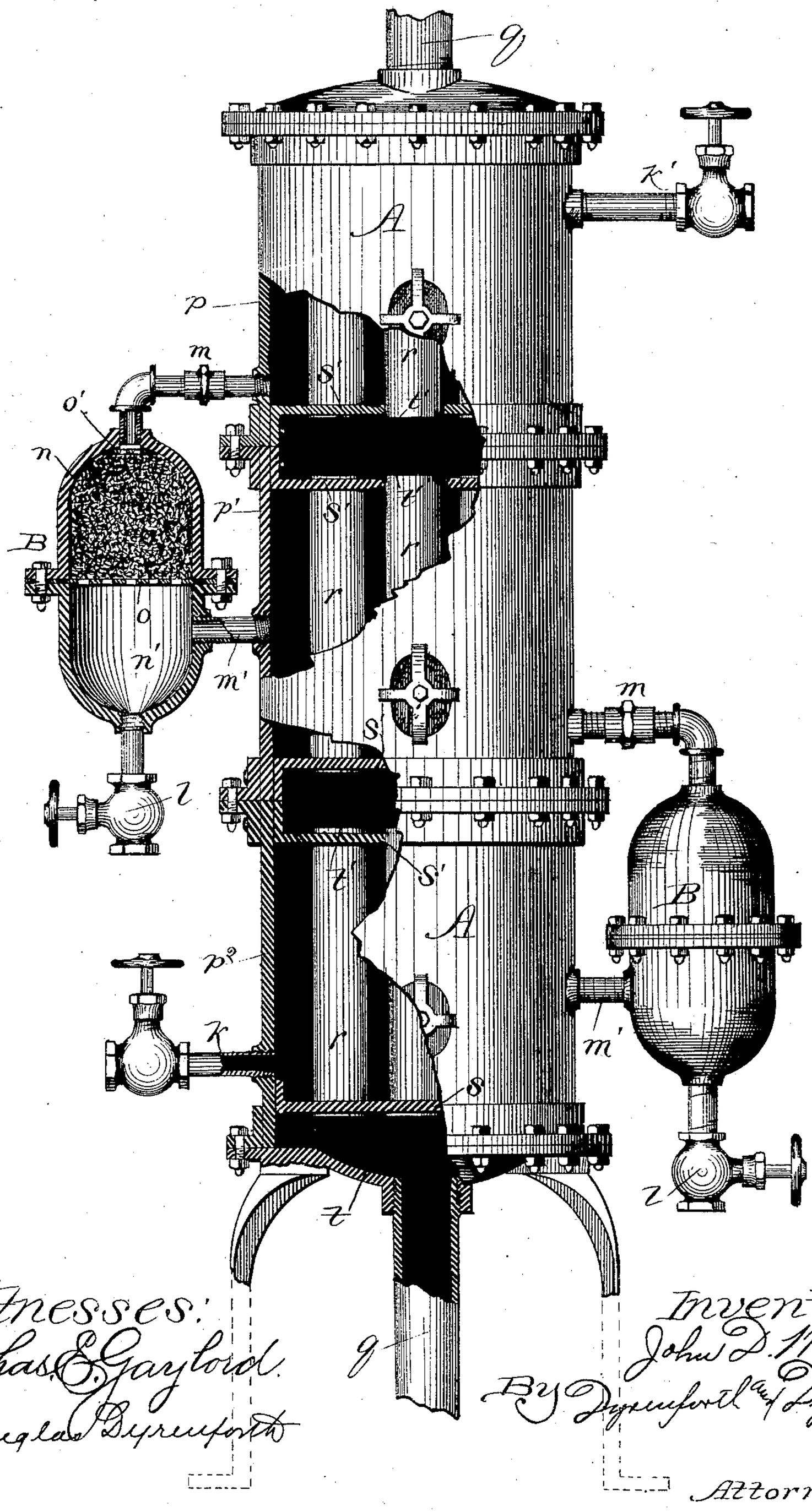
(No Model.)

J. D. MURPHY.

FEED WATER HEATER FOR BOILERS.

No. 307,061. Patented Oct. 21, 1884.



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UNITED STATES PATENT OFFICE.

JOHN D. MURPHY, OF CHICAGO, ILLINOIS.

FEED-WATER HEATER FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 307,061, dated October 21, 1884.

Application filed May 7, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. MURPHY, 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 Feed-Water Heaters for Boilers; and I hereby declare the following to be a full, clear, and exact description of the same.

The object of my invention is to provide a combined heater and purifier, to the end that the heated water may reach the boiler in as clear a condition as possible.

The drawing represents a side elevation of my device, with portions broken away to show the internal construction.

A is a cylindrical shell, formed in sections, as shown. The drawing represents it as formed in three sections; but the number is not of the essence. It may comprise either a greater or smaller number, depending upon the quantity of the water to be heated. In the top and bottom of the shell are chambers *t*, formed by the uppermost and lowest diaphragms, *s*, and at the junctions of the several sections are intermediate chambers, *t'*, formed by the intermediate diaphragms or heads *s'*, and these chambers are connected by flues *r*. Steam from the exhaust or live steam enters the heater by one of the pipes *q*, passes through the flues and the several chambers, and escapes through the other pipe *q*. The intermediate diaphragms, *s'*, besides forming the chambers *t'*, divide the interior of the shell into compartments corresponding in number with the sections. The drawing shows three such compartments, *p*, *p'*, and p^2. B B are combined filters and mud-settlers, each comprising a metallic shell divided by a perforated diaphragm, *o*, into two chambers, *n* and *n'*. The upper chamber, *n*, is filled with a filtering medium—such as charcoal, coke, or other suitable material—and communicates through a pipe, *m*, with the interior of one of the compartments of the heater A, (the compartment *p*, for example,) while the lower chamber, *n'*, which operates as a mud-settler, communicates through a pipe, *m'*, with the next adjoining compartment of the heater, (the compartment *p'*, for example,) and is provided at its lower end with the discharge pipe and valve, *l*, to carry off the sediment. Between the chamber *n* and the pipe *m* is a screen, *o'*, to prevent the filtering material from being washed into the interior of the heater. The opposite filter and mud-settler B is similarly constructed in every respect, but connects the intermediate compartment, *p'*, with the lowest compartment, p^2. If there were but two sections to the heater instead of three, only one filter B, with the necessary connections, would be employed, while, on the other hand, if the heater comprises four sections, three filters would be required, and so on. A pipe, *k*, leads into the lowest compartment of the heater, and a pipe, *k'*, leads out of the uppermost compartment.

The operation is as follows: Water under pressure is admitted into the compartment p^2 through the pipe *k*, and thence passes, by way of the first pipe *m'*, filter B, and pipe *m*, into the adjoining compartment *p'*, thence, by way of the next pipe *m'*, filter B, and pipe *m*, into the adjoining compartment *p*, and finally out at the pipe *k'* to the boiler, having been heated in its progress by exhaust or live steam from the boiler, passed in either direction through the flues *r* and chambers *t'*, and purified by passing through the successive filtering and settling devices. From time to time the sediment which lodges in the mud-settlers *n'* is drawn off by means of the discharge-valves *l*.

It is obvious that the arrangement might be such as to have the water flow down through the heater instead of up; but the arrangement shown is preferred, as it provides more effectually and simply for the drawing off the sediment from the filters. The reverse construction referred to is, however, within the spirit of my invention, as well as any other construction that will serve to include the filter in the water-passage connecting pairs of sections in a sectional heater.

I do not limit myself to any particular construction as to the filters, nor to any other matters of mere detail. The construction above described is the one preferred, especially the feature of the sectional shell, which presents great advantages, it being thereby an easy matter to make heaters of any desired capacity by simply employing a greater or smaller number of sections. It is not always necessary that all the connecting-passages between the sections should contain filtering ma-

terial, though it is preferred that they should, in heaters of ordinary dimensions, such as that represented. Moreover, even without the filtering medium, the mud-settler alone would perform a valuable function, and, on the other hand, the filter might be used without the mud-settler. For many reasons it is preferred to have the connecting-passages between the several compartments of a heater external, as shown, though this is not absolutely necessary.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a feed-water heater for boilers, a shell formed in sections, provided with flanges for bolting them together, whereby heaters of different capacities may be made by employing a greater or smaller number of such sections, in combination with means, substantially as described, for passing steam and water through the heater.

2. A sectional feed-water heater for boilers, having a filtering medium in the water-passage connecting pairs of sections, substantially as described.

3. A feed-water heater comprising a metallic shell, steam-flues arranged longitudinally within the same, means for directing steam through the flues, and pipes for conveying water to and from the interior of the shell, in combination with transverse diaphragms dividing the interior around the steam-flues into compartments, and one or more exterior conduits connecting consecutive compartments, and containing a mud-settling chamber, provided with means for drawing off the sediment from the same, substantially as described.

4. A feed-water heater comprising a metallic shell, steam-flues arranged longitudinally within the same, means for directing steam through the flues, and pipes for conveying water to and from the interior of the shell, in combination with transverse diaphragms dividing the interior around the steam-flues into compartments, and one or more exterior conduits connecting consecutive compartments, and containing a filtering medium, all substantially as described.

5. A feed-water heater and purifier comprising, in combination, the shell A, formed in sections, and divided by diaphragms *s* and *s'* into separate compartments, pipes *k* and *k'*, leading into the end compartments, means for directing steam through the flues, and one or more exterior filtering devices with pipes *m* and *m'*, connecting the compartments in series, all substantially as described.

6. In combination with the shell A, formed in sections, diaphragms *s* and *s'*, flues *r*, means for directing steam through the flues, inlet and outlet pipes *k* and *k'*, and pipes *m* and *m'*, the combined filters and mud-settlers B, connecting the pipes *m* and *m'*, and each comprising a metal shell divided by a perforated diaphragm, *o*, into two compartments, the upper compartment containing a filtering medium, and the lower compartment being provided with a discharge-valve, substantially as described.

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In presence of—
CHARLES C. LINTHICUM,
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