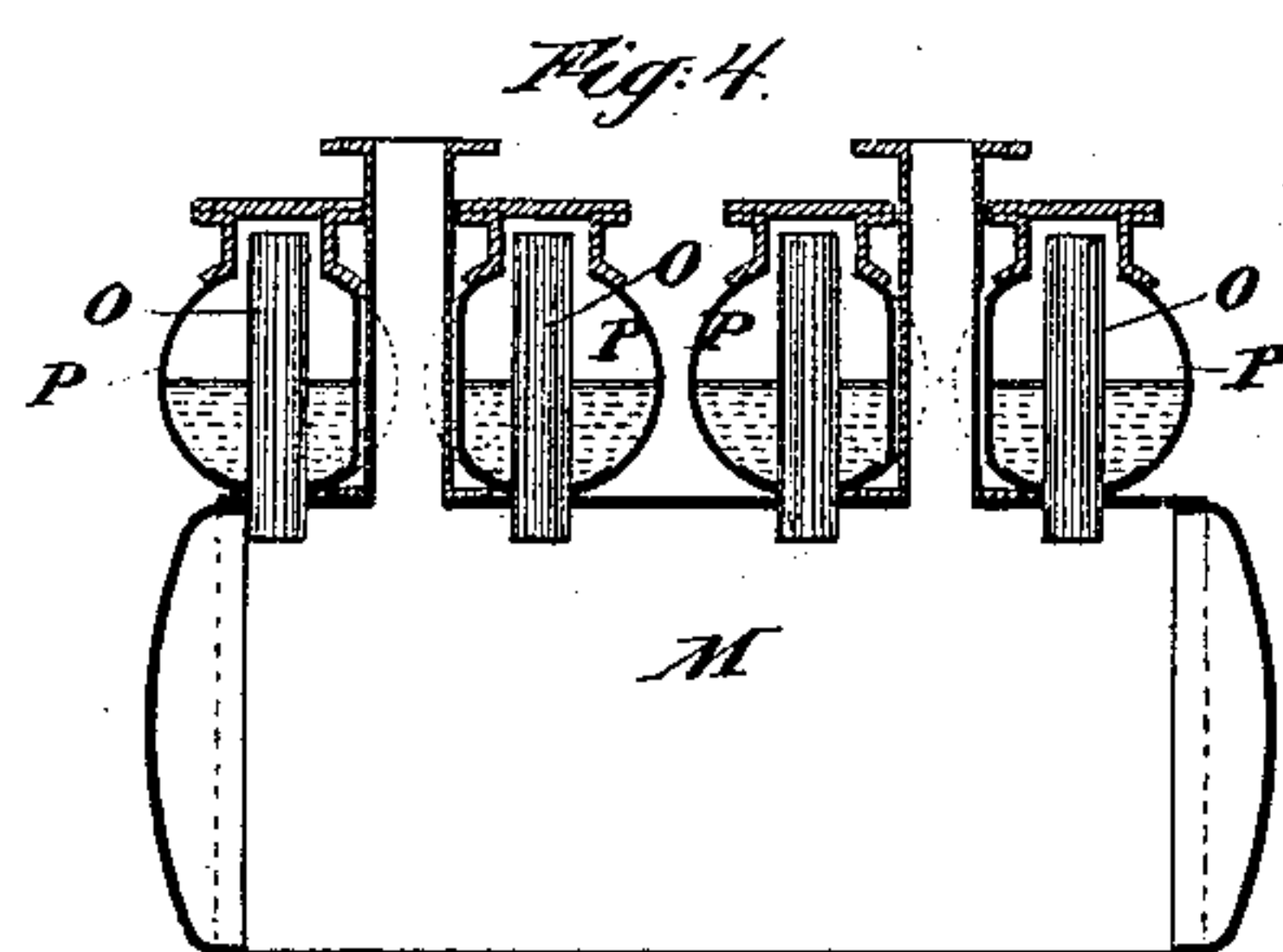
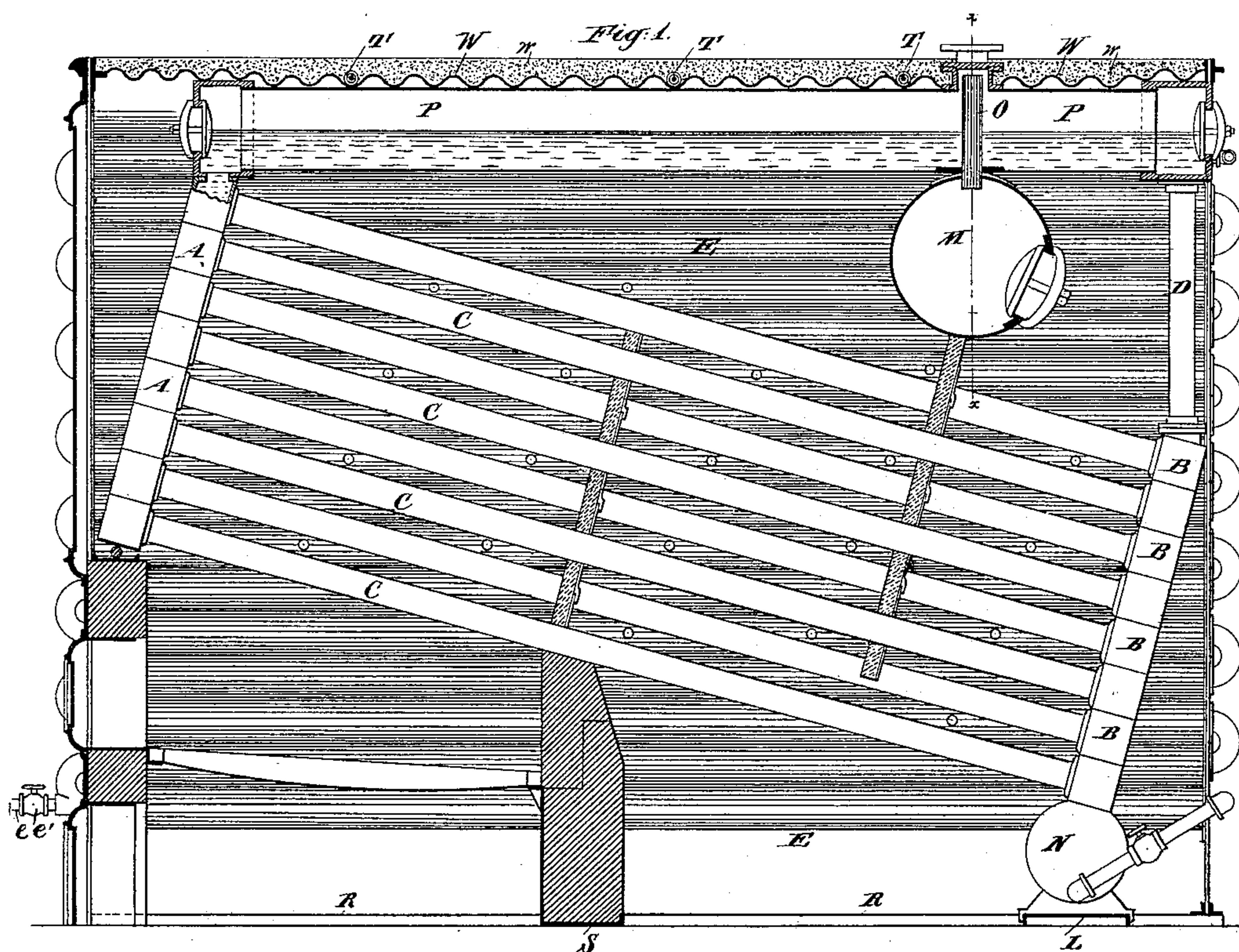
2 Sheets—Sheet 1.

F. SCHERR.

## STEAM BOILER.

No. 338,618.

Patented Mar. 23, 1886.



*Witnesses:*

Charles R. Searle.

Lyndon P. Smith.

*Inventor:*

Mr Frederick Scherr  
his attorney  
Thomas S. New Nelson

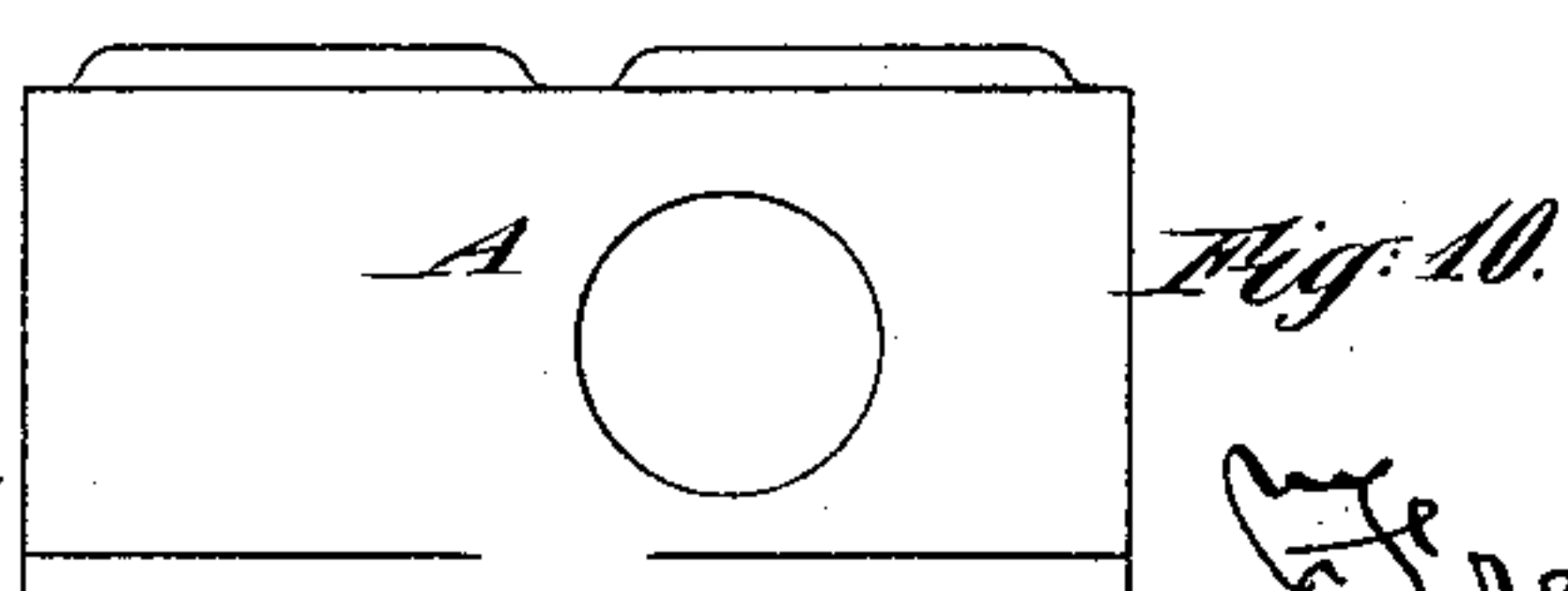
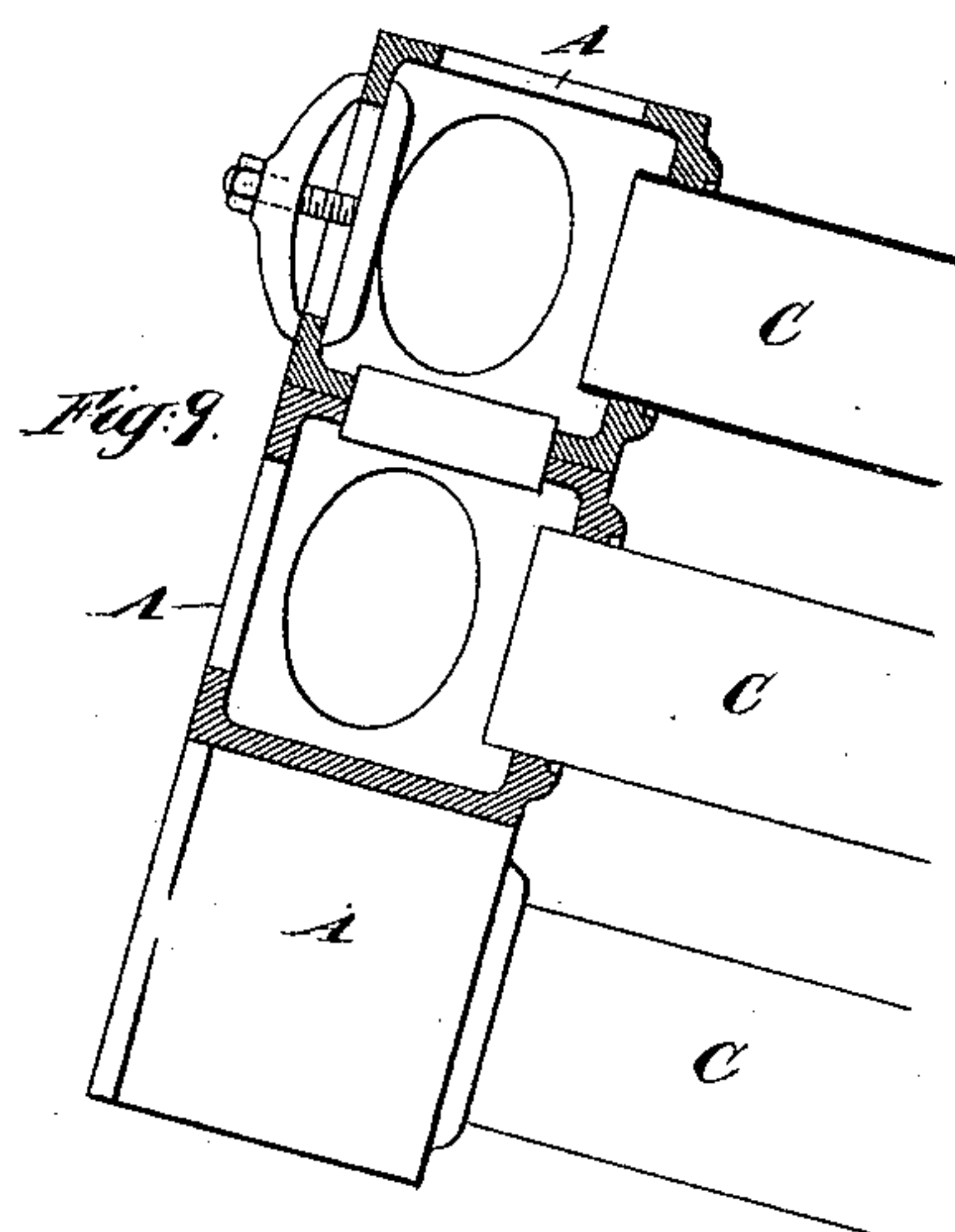
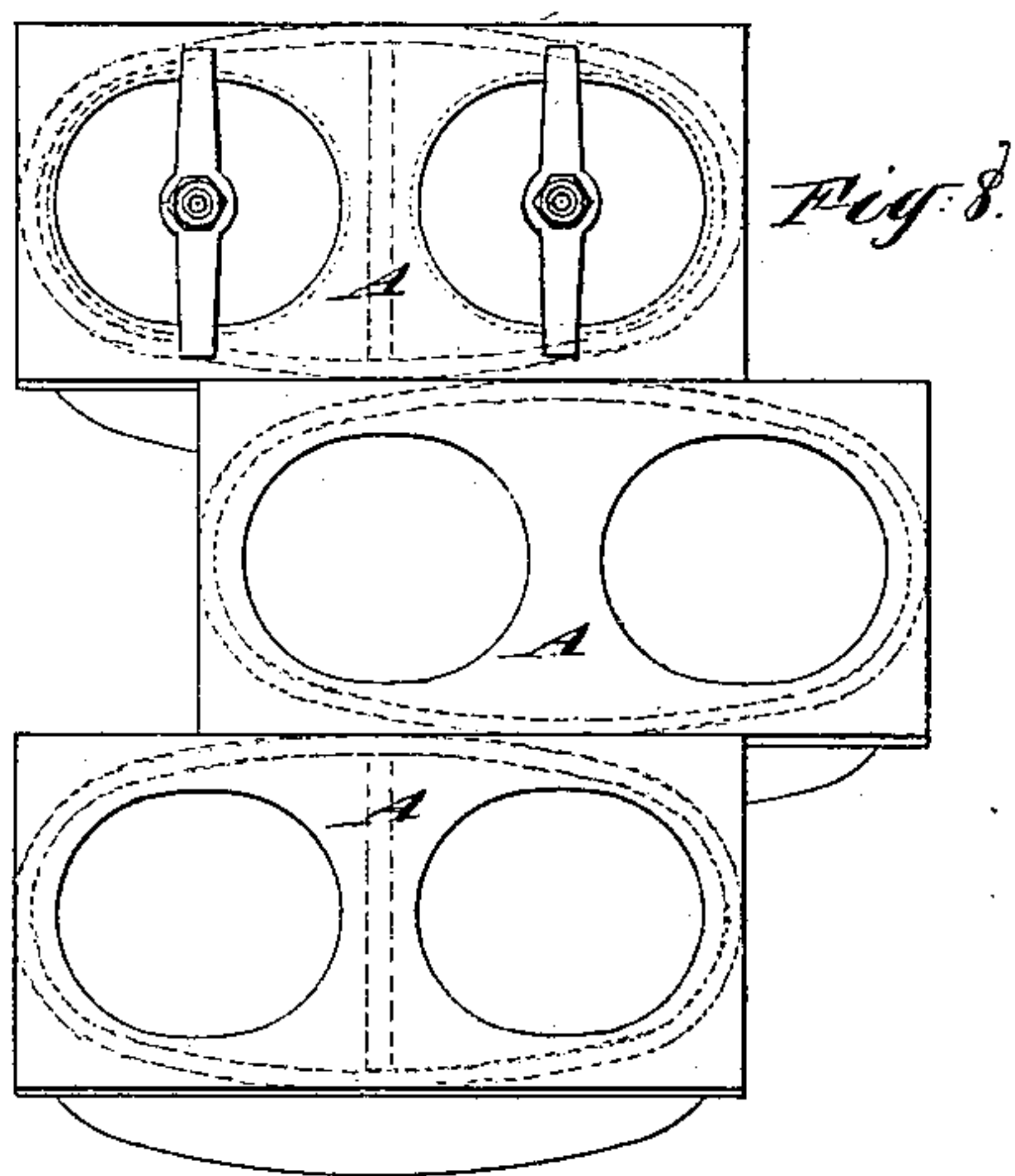
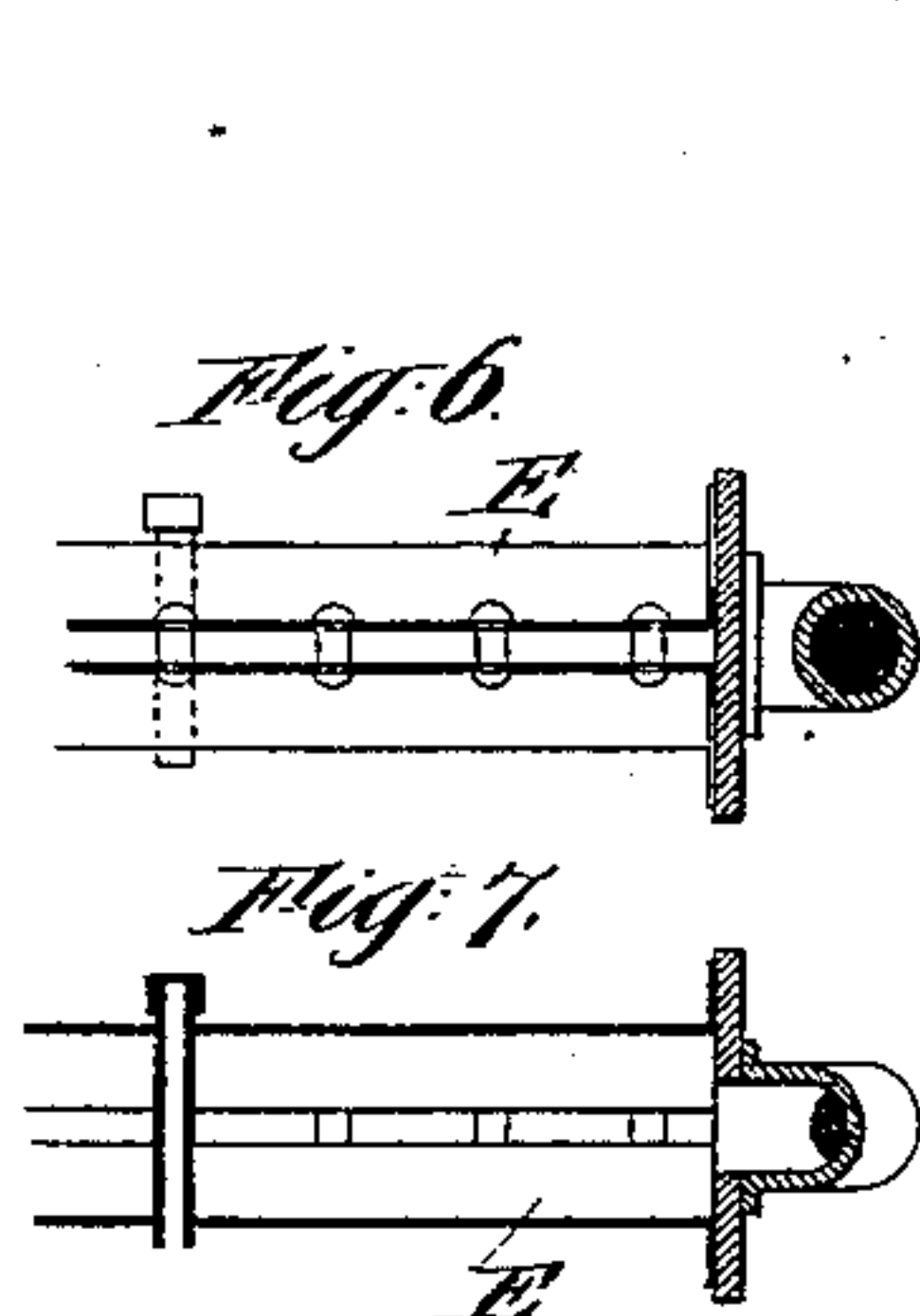
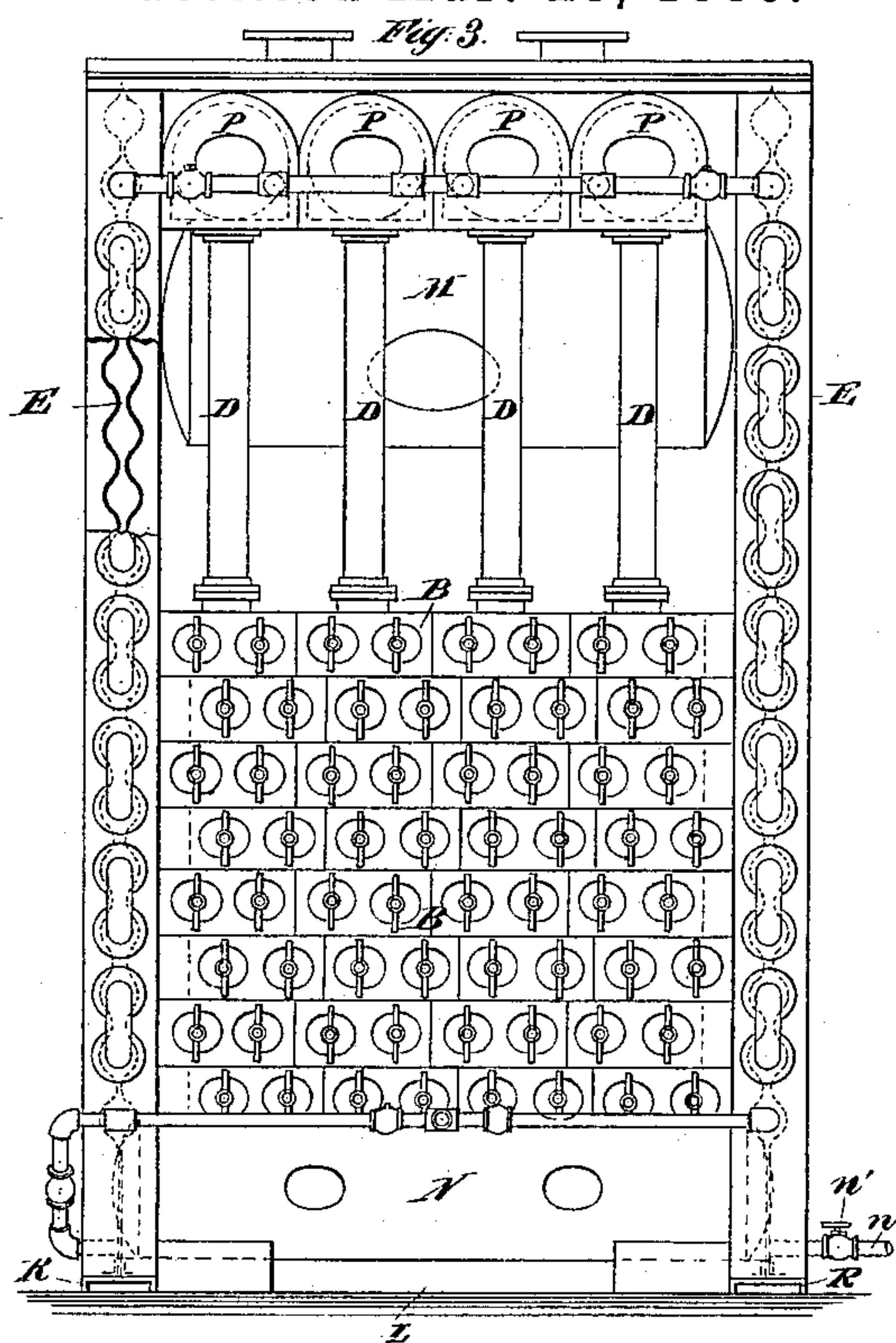
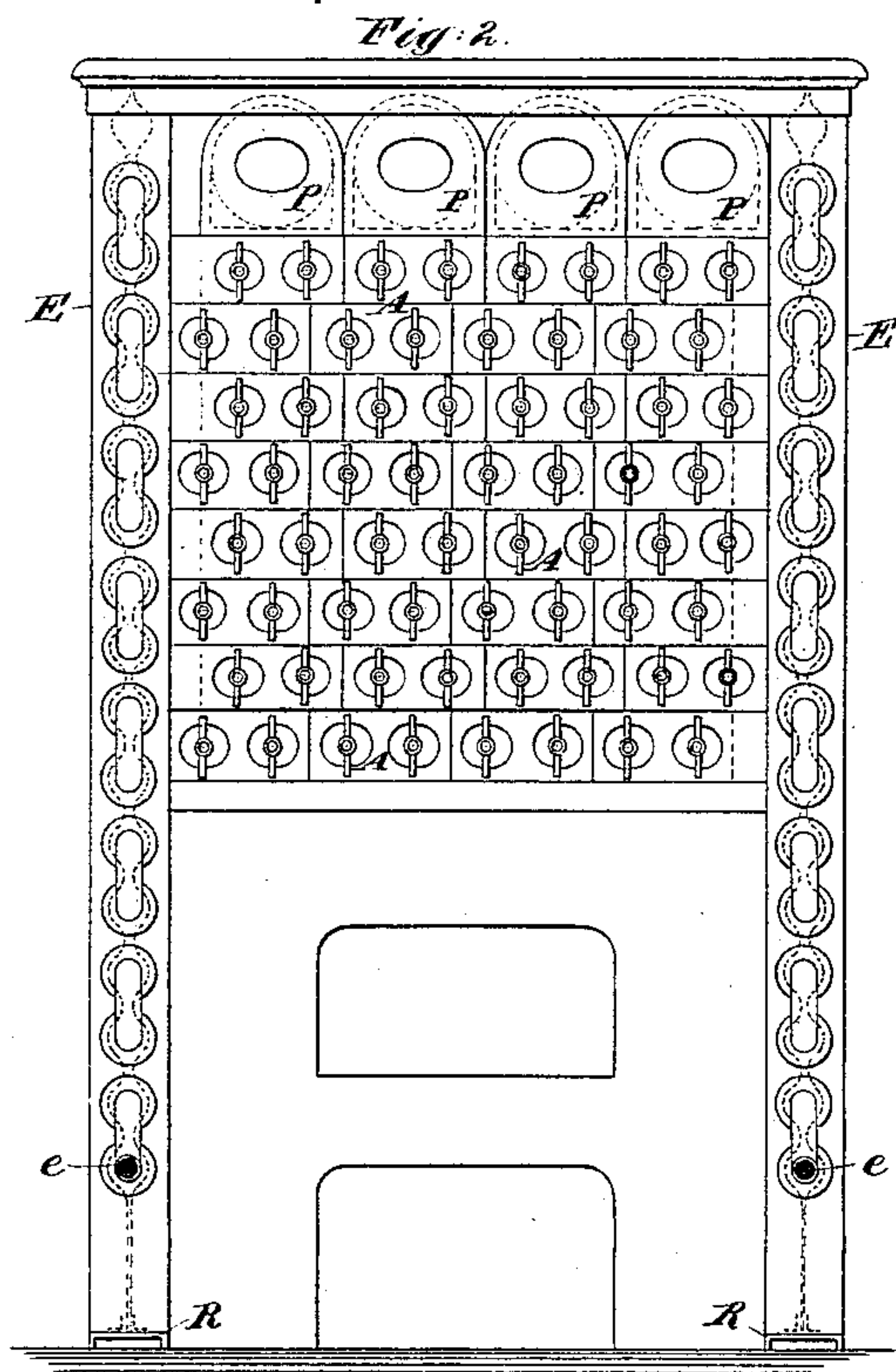
(No Model.)

2 Sheets—Sheet 2.

F. SCHERR.  
STEAM BOILER.

No. 338,618.

Patented Mar. 23, 1886.



Witnesses:  
Charles H. Searle.  
L. P. Smith.

Inventor:  
Frederick Scherr.  
By his attorney  
Thomas Drew Stetson



# UNITED STATES PATENT OFFICE.

FREDERICK SCHERR, OF BROOKLYN, NEW YORK.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 338,618, dated March 23, 1886.

Application filed August 19, 1885. Serial No. 174,778. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK SCHERR, of Brooklyn, Kings county, in the State of New York, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

The improvement applies to that class of boilers in which the water is circulated through pipes outside of which the gaseous products of combustion are circulated. Such boilers have been long known, and are much approved. It is common to induce an active circulation of the water by causing it to traverse inclined tubes, an active upward circulation being induced by the rise of the steam and hot water due to its diminished gravity. The steam is allowed to separate in larger tubes or flues extending horizontally along the top of the system. I employ such construction in combination with other parts.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a longitudinal section of the boiler. Fig. 2 is a front view, and Fig. 3 a rear view, of the same. The remaining figures represent details detached. Fig. 4 is a vertical section on the line  $x x$  in Fig. 1. Fig. 5 represents two of the large top pipes which serve as separating-drums, with one of the vertical pipes which conduct the steam therefrom. Fig. 6 is a horizontal section, and Fig. 7 is a horizontal section taken at a lower scale. The remaining figures are on a larger scale. Fig. 8 is a face view of some of the headers, which are mounted one upon another in tiers inclined a little out of perpendicular, as shown in Fig. 1. Fig. 9 is a corresponding vertical section. Fig. 10 is a corresponding plan view.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

The inclined tubes C are expanded into front and back headers, A B, two tubes and two headers forming a section. By setting the headers to the right and the left alternately the tubes C are held in a staggered position.

The construction of the headers is shown in

Figs. 8, 9, 10, the body of the header forming an elliptical prism with a rectangular plate on its front side. Opposite each tube is a hand-hole plate applied from the inside. The seats for these plates can be turned on a common lathe and the plates applied without any packing. The sections of each vertical row are connected together by nipples expanded, allowing the circulation of the water down the back headers, through the inclined tubes C, up the front headers into the water and steam tubes P. The front top header of each row is connected with P by a nipple, and the back top header is connected with P by the tube D, supporting at the same time the tube P. The tubes P, of about twelve inches diameter, are lap-welded tubes screwed into cast headers provided with hand-hole plates for the purpose of cleaning.

Underneath the tubes P is a cross-drum, M, serving as a steam reservoir and superheater. It is connected with the tubes P by means of tubes O, expanded into both the tubes P and drum M, and extending above the water-level in P, in order to take the saturated steam from the tubes P into the drum M. A nozzle may be passed between two tubes P, bending the iron of these tubes so much as to make room for this nozzle, as shown in Figs. 4 and 5. The man-hole is arranged as shown in Figs. 1 and 3. The space between the tubes D should be wide and high enough to allow a man to get in and out.

The side chambers, E E, are constructed of corrugated metal, the corrugations extending horizontally, two plates being put together, so as to form channels and leaving the plates about one-half inch or five-eighths of an inch apart, by means of rivets surrounded by thimbles of proper length. At the front and back ends the plates forming channels are flanged to the outside, in order to be riveted against a wrought-iron plate of five-eighths inch to three-quarters of an inch thickness and proper width, serving as flexible columns for the side walls. These plates have bored holes of about three inches diameter opposite each channel. Elbows are applied on the front plate, connecting the lowest channel with the second, on the back or rear plate, connecting the second channel with the third, on the front, connecting the third with the fourth, and so on.



The construction is shown in detail by Figs. 6 and 7, representing horizontal sections through channels E.

In order to blow the ashes from the inclined tubes C, there are secured into both plates forming the channels and across these channels small pipes of gun-metal, with a closing-cap at the outside, in suitable positions between the inclined tubes C so as to permit the application of a steam-jet for blowing off. (Construction shown in Figs. 1, 6, and 7.)

If the boiler be built with brick-work, suitable side clearing-doors may be set in the walls for cleaning purposes. The wrought-iron columns are secured by bolts to the long beams R on their base, solidly connected to the furnace-front, and are held in their vertical and proper position by means of top traverses, T. The main boiler, with its mud-drum N and saddles, rests on cross-beam L, which is solidly connected with the side beams, R; also, the bridge-wall is supported by cross-beam S, which is also connected to beams R. The main boiler rests with its front end on a roller on the furnace-front, so as to expand and contract independently of side chambers or side walls. By this construction the side chambers, E, secured to the front to the beams at the base and connected by traverses at their top, form an independent casing for the main boiler and furnace. If the boiler be applied on shipboard, this casing may be secured in its position by means of bolts at the bottom, and by means of braces against the walls of the boiler-room. On the top of the side chambers is applied a light flat iron, high enough and bent so as to receive a cover, W, of corrugated plates, supporting a filling of non-conducting material, w. Underneath the side chambers, which do not go farther down than the grate, the space is closed with plates provided with a door, allowing to get into the furnace.

Operation: The water is fed into the lowest channel on the rear end of each side chamber E E by means of suitable piping and check-valves, as shown in Figs. 1, 2, and 3. It follows the first channel and flows into the second through connecting-elbow on the front end, into the third channel through elbow on the rear end, from the third into the fourth channel through elbow on the front end, and so on until it reaches the channel on the water-level, from where it is fed by means of piping and check-valves into the steam and water pipes P of each vertical row of sections, as shown in Fig. 1. From there the water circulates in each vertical row of sections through back headers, B, inclined tubes C, up through front headers, A, into tubes P, and so on. The steam generated accumulates in the upper half of tubes P, and flows through tubes O into superheating-drum M, from where it is taken through suitable nozzles for use and for safety-valve. As the side chambers, E E, are so constructed as to leave a small space in the throats between each channel, the plates

being stayed about one-half inch or five-eighths of an inch apart by means of rivets with thimbles of proper length, steam generated in the side chamber may rise freely through these throats, traversing the channels, and find its way from the uppermost channel into steam-room through suitable pipe connections leading thereto. Generally, if the boiler is worked to nearly its rated capacity, there will be no steam developed in the side chambers, but the water heated to a high degree. The mud contained in the feed-water may pass down through the throats, and can be blown off from the lowest channel through blow-off pipe e, Fig. 1, by opening a valve, e'; also, in the main boiler, the mud descending into the mud-drum can be blown off by opening a valve, n', in a pipe, n, connecting with the feed-pipe, as shown in Fig. 3.

In order to clean the side chambers, take off the elbows connecting the adjoining channels, each one exposing two channels and corresponding throats, which may be cleaned by properly-shaped scrapers.

For cleaning the inclined tubes C of the main boiler, the headers A B are provided each with a hand-hole and plate applied from the inside opposite each tube C. The tubes P and mud-drum N are also provided with suitable hand-holes for cleaning.

Modifications may be made in the forms and proportions without departing from the principle or sacrificing the advantages of the invention.

The number of tiers of headers may be increased or diminished.

The width of the structure may be increased by increasing the number of the plates of the top tubes and correspondingly increasing the number of series of headers A B and inclined tubes C. These headers may be built with only one large elliptic hand-hole and plate, giving access to both tubes when removed, instead of a small hand-hole and plate opposite each tube. In such case the inside facing may be done by a special tool.

Parts of the invention can be used without the whole.

I can dispense with the side chambers, E E, providing in their places walls of fire-brick or other suitable side partitions.

The headers may be adapted each to receive three instead of two of the tubes C.

If the boiler be built with side walls made of brick-work, a man-hole may be applied on one end of the drum M, and also a nozzle put on each end for taking out the steam and for safety-valve.

The connection in steam-room in tubes P with steam-drum M may be effected by some other means without injuring my invention.

The steam-drum may be set somewhat horizontally forward or backward.

The pipes O may be external to the tubes P and arranged to connect the upper portion of said tubes to the steam-drum M.

I claim as my invention—



1. In a sectional steam - boiler, the headers A, each of elliptical body with a flange on its front forming a rectangle, combined, as shown, with each other and with two tubes connected  
5 to each header, all arranged for joint operation substantially as herein specified.

2. In a steam - boiler, substantially as described, the steam and water tubes P, having headers on each end connected to each vertical row of sections by the uppermost header, respectively, in combination with the steam-superheating drum M, arranged across the furnace and common to all the tubes P, as set forth.

3. In a sectional boiler, the steam-superheating drum M, with connecting - tubes O, taking the saturated steam from the steam-room of tubes P, as herein specified.

4. In a sectional boiler, the superheating-drum M, applied underneath the water-level of the boiler in place of the hanging wall, leading the draft downward, as herein specified.

5. In a steam-boiler, the side chambers, E, composed of corrugated metal arranged to form  
25 channels, in combination with the elastic end connections of wrought-iron plates and elbows connecting the channels on both ends alternately, and a furnace inclosed between the said chambers, all arranged for joint operation as specified.

6. In a sectional boiler, the side chambers, E E, applied in first place as feed-water heaters, with suitable means of receiving, circulating, and delivering the feed - water into the

main boiler, and provided with suitable piping for blowing off the mud from the lowest part, all arranged for joint operation as herein specified.

7. In a sectional boiler, the side chambers, E E, secured to side beams, R, in connection with cross-beams L and S, and connected together by furnace-front and suitable traverses on the top with covering W w, so forming together a casing for the furnace, as herein specified.

8. In a sectional boiler, the headers A B, receiving the inclined tubes C, the water and steam tubes P, in connection with the superheating - drum M, applied below the water-level, and means, O, for connecting with the steam-room in tubes P, the side chambers, E E, constructed of corrugated metal, so as to receive, circulate, and deliver the feed - water and steam, connected with long and cross beams at the base, and with front and top connections, so as to form together an independent casing for the furnace of the main boiler, all arranged for joint operation substantially as herein specified.

In testimony whereof I have hereunto set my hand, at Brooklyn, New York, this 12th day of August, 1885, in the presence of two subscribing witnesses.

FREDERICK SCHERR.

Witnesses:

CHARLES R. SEARLE,  
H. A. JOHNSTONE.