

No. 812,844.

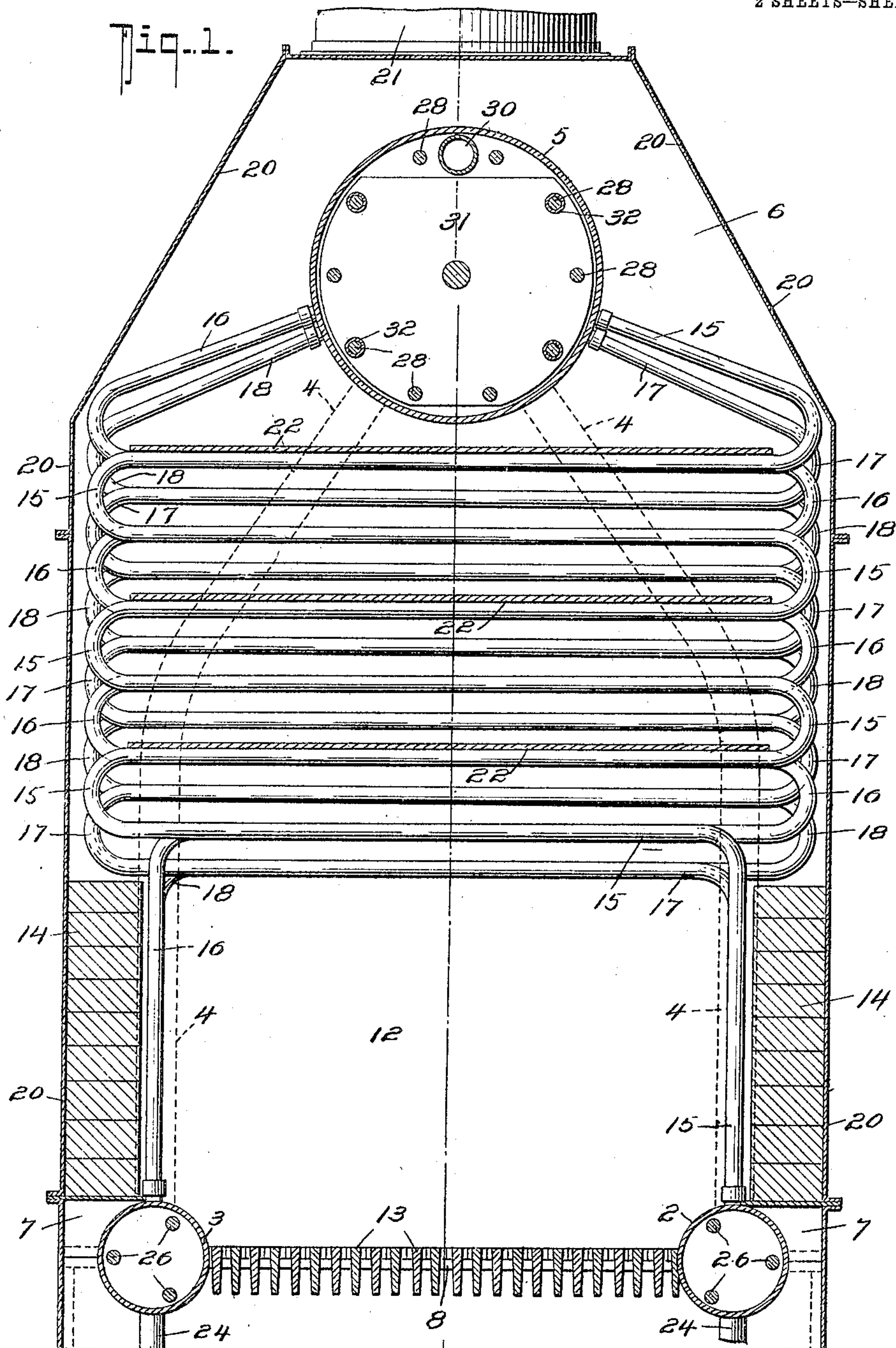
PATENTED FEB. 20, 1906.

S. HALLANDER.

BOILER.

APPLICATION FILED OCT. 10, 1905.

2 SHEETS—SHEET 1.



WITNESSES:

E. L. Gibson.
John T. Schrott.

INVENTOR

Samuel Hallander

BY

Fred Goetz
ATTORNEY

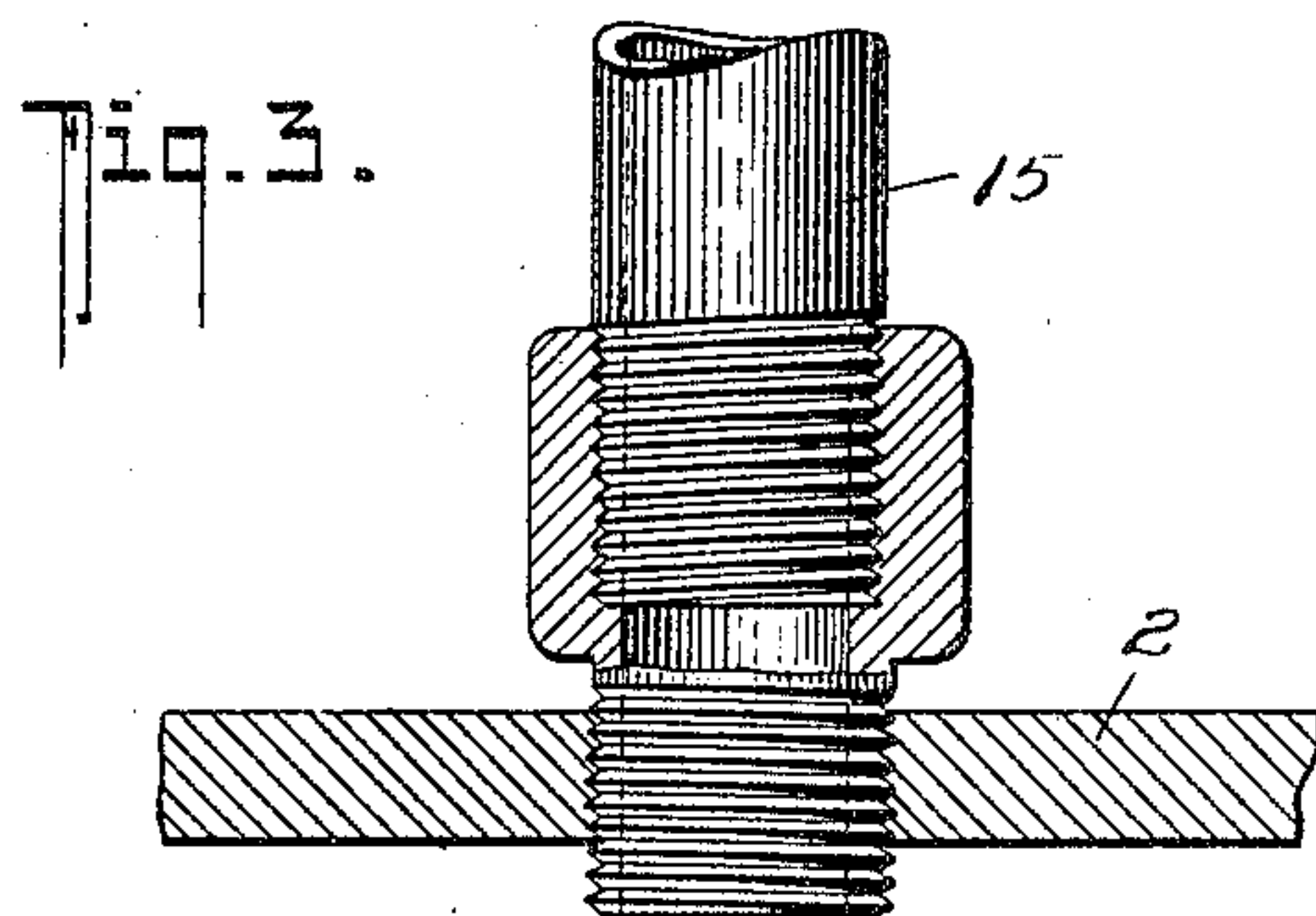
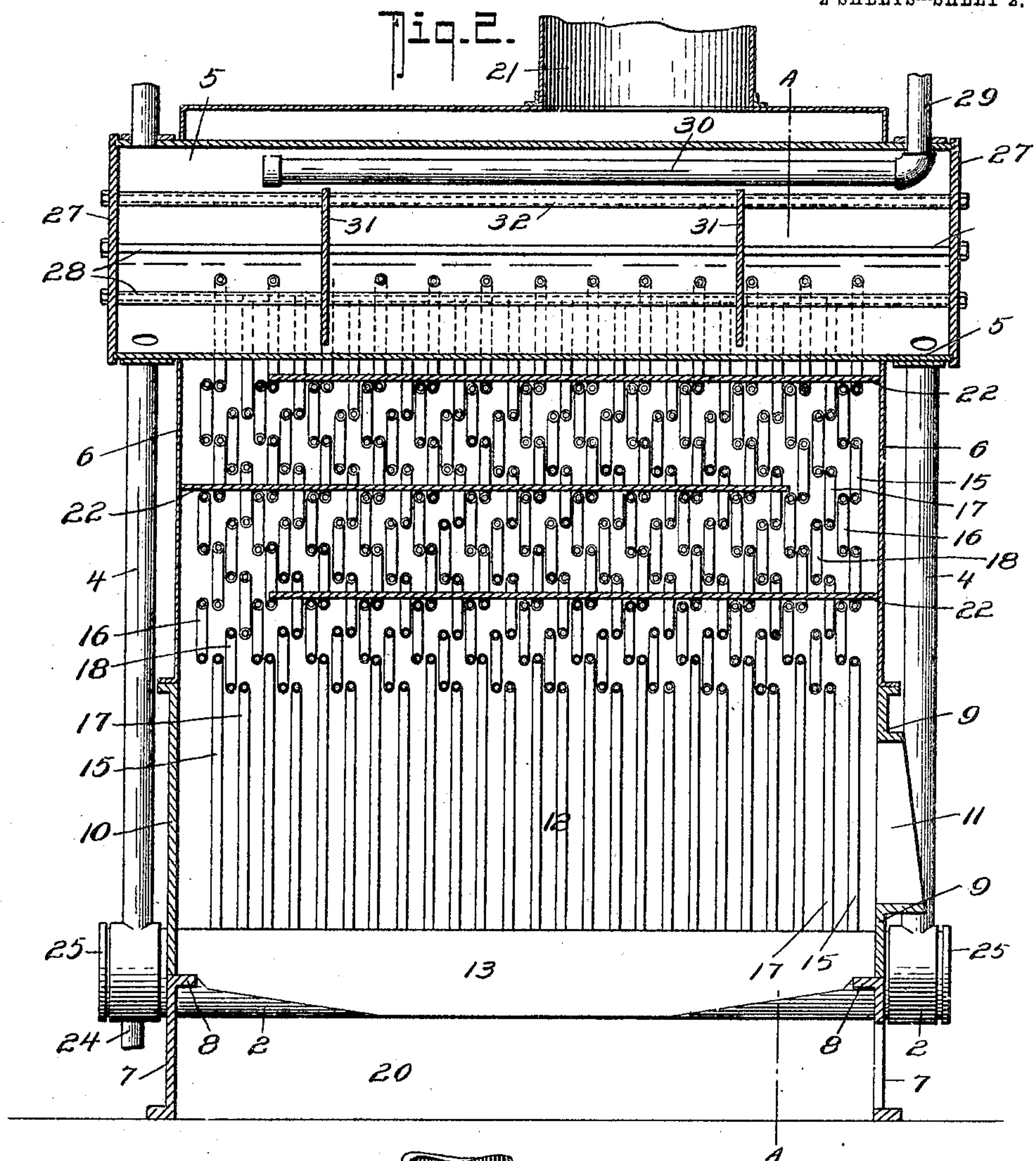
No. 812,844.

PATENTED FEB. 20, 1906.

S. HALLANDER.
BOILER.

APPLICATION FILED OCT. 10, 1905.

2 SHEETS—SHEET 2.



WITNESSES:

F. C. Gibson.
John T. Schrott.

INVENTOR

Samuel Hallander.

BY

Paul G. Breterich
ATTORNEY

UNITED STATES PATENT OFFICE.

SAMUEL HALLANDER, OF VANCOUVER, CANADA.

BOILER.

No. 812,844.

Specification of Letters Patent.

Patented Feb. 20, 1906.

Application filed October 10, 1905. Serial No. 282,093.

To all whom it may concern:

Be it known that I, SAMUEL HALLANDER, a citizen of the Dominion of Canada, residing at Vancouver, in the Province of British Columbia, Canada, have invented a new and useful Improvement in Pipe-Boilers, of which the following is a specification.

My invention relates to an improved pipe-boiler for steam-generating purposes which is possessed of several novel features of design and construction with the object of obtaining an effectual disposition of the furnace-gases among the steam-generating tubes, an uninterrupted and quiet circulation of the water through the several parts of the boiler, and general accessibility for cleaning and for repair or renewal of any of the tubes. To attain these ends, I provide a brick-lined combustion-chamber up the sides of which a series of steam-generating pipes extend from two base-pipes along each side of the fire-box to a steam-drum above extending along the middle line of the boiler. These steam-generating pipes are carried horizontally back and forth across the upper portion of the furnace-chamber, within which the products of combustion in their progress to the smoke-stack are conducted back and forth among the pipes from end to end by a series of baffle-plates. The steam-generating pipes and steam-drum are all exposed either directly to the furnace or to the products of combustion therefrom, as the casing of the boiler extends upward from the base-pipes and incloses the steam-drum except where the two ends of it project beyond the front and rear casing to provide a means for attachment for a pair of return-pipes from each projecting end of the steam-drum to similarly projecting ends of each base-pipe. These return-pipes support the steam-drum and provide a means for the downward circulation of the water exterior to the furnace, so that no conflict of opposing currents may interfere with the quiet circulation.

The particular construction and operation of the boiler is fully described in the following specification and illustrated in the drawings which accompany it.

Figure 1 is a vertical cross-section through the boiler on the line A A in Fig. 2. Fig. 2 is a vertical longitudinal section on the line B B in Fig. 1, and Fig. 3 a detail of the socket-nipples by which the generating-pipes are connected to the base-pipes and steam-drum.

The boiler is provided with two base-pipes

2 and 3, which extend along each side of the furnace-chamber and at the front and back end of the boiler project outwardly beyond the fire-box casing a sufficient distance to enable return-pipes 4 to be connected to each end of each base-pipe. These return-pipes 4 are carried vertically upward for a short distance; and each is then inclined inward toward the middle line of the boiler and is connected to the similarly-projecting outer ends of a steam-drum 5, to which the pipes 4 afford support, which drum extends along the middle line of the boiler parallel to the base-pipes. Each end of the base-pipes 2 and 3 rests in a semicircular seat in base end frames 7, above which are secured the front and back plates 9 and 10 of the furnace, which are provided with corresponding semicircular seats to pass over the upper side of the base-pipes and secure them in place. In the front plate 9 is the furnace-doorway 11, and the upper edges of both plates are furnished with outwardly-projecting flanges to receive the flanged lower edges of the end plates 6 of the casing of the combustion-chamber, through which casing the ends of the steam-drum 5 outwardly project.

The side casings 20 of the furnace and combustion-chamber extend vertically upward from the foundation or base of the boiler to approximately the level of the under side of the steam-drum 5 and therefrom incline inward toward the middle line of the boiler to a width above the steam-drum sufficient to provide a seat for the smoke-stack 21. The side casing 20 may be made in sections to be conveniently removed for the examination and repair of the steam-generating pipes to be hereinafter described.

The base end frames 7 are provided with inwardly-projecting ledges 8, on which the grate-bars 13 rest.

A series of steam-generating pipes 15, 16, 17, and 18 are secured into the upper side of each base-pipe 15 and 17 in the pipe 2 and 16 and 18 in the pipe 3, and these generating-pipes extend vertically upward a sufficient distance to form a furnace-chamber 12 and between that and the underside of the steam-drum 5 are bent so as to extend horizontally back and forth across the width of the flue-space and are at their upper ends connected into the steam-drum 5 just below the horizontal diameter, the apertures into which they are connected being pitched zigzag to avoid any excessive weakening of the shell of the

drum 5. The pipes 15 and 16 from the base-pipe 2 are connected to the same side of the drum on which that base-pipe is, and similarly 16 and 18 are connected to the drum 5 on the same side as the base-pipe 3. The horizontal cross portions of the pipes are pitched approximately the same distance apart, and the pipes from the lower line of the apertures in the drum are so bent that their horizontal portions will pitch between the pipes from the upper line of apertures. (See the cross-section in Fig. 1.) The space between the furnace-chamber and the steam-drum is thus filled with a series of closely-pitched horizontal pipes, through which the water may circulate from the base-pipes 2 and 3 to the drum 5 and among which the furnace-gases require to pass toward their exit at the smoke-stack 21; but to prevent the current of such gases taking the short cut to such exit baffle-plates 22 are placed on the horizontal pipes, which baffle-plates extend alternately from the front end casing to a short distance from the back and from the back end casing to a short distance from the front. The furnace-gases will thus be diverted from end to end of the flue-space in their progress to the chimney and will be brought effectually in contact with all the generating-pipes, and that without having to descend in opposition to the specific gravity.

It will be noticed that although the baffles will divert the general current back and forth from end to end ample space is provided among the bends for the passage of the furnace-gases upward round the edge to above the baffle, so that if any amount of combustible gas has become cooled below the ignition-point as it returns the flame from a hotter portion of the fire beneath may again ignite it, and a more efficient combustion will be attained than would be possible were the flue-passages between the baffles completely cut off from one another.

Each side of the furnace-chamber 12 is provided with a fire-brick lining 14, extending upward to approximately the level of the first horizontal bend of the generating-pipes. A similar lining may be provided on the front and back plates 9 and 10, and the rest of the casing 6 and 20 may be lined with asbestos, if found necessary.

Blow-off pipes 24 are connected to the outwardly-projecting ends of the base-pipes 2 and 3, and the feed-pipe may be similarly connected. The ends of these pipes 2 and 3 are provided with reinforcing-bends to avoid excessive weakening.

The ends of the pipes 2 and 3 are closed by plates 25, each having a circular groove to seat on the ends of the pipe and secured thereto by stay-rods 26 and nuts. The plates 27 of the steam-drum 5 may be similarly jointed on the ends of the drum and secured by through-bolts 28 or in larger boilers by stays

riveted to the shell of the drum. The ends of either base-pipes or steam-drum may thus be readily removed for examination, cleaning, or repair.

The steam-pipe 29 is connected to the outwardly-projecting end of the steam-drum and is connected to a dry pipe 30, extending along the upper inner side of the drum and provided with perforations along its upper side. The safety-valve connection may be similarly made to the other projecting end of the drum, and to prevent the water within the drum surging from end to end loosely fitting partition-plates 31 are placed within the drum, which plates are maintained in position by passing the stay-rods through them and providing tubular distance-pieces 32 upon several of the stays.

With this construction of boiler the furnace-gases are effectually distributed among the steam-generating pipes, the water and steam within which will freely ascend to the drum 5, and a steady quiet circulation of the water is insured by having the down-pipes 4 exterior to the furnace or flue-space, as there will be no conflict of opposing currents through either generating-pipes or down-pipes. The down-pipes may of course be covered with non-conducting material to prevent loss of heat. The upward circulation through the generating-pipes being drawn uniformly throughout the length of the base-pipes, there will be no violent current through them, and not being themselves exposed to excessive heat if impurity is in the water it will deposit in the base-pipes to be withdrawn by the blow-off. The provision of cross-partitions in the steam-drum will maintain a steady water-line and prevent water being carried into the steam-pipe, enabling the boiler to work effectually without an external dome or steam-drum.

Any one of the generating-pipes may be easily removed for renewal or repair, as the connections to the base-pipe and drum may be made by right and left hand socket-nipples, (see Fig. 3,) and the extreme flexibility of the pipes due to their bends enables these connections to be very easily made.

Care must be taken in placing the baffles 22 to see that they rest within the open loops of each horizontal bend, so that a pipe may be withdrawn from either side. Thus on reference to Fig. 1 it will be seen that the position of the baffles is such that a pipe may be withdrawn from either side without disturbing the baffles or requiring the removal of any of the other pipes.

Having now particularly described the construction of my invention and the advantages derived from such, I hereby declare that what I claim as new, and desire to be protected in by Letters Patent, is—

1. In a boiler of the class described; the combination with two base-pipes situated

one on each side of the furnace, of a steam-drum above such base-pipes, stay-rods passing through said drum, a series of loosely-fitting partitions within said steam-drum and supported by said stay-rods, down-pipes exterior to the furnace-chamber connecting the base-pipes to the steam-drum, a series of steam-generating pipes between the base-pipes and the steam-drum such generating-pipes extending vertically upward from the base-pipe a short distance and thereafter passing back and forth across the furnace, each series of pipes from each base-pipe being connected to the same side of the steam-drum on which the base-pipe is to which they are connected, a foundation-frame in which the base-pipes rest supporting the bars of the furnace, and a casing inclosing the steam-generating pipes and that portion of the base-pipes and steam-drum to which they are connected.

2. In a boiler of the class described; the combination with two base-pipes extending along each side of the furnace and having their ends projecting beyond the furnace-casing, of a steam-drum in the middle line of the boiler above the base-pipes and similarly extending beyond the casing of the flue-space, stay-rods passing through said drum, a series of partition-plates loosely fitted on said stay-rods within said drum to extend across the drum, down-pipes from the under side of the ends of the drum exterior to the flue-casing to the similarly-projecting ends of the base-pipes, means for supporting the base-pipes and retaining them in position, a front plate provided with a furnace-doorway and a back end plate, such front and back plates being connected to the base-frame, furnace-bars suitably supported between the base-pipes, a series of steam-generating pipes inserted into the upper side of the base-pipes and extending upward a sufficient distance to clear the furnace and thereafter bent backward and forward across the furnace between it and the steam-drum each series of pipes being inserted into the steam-drum in the same side as the base-pipe is to which they are secured at the lower end, the apertures in the drum to which the steam-generating pipes are connected being pitched zigzag and the pipes to the upper line of apertures being so bent that the horizontal portion of them will in cross-section of the boiler be pitched between the horizontal portion of the pipes which are connected to the lower line of the apertures in the drum, and a casing inclosing the furnace and flue-space and extending upward to include the steam-drum.

3. In a boiler of the class described; the combination with two base-pipes and a steam-drum above them, of a series of steam-generating pipes connecting the base-pipes and drum, which generating-pipes are bent back and forth across the furnace, down-

pipes exterior to the furnace and flue-spaces connecting the base-pipes to the steam-drum, a series of baffles among the cross-pipes extending alternately from the front plate to a short distance from the back plate and from the back plate to a short distance from the front plate, such baffles being placed in the open loops of the pipes of each side so that any one pipe may be removed without disturbing the other pipes or the baffles.

4. In a boiler of the class described; the combination with base-pipes on each side of the furnace, of a steam-drum in the middle line above said base-pipes, a series of stay-rods running from end to end within the drum, loosely-fitting partition-plates held on said stay-rods and arranged across the steam-drum, down-pipes external to the furnace or flue-space connecting the steam-drum to the ends of the base-pipes and cross-pipes within the furnace connecting the drum with the base-pipes substantially as shown and described.

5. In a boiler of the class described; the combination with a side casing forming the side wall of a furnace and having a non-conducting lining, of the end plates inclosing the ends of the furnace, the casing inclosing the ends of the flue-space, the smoke-stack, the base-pipes, the ends of which project beyond the end walls of the furnace-chamber, the steam-drum within the upper part of the flue-space and having ends projecting beyond the ends thereof, the down-pipes from the outer ends of the steam-drum to the outer ends of each base-pipe, the steam-generating pipes from the base-pipes to the steam-drum, the baffles extending alternately from the front plate to a short distance from the back plate and from the back plate to a short distance from the front plate, and the partition-plates secured within the steam-drum.

6. In a boiler of the class described; the combination with base-pipes on each side of the furnace, of a steam-drum in the middle line above said base-pipes, a series of stay-rods running from end to end within the drum, loosely-fitting partition-plates held on said stay-rods and arranged across the steam-drum, down-pipes external to the furnace or flue-space connecting the steam-drum to the ends of the base-pipes, a plurality of cross-pipes connecting the steam-drum with the base-pipes, and a series of baffles among the cross-pipes.

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

SAMUEL HALLANDER.

Witnesses:

ROWLAND BRITAIN,
FREDA QUINN.