

C. S. BUCHANAN.  
Domestic Boiler.

No. 20,546.

Patented June 15, 1858.

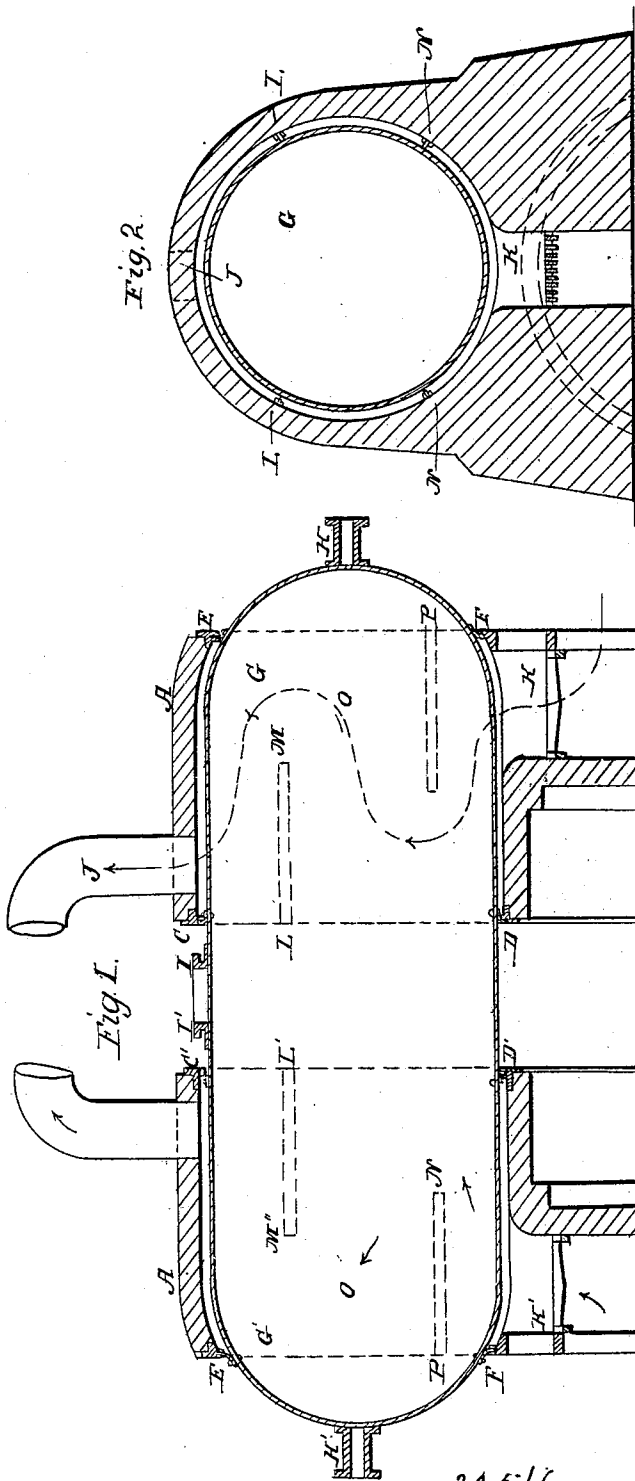


Fig. 2.

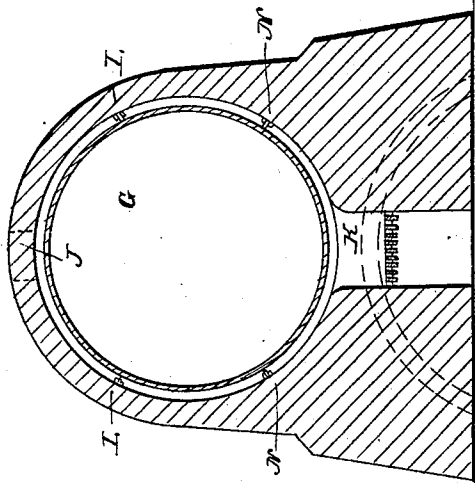


Fig. 4.

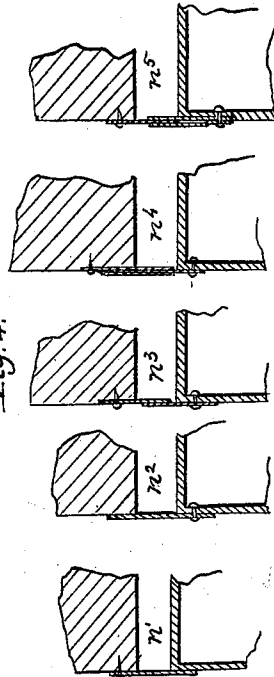
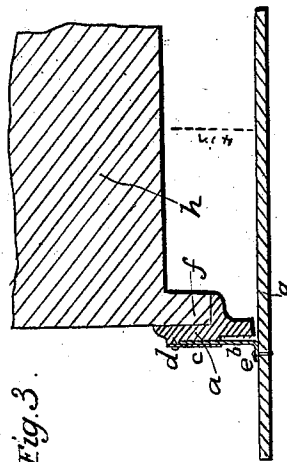


Fig. 3.



20,546.

# UNITED STATES PATENT OFFICE.

C. S. BUCHANAN, OF BALLSTON, NEW YORK.

## MODE OF HEATING ROTARY BOILERS.

Specification of Letters Patent No. 20,546, dated June 15, 1858.

### *To all whom it may concern:*

Be it known that I, C. S. BUCHANAN, of Ballston, in the county of Saratoga, in the State of New York, have invented a new and Improved Mode of Heating Rotary Boilers; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon.

The nature of my invention consists in certain improvements in the construction and arrangement of rotary boilers for generating and superheating steam, for boiling, evaporating, or distilling liquids, generally for all purposes to which boilers are applied but particularly for the treatment of rags, straw or any other substance to be used in the manufacture of paper.

The advantages derived from the use of rotary boilers are paramount but their introduction in the arts and manufactures has been very limited to the present day on account of the expense in the construction and establishment of such boilers and in the consumption of fuel and their liability of getting out of working order. The heating of rotary boilers was practically effected by allowing the steam generated in another boiler to enter the boiler through the journals, either into a jacket surrounding said boiler or into the interior of the boiler itself, where the substance to be heated is submitted to the direct action of the steam. These modes of heating rotary boilers present serious inconveniences resulting from the injurious effects of the steam on certain substances within the boiler as this is the case in the boiling of straw in an alkaline liquor for the manufacture of paper—or by the great waste of fuel. It was suggested that rotary boilers be heated by fire emanating from burning fuel and by the products of combustion thereof. But there are none in use to my knowledge which answer the purpose practically.

The object of my invention therefore is to construct a cheap, strong and effective boiler heater from without by fire and the products of combustion—operating without danger, when a small quantity of water or of any other liquid is used and generating and superheating (if desired) steam at an inferior cost as this has heretofore been done.

To enable others skilled in the arts to construct and use my improved boiler I shall

now proceed to describe my invention, referring to the accompanying drawing forming part of this specification in which:

Figure 1 is a longitudinal section; Fig. 2 is a cross section through A B of Fig. 1; Fig. 3 and Fig. 4 represent various ways substantially the same of closing the flues. The scale for Fig. 1 and Fig. 2 is  $\frac{3}{8}$  of an inch for a foot. Fig. 3 is drawn at a quarter size.

G G' is a rotary boiler which revolves on trunnions H H', and is provided with a man-hole II. In the center of the boiler I leave uncovered a length of about four feet C C', D D' for the man-hole to revolve freely and for easy access to it, either for filling or for emptying the boiler. On each end of the boiler, I also leave uncovered the portion E H F and E' H' F' which I determine by drawing a plane E E across the boiler to half way between center O and the end of the boiler. By thus leaving a large space uncovered around the journals I am sure that these will never get hot from the fire and my flues do not become narrower as they would if drawn to near the center H. Each of the remaining spaces C E F D and C' E' F' D' I inclose in a cylindrical envelop of bricks or other materials about four inches distant from the boiler. At the top is a pipe J leading to a chimney, and at the lower part a fireplace K is arranged in the usual way.

The circular opening at each end of the brick cylinder is closed by means of two flanges; the one of light iron plate is riveted to the boiler; the other of cast iron is firmly united with the brick work; in the last a circular groove is cut in which the flange attached to the boiler fits loosely and revolves. Another way of closing the opening is represented Fig. 3; *g* is the boiler, *h* the brick casing around it; *a* is a cast iron ring which is built upon and is partly protected from the flames by bricks *f*; *b* is an iron flange screwed to the boiler in *e*; *c* is a flat ring screwed on flange *a* in *d* and which presses upon flange C, both ring *c* and flange C having spring enough to form a close joint and leave flange *b* free to revolve. By this arrangement the joint is protected from the direct action of the heat and its less durable parts may be replaced from outside without difficulty.

When a fire is kindled the flames divide on each side of the boiler, go up between

it and the cylindrical casing and escape through pipe *j*. In order to get more heat out of the flames before they reach the chimney, I divide the cylindrical flues by  
 5 partitions N P and L M parallel or nearly so to the axis of rotation. They are formed by bricks which project from the vault as close to the boiler as practicable. These  
 10 partitions do not go the whole length of the flues; a passage is left for the smoke alternately left and right so that the flame takes reversed motion as indicated by arrows; this has moreover the advantage of well  
 mixing the products of combustion.

15 The accompanying drawings represent a boiler 24 feet long and 8 feet in diameter intended for the preparation of paper pulp. In this manufacture large man-holes in the center on the cylinder, are requisite, and as  
 20 a consequence the arrangement for heating has to be double, the one at one end of the boiler being the counterpart of that at the other end. For generating steam and for many other purposes I would have only one  
 25 casing extending the whole length of the boiler from E' F' to F E in which case the fire place might be in the center of the boiler. For a steam boiler stationary pipes  
 30 one of them would be curved down till the end be near the lower part of the boiler for the purpose of supplying water; the other would turn up so that its aperture be above the water level, as high as practicable for  
 35 the purpose of taking out steam. The boiler would be made to rotate by the ordinary arrangement of a wheel and a pinion.

The advantages of my plan for boiling are: 1st it requires but one boiler instead of  
 40 two as now practiced in paper mills, viz, a rotary boiler containing rags, straw or any other substance for making paper pulp, and an ordinary boiler generating steam, which is conveyed in the former or rotary boiler  
 45 to boil the paper stock; 2d it does the work with much less fuel. For the purpose of raising steam my improvement has another advantage which is that the steam being in contact with a fire surface is completely  
 50 dried, the moisture suspended in it being transformed into steam. It also does away with explosion proceeding from a deficiency

of water within the boiler; for the reason that no part of the boiler has time to become red hot before it is cooled by being brought  
 55 in contact with the water.

The closing of the flues can be effected by any of the plans represented, Fig. 4, in which No. 1 represents the flue closed with a flange fastened to the casing; No. 2 represents a flange fastened to the boiler; No.  
 60 3 represents two flanges attached one to the boiler and the other to the casing and overlapping each other; No. 4 represents two flanges attached to the casing and another between the two first which is fastened to  
 65 the boiler; No. 5 is the reverse of No. 4, viz., one flange on the casing and two on the boiler.

The partition which divides into flues the  
 70 space around the boiler, can be in the form of the thread of a nut thus making the flames go around and around the boiler from the fire place to the chimney.

Having now fully described my improvements, what I claim as my invention and  
 75 desire to secure by Letters Patent is:

1. Combining and surrounding a cylindrical boiler made to revolve upon its axis, with one or more stationary envelops, made  
 80 of firebrick or any other equivalent material, arranged at such distance from said boiler as to allow the fire and other products of combustion to pass around the boiler in the manner and for the purposes specified.  
 85

2. I also claim arranging the stationary envelops around a rotary boiler in such a manner as to leave both the ends and the middle of said boiler uncovered for the  
 90 respective purposes of protecting the journals at the ends of the boiler from heating and of allowing access to the manhole as specified.

3. Also, in combination with a boiler constructed and operating in the manner herein described I claim two furnaces arranged  
 95 as described symmetrically in relation to the boiler, whereby the heating of said boiler can be effected in a more economical and uniform manner.

C. S. BUCHANAN.

Witnesses:

V. BEAUMONT,  
 S. DEVEAUVAIR.