

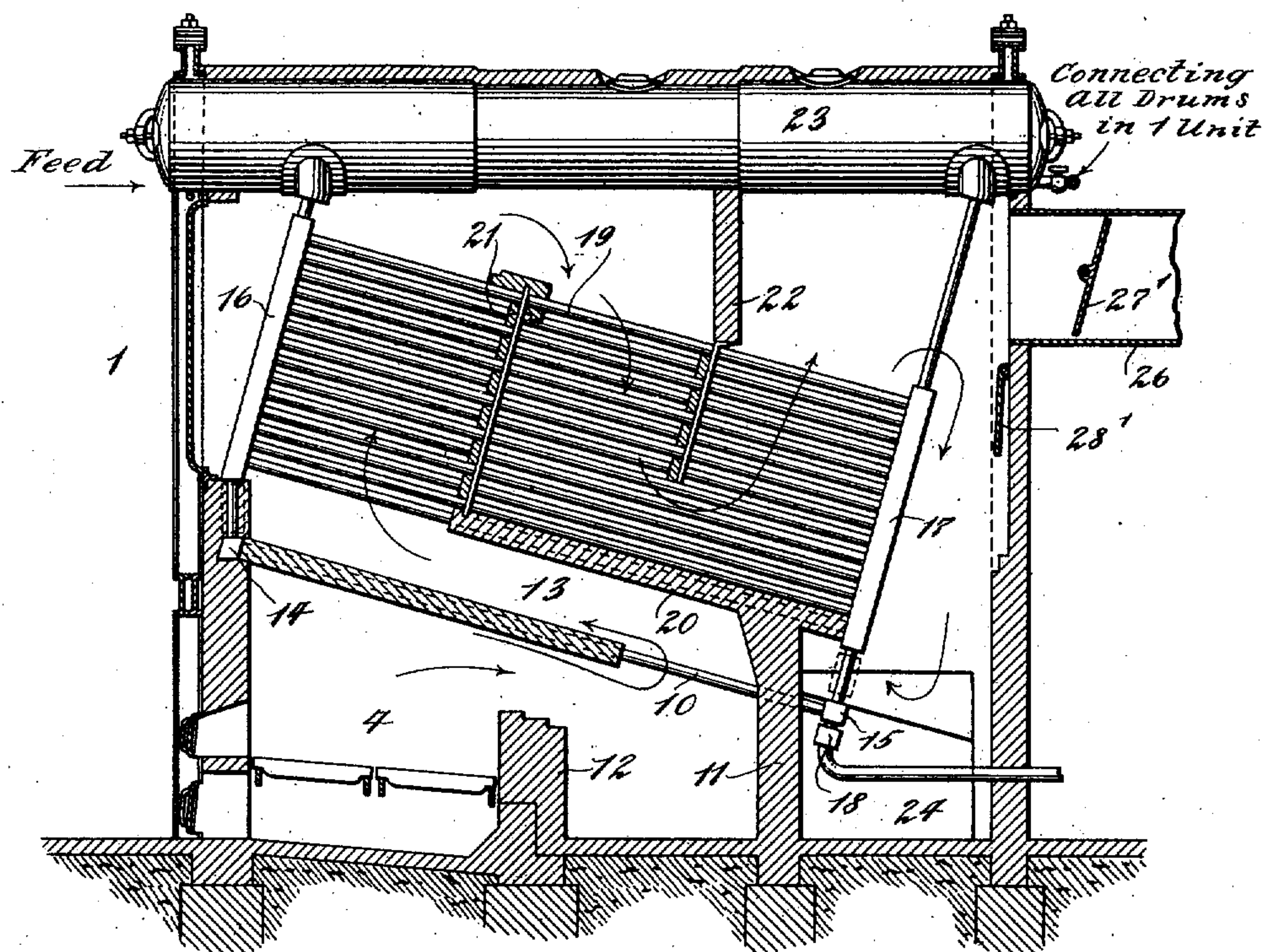
M. W. SEWALL.  
STEAM GENERATING PLANT.  
APPLICATION FILED JAN. 4, 1911.

986,649.

Patented Mar. 14, 1911.

3 SHEETS-SHEET 1.

Fig. 1.



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Inventor  
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By *his Attorneys*  
*Jefford & Rice*

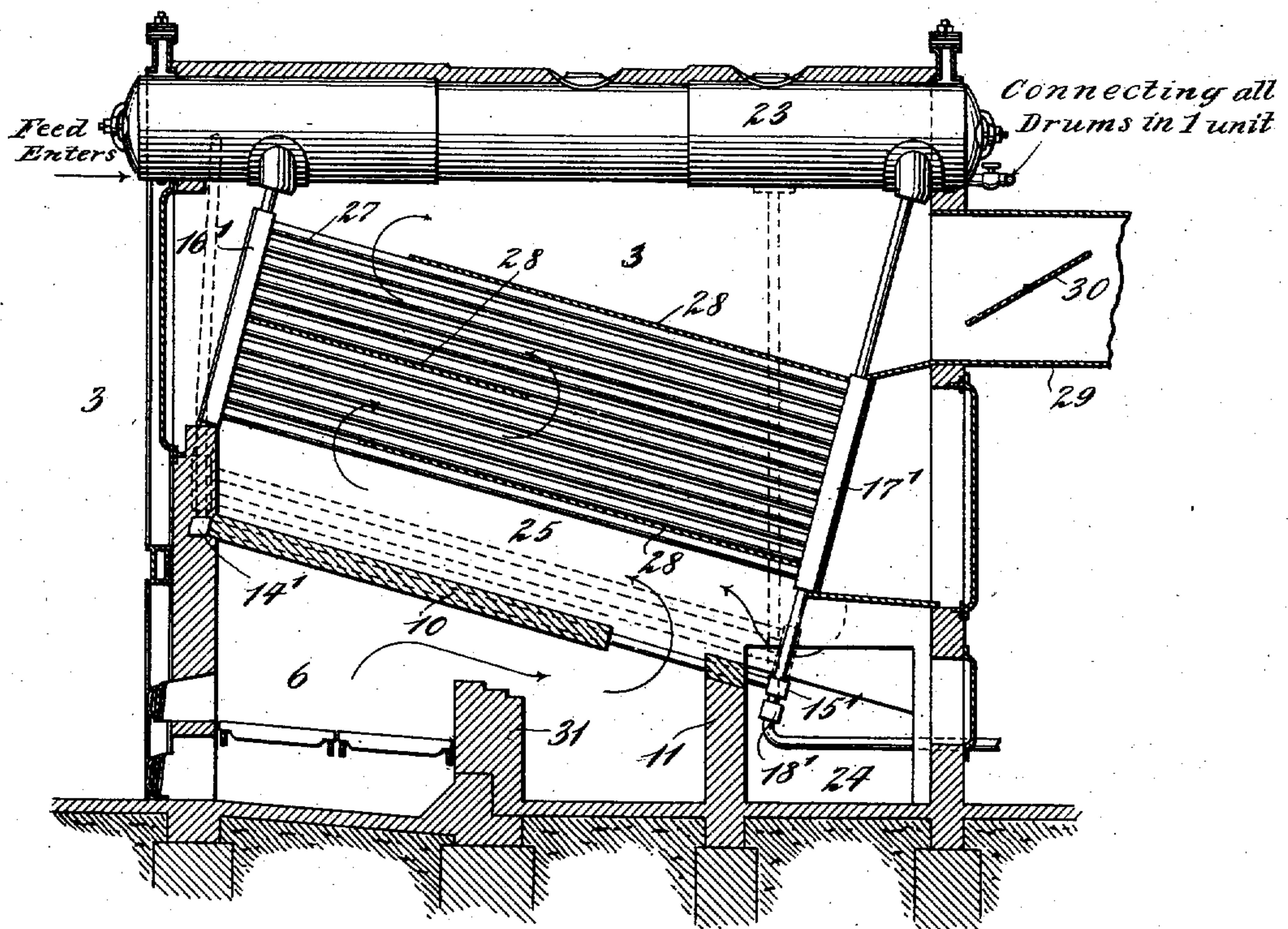
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3 SHEETS-SHEET 2.

Fig. 2.



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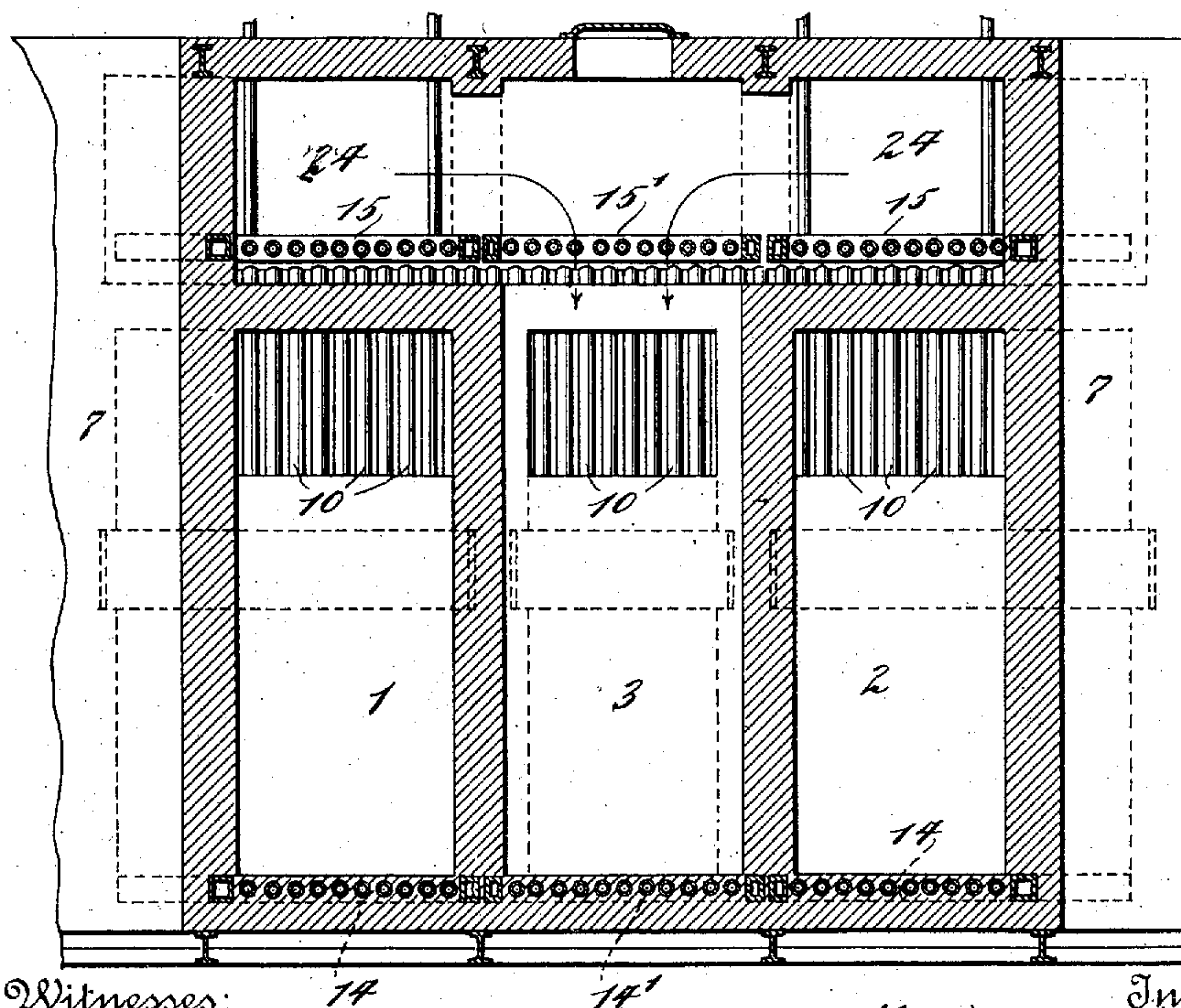
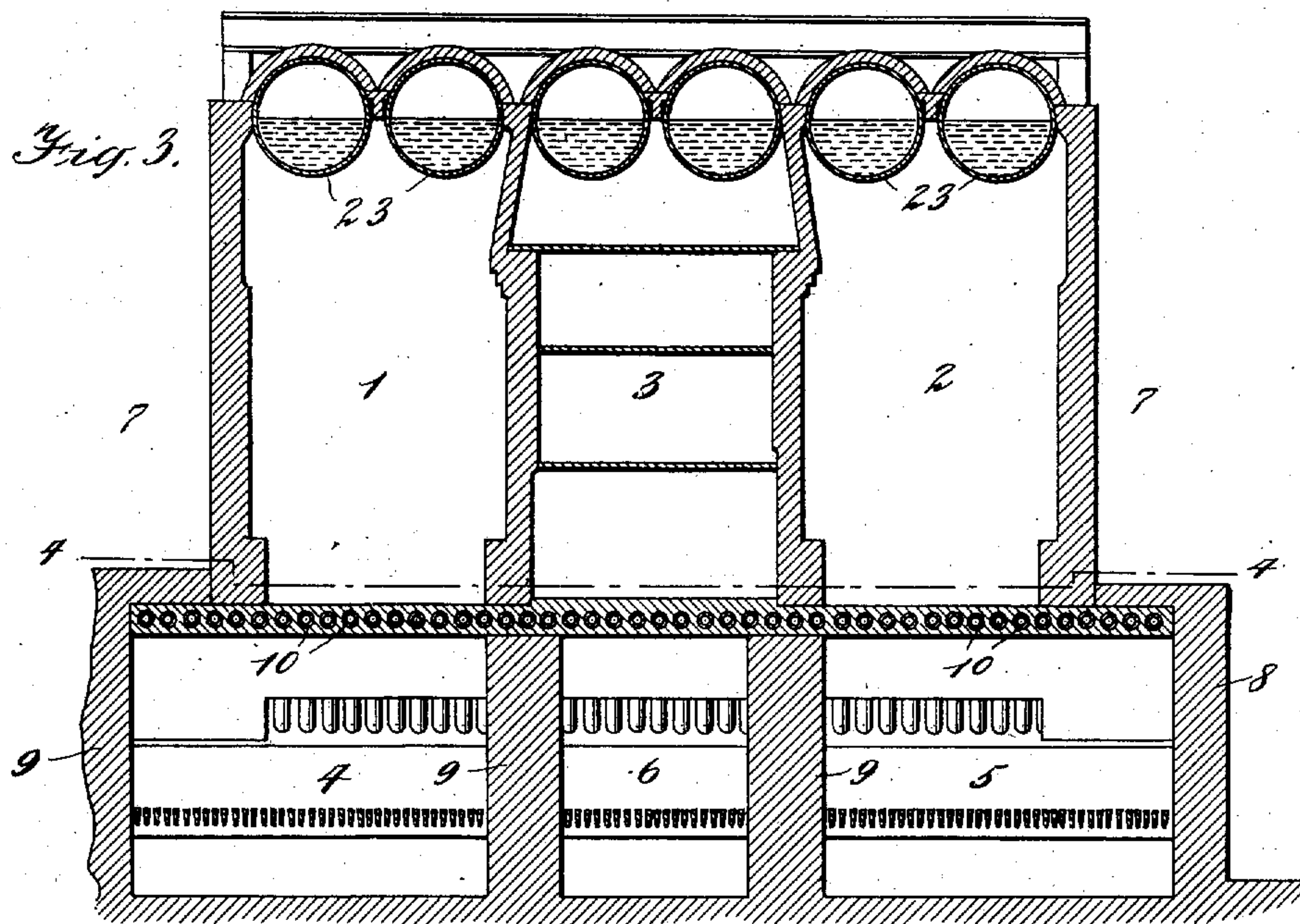


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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

MINOTT W. SEWALL, OF NEW YORK, N. Y., ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF BAYONNE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## STEAM-GENERATING PLANT.

986,649.

Specification of Letters Patent.

Patented Mar. 14, 1911.

Original application filed May 6, 1909, Serial No. 494,383. Divided and this application filed January 4, 1911. Serial No. 600,814.

*To all whom it may concern:*

Be it known that I, MINOTT W. SEWALL, a citizen of the United States, residing at New York city, borough of Manhattan, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam-Generating Plants, of which the following is a specification.

In my application Serial Number 494,383, filed May 6, 1909, of which the present application is a division, I described a steam-generating plant comprising two units, each unit consisting of two boilers and an economizer boiler placed between the two, all of which are mounted above two furnaces which occupy the width of the three boilers plus a sufficient width of floor space for a cleaning passage. Each furnace and its boiler is independently operated and the economizer is heated by the gases from the furnaces after passing through the boilers. The object of the invention disclosed in said application is to produce steam at a high economy.

The present invention has in view the same object and also to produce a very large amount of steam at the shortest notice. These objects are accomplished by providing the economizer with an independent furnace so that it may be heated thereby, or by the furnace gases from the boilers, and by so doing I am able to produce a steam plant in which highly economic results may be obtained at one time and at another time all of the heating surface may be forced to its ultimate evaporative capacity. The economizer may be used as a boiler for the generation of steam, or as a feed water heater, and the term "economizer" used in the following description is intended to include both.

The invention will be understood by reference to the accompanying drawings in which—

Figure 1 is a vertical longitudinal section through one of the boilers; Fig. 2 a vertical longitudinal section through the economizer; Fig. 3 a transverse vertical section with the boiler and economizer tubes omitted; and Fig. 4 a horizontal section on the plane of the line 4—4 of Fig. 3.

Similar reference numerals indicate similar parts in the several views.

In the drawings I have shown a single unit

comprising two boilers 1 and 2, and an economizer 3 installed between the two boilers, said parts being mounted respectively above the independently operated furnaces 4, 5 and 6. The furnaces occupy the entire surface laterally of the boilers and may extend therebeyond to provide cleaning passageways 7, if the plant comprises two or more units. Although I have shown but one unit, it is to be understood that there may be any additional number required for a given installation. The end walls 8 and the parting walls 9 are of ordinary fire-brick and built up to the height of the inclined roof. The furnaces are of any usual construction provided with grates and doors, or automatic stokers, the grate surface extending from wall to wall. The roof over all the furnaces is formed of inclined water tubes 10 inclosed in special fire clay tiles, said tiles extending to the rear of the bridge walls 12 of the furnaces 4 and 5, and the bridge wall 31 of the economizer. The extension of the roof in this manner provides exit openings for the gases from furnaces 4 and 5 into passages 13 directly beneath the tubes of the boilers 1 and 2, and from furnace 6 directly into passage 25 beneath the tubes of the economizer. The roof tubes of furnaces 4 and 5 are expanded into manifolds 14 and 15 and these latter are connected to the headers 16 and 17, respectively, through the usual nipples. The mud drums 18 are also nipped to the manifolds 15 and have blow-off connections, as shown in Fig. 1. The roof tubes of the economizer furnace are expanded in the manifolds 14' and 15', which are in turn connected to headers 16' and 17' respectively through the usual nipples. The mud drum 18' is also nipped to the manifold 17' and has a blow-off connection, as shown.

My invention is not restricted to the particular type of boiler shown and I have, merely for the purpose of illustration, shown the boilers 1 and 2 as comprising inclined water tubes 19 connected to the headers 16 and 17, which headers are connected to the steam drums 23. The secondary roof 20 is supported on the lower row of boiler tubes and extends from the first transverse pass to the rear header 17. To secure the proper circulation of the gases through and across the tubes, any efficient form of baffling may be used. I have shown a transverse baffle 21



extending from the front of the secondary roof 20, and a second transverse baffle 22 extending from the steam drum 23 to the top row of tubes and across a portion of the tubes. The construction described provides for each of the boilers 1 and 2 a passage for the gases from the furnace to the combustion chamber at the rear of the bridge wall 12, thence into the passage 13 to the steam up-take end of the boiler, and thence across the tubes 19 through the three transverse passes formed by the baffles 21 and 22 over the top of headers 17, and downwardly to the flue 24 at the rear of wall 11. In this flue the gases from the boilers 1 and 2 commingle and then flow into the passage 25 of the economizer, when the latter is not independently fired, then over the heating surface thereof, as directed by the baffles, to the flue connection 26.

The economizer which I have shown for the purpose of explaining my invention, comprises inclined water tubes 27 expanded into the headers 16' and 17'. The course of the gases through the economizer may be directed by baffles 28 disposed longitudinally of the tubes, as shown in Fig. 2.

Each of the boilers 1 and 2 is provided with a gas outlet flue 26 leading to the main flue and having a damper 27' therein; and a damper 28' in the flue at the rear of header 17 leading to passage 24. The economizer has a flue 29 leading to the main flue. When furnaces 4 and 5 only are fired, the economizer furnace 6 will be completely closed at the front to prevent an influx of air thereto which would mingle with the gases approaching the economizer from the boilers 1 and 2. The dampers 27' are closed, and damper 28' opened, and damper 30 and flue 29 also opened. In this, the ordinary operation of the plant, the gases after passing through the boilers, pass through the economizer, as above stated. When all of the furnaces are fired, the dampers 28' are closed and dampers 27' and 30 are opened. In that case, the gases from the boiler furnaces 1 and 2 do not pass through the economizer but discharge directly to the main flue. The gases from the furnace 6 pass into the combustion chamber at the rear of bridge wall 31, thence through the opening at the end of the roof into the passage 25 directly to the heating surface of the economizer, which then becomes a boiler.

In order that the economizer may be an efficient absorber of heat, its heating surface and gas passages are proportioned to the area of the gas passages of the boilers 1 and 2, it being borne in mind that, under the ordinary operation of the plant, the gases of said boilers are combined in a passage leading to the economizer, and that their volume is greatly reduced at the lower temperature. By arranging the gas passages as

described so that the gases from the boilers 1 and 2 are directed through the passage 25 of the economizer, an advantage gained in that the radiant heat through the walls of said passage tends to increase the heat of the gases therein while approaching the economizer.

As in the invention of my application Serial Number 494,383, before referred to, the present invention avoids, to a large extent, the waste due to the banking of the furnace fires during the greater part of the day, when a plant is operating under a variable load. In a plant designed on the "unit system," during the greater portion of the day when the load on the plant is comparatively small, it is necessary to produce steam at the utmost economy. By my invention I accomplish this desired object by cutting out the economizer furnace and utilizing the waste gases from the boilers 1 and 2 to heat the economizer. When, however, a large production of steam for a short time is required, the furnace 6 is fired so as to make the economizer a boiler for the production of the excess amount or pressure of steam required.

The present boiler is shown above a type of furnace which is particularly adapted to the burning of highly volatile bituminous coals; it is not, however, necessary that a roof be used in connection with the furnace of boilers 1 and 2, as the gases from the furnaces could as well discharge directly among the boiler tubes as in the usual type of inclined water tube boilers. In this case the bridge wall 12 would be carried up to meet the lower tubes of the boiler. Neither is a roof necessary for the economizer, as the gases from the boilers could as well pass above the bridge wall and vacant furnace 6 on their way to the tube surface of the economizer without the intervention of roof 10.

What I claim and desire to secure by Letters Patent of the United States is:—

1. A steam-generating plant comprising two boilers spaced apart, an economizer installed between said boilers and embraced within the boiler setting, furnaces for said boilers, a furnace for said economizer, said furnaces being independently operated, and walls forming passages for the gases whereby the furnace gases pass through the corresponding boiler and may be discharged through the economizer or direct to the main flue.

2. A steam-generating plant comprising two rapid steaming elements and furnaces therefor, an economizing element and a furnace therefor, all of said furnaces being independently operated, walls forming passages for the gases, and dampers to direct the gases of the three furnaces over the corresponding heating surface when all of the furnaces are fired, and directly from the



heating surface of each element to the main flue.

3. A steam-generating plant comprising two boilers spaced apart, an economizer installed between said boiler and embraced within the boiler setting, a furnace for each boiler, a special furnace for the economizer, all of said furnaces being independently operated, a roof for each furnace extending from the front to a point beyond the bridge walls of the furnaces, a combustion chamber at the rear of each bridge wall, walls

forming passages for the gases, and dampers whereby the gases from the boiler furnaces may be discharged through the economizer or direct to the main flue. 15

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

MINOTT W. SEWALL.

Witnesses:

HUGH McDONGAN,  
JULIA E. SMITH.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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