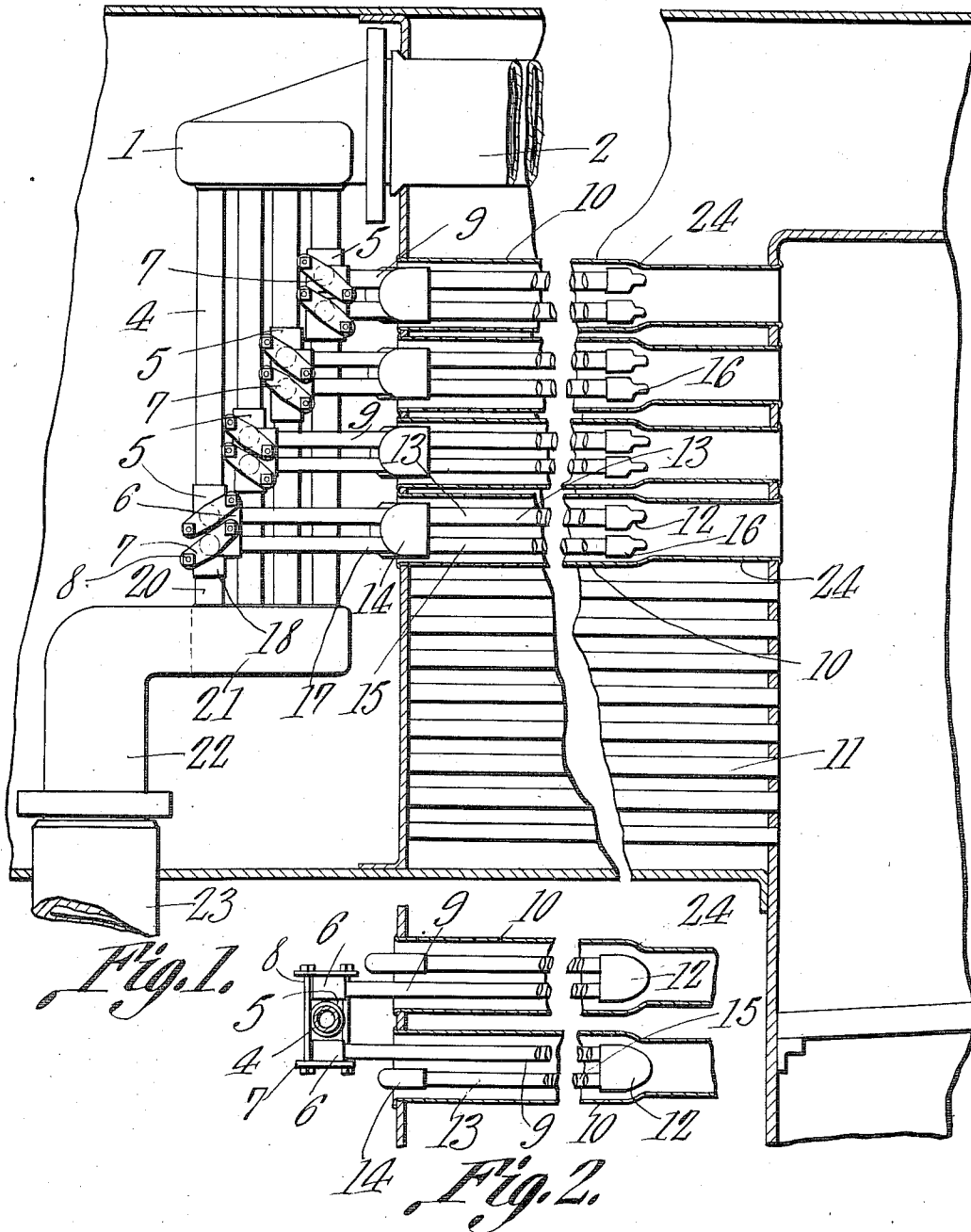


J. C. HERON.
STEAM SUPERHEATER.
APPLICATION FILED AUG. 29, 1910.

979,669.

Patented Dec. 27, 1910.

2 SHEETS-SHEET 1.



Witnesses
J. J. Dornin
A. Easterday

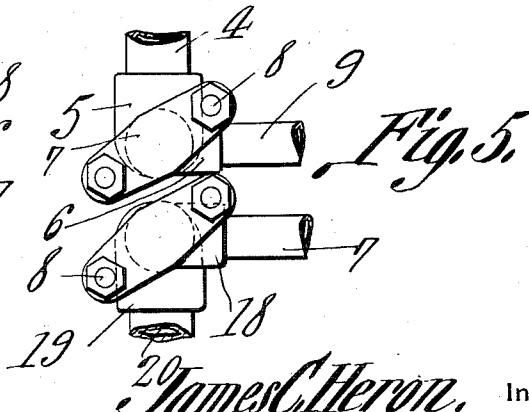
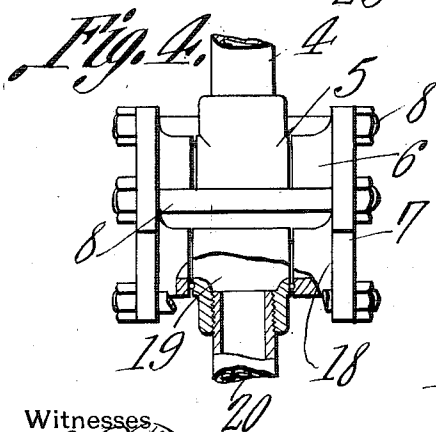
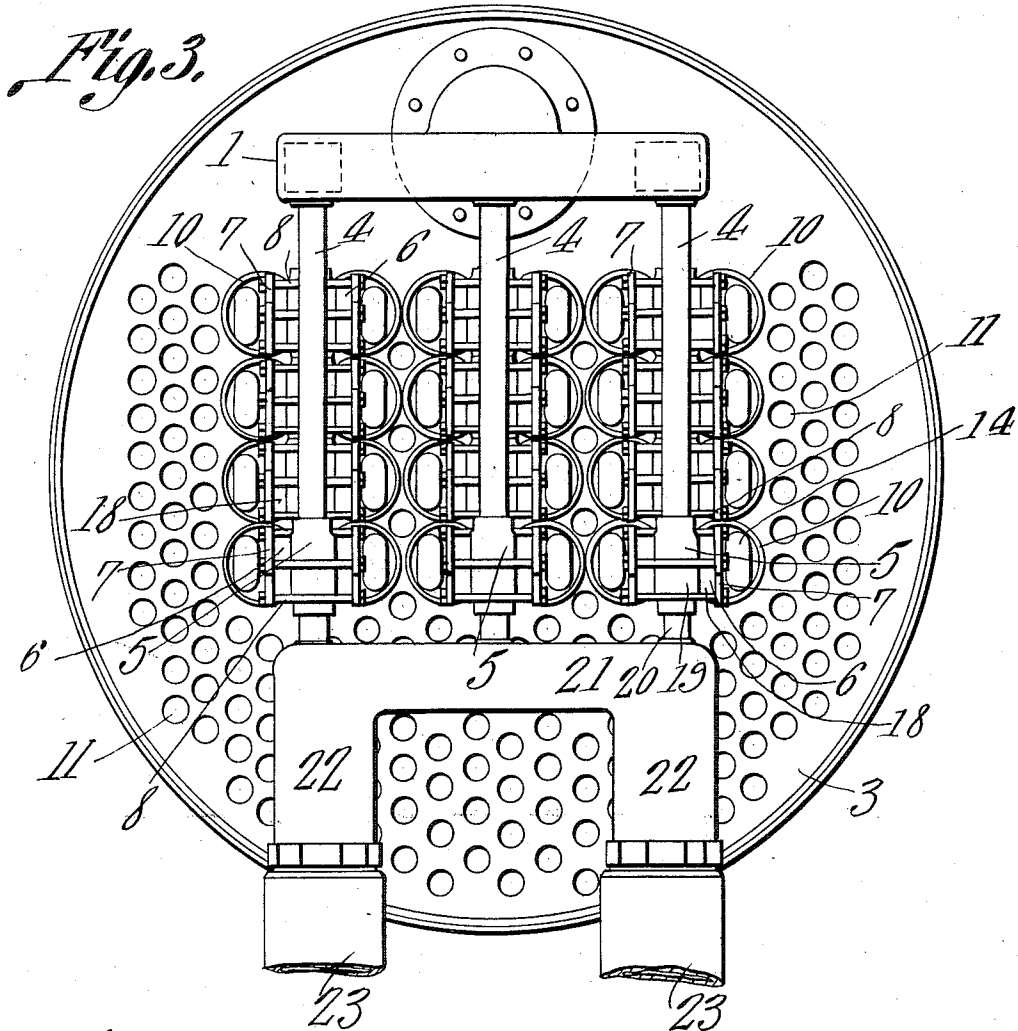
James C. Heron,
Inventor
by *C. A. Snow & Co.*
Attorneys

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UNITED STATES PATENT OFFICE.

JAMES C. HERON, OF ST. PAUL, MINNESOTA, ASSIGNOR OF ONE-HALF TO ARTHUR C. DEVERELL, OF ST. PAUL, MINNESOTA.

STEAM-SUPERHEATER.

979,669.

Specification of Letters Patent.

Patented Dec. 27, 1910.

Application filed August 29, 1910. Serial No. 579,370.

To all whom it may concern:

Be it known that I, JAMES C. HERON, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Steam-Superheater, of which the following is a specification.

This invention has relation to steam superheaters adapted to be used in conjunction with steam boilers and steam boiler furnaces and it consists in the novel construction and arrangement of its parts hereinafter shown and described.

The object of the invention is to provide a superheater especially adapted to be used in combination with a locomotive boiler and boiler furnace although the superheater may be used to advantage in combination with stationary boiler furnaces.

With this object in view the invention consists in providing a boiler of the fire tube type with a series of tubes which extend longitudinally of the boiler and are open at both ends. The discharge ends of the said tubes are slightly contracted for the purpose of holding the heat back. The superheater consists of an upper and a lower head the upper head being connected with the steam outlet of the boiler. Coils of pipes are located in the tubes before mentioned and the said coils are approximately horizontally disposed. The said coils at one end are connected with the upper head and at their other ends are connected with the lower head of the superheater. The parts being so arranged the superheater may expand and contract without danger of separating the joints between the upper and lower heads thereof and also when the superheater is subjected to vibration the danger of separating the pipes at the joints is reduced to a minimum. This is due to the fact that the upper and lower heads of the superheater are not connected directly together by straight pipes but the pipes connecting the said heads connect with the coils as indicated and the contraction and expansion to which the apparatus is subjected will in a great measure be taken up or absorbed by the said coils of pipe and that the danger incident to contraction and expansion in such apparatus is reduced to a minimum.

In the accompanying drawings Figure 1 is a vertical longitudinal sectional view of a steam boiler with the superheater attached

thereto and showing parts broken away. Fig. 2 is a horizontal sectional view of a portion of the boiler and sections of the superheater with parts broken away. Fig. 3 is a front end elevation of a steam boiler with the superheater attached thereto. Fig. 4 is a detail enlarged front elevation of a portion of the superheater. Fig. 5 is detailed enlarged side elevation of that portion of the superheater shown in Fig. 4.

The steam superheater consists of a head 1 which is connected to the steam outlet 2 of the steam boiler 3. Vertically disposed pipes 4 depend from the head 1 and T's 5 are connected to the lower ends of the said pipes 4. L's 6 are connected with the ends of the T's 5 and plates 7 are located at the outer sides of the L's 6. The plate 7 at one side of each L 6 is connected with the plate 7 at the outer side of the opposite L 6 by means of a cross-bolt 8 which serves as clamping means for holding the said plates in position and for holding the L's in close contact with the ends of the T's 5. Pipes 9 are connected with the L's 6 and extend longitudinally along tubes 10 provided in the boiler 3 between the fire tubes 11 thereof. Return bends 12 are connected to the ends of the pipes 9 remote from those ends thereof which connect with the L's 6 and return pipes 13 are connected with the return bends 12 and are also located in the tubes 10 and extend parallel with the pipes 9. Return bends 14 are connected with the ends of pipes 13 at the forward ends of the tubes 10 and pipes 15 are also connected with the said return bends 14 and extend longitudinally through the tubes 10. The pipes 15 are located vertically below the pipes 13 and are parallel therewith. Return bends 16 are connected with the ends of the pipes 15 which are remote from the L's 6 and pipes 17 are connected with the said return bends 16 and extend back through the tubes 10 and are connected at their forward ends to L's 18 which are similar in construction to the L's 6. The L's 18 connect with the end T's 19 and the said T's in turn are mounted upon the upper ends of pipes 20. The L's 18 and T's 19 are held together by clamps 7 and bolts 8 similar to those above described. The lower ends of the pipes 20 connect with a head 21 which is located in front of the rear end of the boiler and in the fire box of the furnace.

The said head 21 is provided with branches 22 which serve as steam outlets and connect with service pipes 23.

From the above description it will be seen
 5 that as the saturating steam passes from the top of the boiler 3 through the steam outlet 2 it will enter head 1 then the said steam will pass down through the said pipe 4 and become superheated. This is due to the fact
 10 that the products of combustion from the furnace pass up along the pipes 4 and also along the pipes 20 and the coils of which pipes 9, 13, 15 and 17 form component parts. As the products of combustion pass
 15 through the tubes 10 they are held back at the discharge outlets at the discharge ends thereof by reason of the fact that the said tubes 10 are slightly reduced in diameter as at 24. Thus the steam within the pipes
 20 forming the said coils have ample opportunity to become superheated and thoroughly dried. The dried steam passes through the pipe 17 and L's 18 and T's 19 into the pipes 20 and then passes into the
 25 head 21. From the head 21 the dried steam passes into the branches 22 and from the said branches the said steam passes into the service pipes 23. Therefore it will be seen that a steam superheating apparatus
 30 of simple structure is provided and by reason of the fact that the heads 1 and 21 are not directly connected with each other by straight pipes but are connected to the said coils of which the pipes 9, 13, 15 and 17 form
 35 component parts and inasmuch as the pipes forming the said coils are in approximately horizontal position while the heads 1 and 21 are vertically arranged any expansion or contraction in the device is not liable to
 40 open up the joints between the pipes and create leaks in the apparatus. Also by reason of the fact that the pipes which connect with the heads 1 and 21 are connected with the said horizontally disposed coils the apparatus
 45 is not liable to become leaky in consequence of excessive jarring or vibration to which locomotive boilers and attachments are subjected.

Having described the invention what I
 50 claim as new and desire to secure by Letters Patent is:—

1. In combination with a steam boiler a
 55 superheater comprising tubes extending from one end of the boiler to the other, a head connected with the steam outlet of the steam boiler, pipes depending from said

head, coils located in the said tubes and being at approximately right angles to the pipes which depend from the said head, a second head located vertically under the first named head, upstanding pipes mounted upon the last said head, the last said pipes being connected with the discharge end of said coils, the last said head being connected with service pipes.

2. In combination with a boiler a superheater comprising tubes extending longitudinally of the boiler and being open at both ends, said tubes being reduced in diameter at their discharge ends, a head connected with the steam outlet of the said boiler, pipes depending from the said head, coils located in said tubes and extending at right angles to the said pipes depending from the said head, a second head located vertically under the first said head, upstanding pipes mounted upon the last mentioned head and connected with the discharge outlet coil, and the last said head being connected with service pipes.

3. In combination with a steam boiler a superheater comprising tubes extending longitudinally of the boiler and being open at both ends, a head connected with the steam outlet of the steam boiler, a second head located vertically under the first said head, the last mentioned head being connected with service pipes, downwardly extending pipes connected with the first mentioned head, upwardly extending pipes connected with the last mentioned head, T's located at the inner ends of said pipes, L's connected with the ends of said T's, plates located against the outer side of said L's, the plates at one side of the vertically disposed pipes connected with the plates of the opposite side thereof by means of cross clamp bolts, and coils located in the said tubes and having their receiving ends connected with the L's which are attached to the pipes which depend from the first mentioned head, said coils having their discharge ends connected with the L's which in turn connect with the pipes mounted upon the second mentioned head.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JAMES C. HERON.

Witnesses:

JOHN S. CROOKS,
 JENNIE SCHREMSER.