

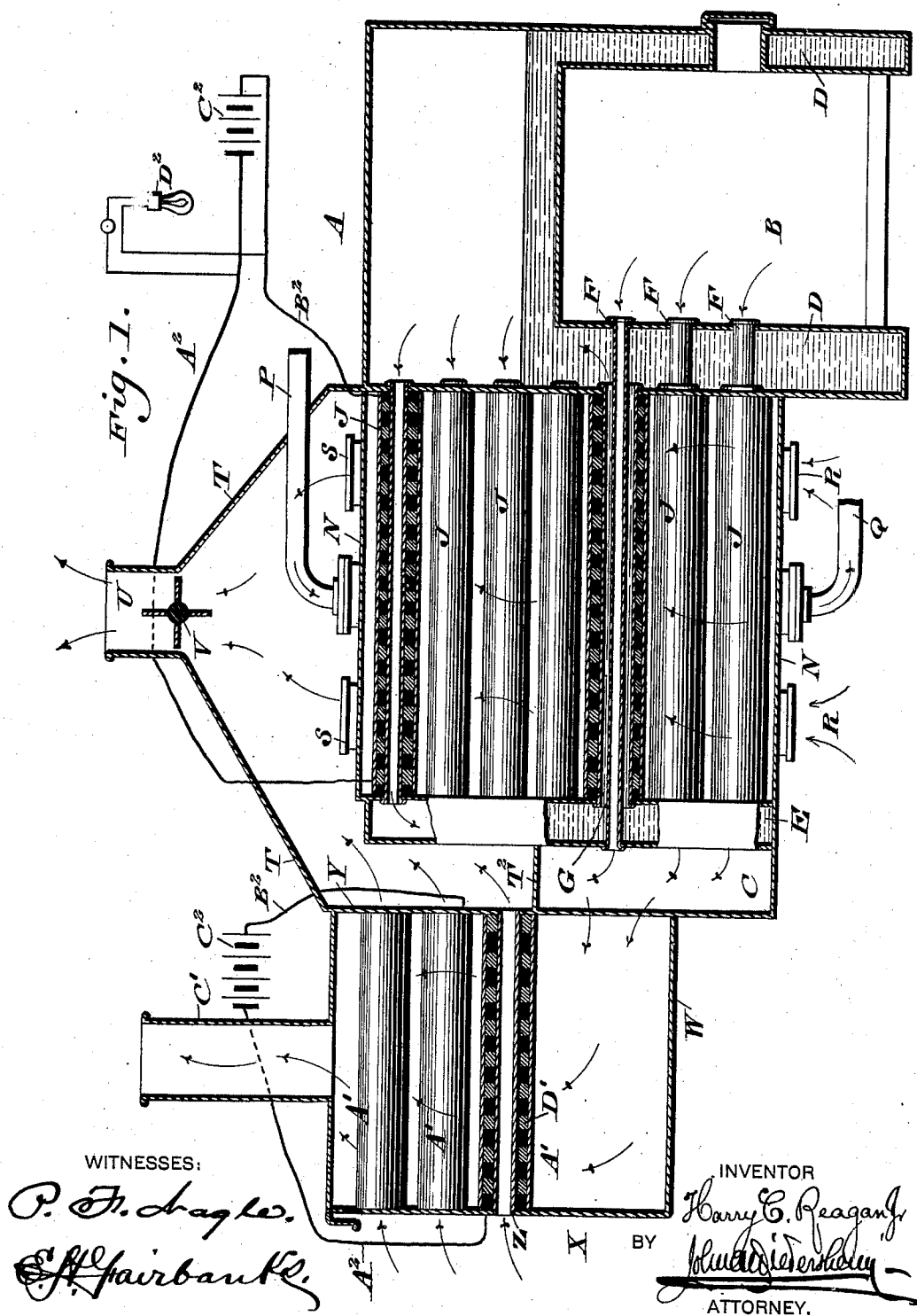
(No Model.)

2 Sheets—Sheet 1.

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APPARATUS FOR GENERATING AND APPLYING HEAT TO THERMOCOUPLES.

No. 577,270.

Patented Feb. 16, 1897.



UNITED STATES PATENT OFFICE.

HARRY C. REAGAN, JR., OF PHILADELPHIA, PENNSYLVANIA.

APPARATUS FOR GENERATING AND APPLYING HEAT TO THERMOCOUPLES.

SPECIFICATION forming part of Letters Patent No. 577,270, dated February 16, 1897.

Application filed April 1, 1896. Serial No. 585,741. (No model.)

To all whom it may concern:

Be it known that I, HARRY C. REAGAN, JR., a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Generating and Applying Heat to Thermocouples, which improvement is fully set forth in the following specification and accompanying drawings.

My invention consists of a novel construction of apparatus for generating and applying heat to thermocouples for the generation of electricity, means being provided for applying heat as well as a cooling medium to said couples, and provision being further made for utilizing to the highest degree all the heat units in the hot gases and the products of combustion.

It further consists of novel details of construction, all as will be hereinafter set forth, and specifically pointed out in the claims.

Figure 1 represents a longitudinal section of an apparatus for generating and applying heat to thermocouples embodying my invention. Fig. 2 represents a vertical view of a modified form of apparatus. Fig. 3 represents a transverse sectional view of Fig. 1, showing the relative position of the thermocouples to the fire-tubes and their inclosing tubes. Fig. 4 represents a longitudinal section, on an enlarged scale, of a portion of one of the thermocouples and its adjuncts, showing certain details of the same which are omitted from the other figures for the sake of clearness of illustration.

Similar letters of reference indicate corresponding parts in the several figures.

Referring to the drawings, A designates an apparatus for generating and applying heat to thermocouples, the same consisting of an inclosing casing within which is contained the fire-chamber B, which is supplied with a grate, a fire-door, ash-pit, and other appurtenances of the usual construction.

D designates a water-leg or fire-box surrounding the combustion-chamber, which is in communication with the fire-chamber B by means of connecting-tubes G.

F designates fire-tubes which lead from the fire-chamber B to the smoke-box C, the preferred manner of connecting the fire-box, com-

bustion-chamber, and water-chambers and of securing in position the thermocouples being illustrated in Fig. 4, in which are shown certain details which have been omitted from Fig. 1 for the sake of clearness of illustration.

The fire-tube F is surrounded by the water-tube G, around which is placed the casing or inclosing shell H, of any vitrified material, upon which rest the thermocouples M and L, which are separated by means of the insulation L², antimony and bismuth being preferably utilized for said couples, although it is evident that other materials may be employed and that the number of couples may be increased or diminished according to requirements.

K designates a casing or shell, of a vitreous or a non-conducting material, inclosing the outer edges of said couples, while the whole is inclosed between the pipe J, which may be of copper or similar material.

N designates an inclosing casing which surrounds said pipes J and their adjuncts, and to which casing the water-leg E is attached.

P designates a pipe leading into said casing for the purpose of introducing the cooling fluid thereinto, the same being conducted therefrom by means of the exit-pipe Q.

S and R designate lower and upper man-holes, respectively, for access to said casing N.

T designates a hood which surrounds the casing N, the same being separated from the smoke-box C by means of the partition T², said hood having an outlet U, within which is located a fan or blower V for the purpose of inducing a current of air to cool the thermo within the casing N, it being understood that the manholes are open to the atmosphere, also to cause the air to pass through the tubes Z to cool the thermo in the smoke-arch.

W designates a casing attached to the smoke-box C and hood T, respectively, the side Y of the same, in conjunction with the side X, serving as tube-sheets and retaining therein the inner and outer tubes Z and A', within which are contained the thermocouples, it being understood that the inner and outer tubes are provided with vitrified linings or any non-conducting material, between which the couples are held in the same manner as illustrated in Fig. 3.

C' designates a stack leading from the upper portion of the casing W, through which the products of combustion make their exit.

Fig. 2 designates a modified form of apparatus, the same consisting of a suitable casing F', from which depends the water-leg E' of said casing, having the upright fire-tubes G' therein.

H' designates laterally-extending tubes which project from said casing F' and are open to the interior of the same.

J' designates a casing which surrounds said laterally-extending tubes and is provided with the exterior shell K', the whole forming a chamber L', within which the thermocouples M' are inclosed, the cooling medium being led into the said chamber L' through the conduit L² and discharged therefrom through the conduit L³, access being had to the interior through the medium of the openings M², it being understood that the thermocouples M' are arranged substantially as seen in Fig. 4.

N' designates a stack leading from the hood D², upon which is supported the annular chamber S', between which and the annular water-jacket P' are located the thermocouples P'', the cooling fluid being introduced into said jacket through the pipe Q' and having its exit therefrom through the pipe R'.

The operation is as follows: Referring first to Fig. 1, the heat and products of combustion pass from the fire-chamber B and are conducted through the tubes F to the smoke-box C, thence to the casing W, and from there to the stack C', the atmosphere or other cooling medium being drawn in the direction of the arrows through the tubes Z into the interior of the hood T, and thence out through the stack U by the rotation of the fan or blower V, it being remembered that the exterior of the thermocouples are simultaneously cooled by the introduction of a cooling medium through the inlet P, the same having its exit through the pipe Q. In order to first create a circulation of cold air to cool the outer junction of the thermos, I remove the caps from the manholes S and R in order to let the air pass in around the tubes containing the thermos, and at the same time air will pass through the inner tubes of the thermos in the casing W, and thus cool their junctions, which in this case would be the inner junctions.

The application of heat and cold to the thermocouples in the manner described will, as is familiar to those skilled in the art, generate electricity, which may be conducted away from said couples in any suitable manner, the thermo elements being connected up in parallel or in series, as is evident, although I have not deemed it necessary to show such construction in detail.

In the construction seen in Fig. 2 the heat-generator is shown as being placed in vertical position, while the laterally-projecting tubes H' are vitrified or surrounded by any material not a conductor of electricity, and

the thermocouples surround these tubes, as in Fig. 4, while, as in Fig. 1, there is a cooling-jacket surrounding the tubes, as shown, and I also place thermocouples on the stack N' to get the benefit of the heat units of the escaping gases, thus utilizing every portion of the latter.

It will be seen that by vitrifying the tubes in the manner described the thermo junctions bear against the vitrified tubes, thereby preventing a short circuit of the thermos, and that further the water being a great absorber of heat will retain the heat evolved from the fire while the thermocouples are taking their heat from the water, steam, or other heat-absorbing agent, and even if the fire was extinguished the thermos would still be supplied with heat from the steam, hot water, or other heat-absorbing agent which is contained within the casing constituting the boiler, it being of course understood that ordinarily no steam is withdrawn from the boiler, the same after having been once filled being tightly closed.

It will be apparent that conductors, as A² B², may be employed, leading from the thermos to the battery C² or the lights D², and that the thermos may be connected up in such other manner as may be desirable. It will also be understood that I may use any form of pipe or tube projecting from a heat-generating device on which the thermos may be mounted, as in Fig. 2 I show straight tubes projecting from the heat-generating chamber which may be of any length or shape and may bend around and have both ends open to or project into the boiler. It is also apparent that I may use any fuel in operating this device, such as oil, coal, gas, or other combustible matter.

It is to be understood that I do not confine myself to the specific construction shown, but I can use such forms as come within the scope of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A boiler provided with water-tubes, fire-tubes passing through the latter, a series of thermocouples supported upon said water-tubes and means for holding said couples in position, substantially as described.

2. A steam or heat generator consisting of a fire-box, a smoke-box, and a water-jacket, fire-tubes connecting the combustion-chamber and smoke-boxes, and water-tubes connecting the water-legs, in combination with thermocouples supported upon said water-tubes, substantially as described.

3. A boiler consisting of water-tubes, a water-leg and a smoke-box, fire-tubes connecting the latter and the combustion-chamber, water-tubes connecting the water-legs and surrounding said fire-tubes, a lining of vitreous or other non-conducting material surrounding the said water-tubes, thermocouples supported upon said lining, a second lining of vitreous or other non-conducting

material inclosing said couples, and an inclosing tube surrounding said non-conducting linings and couples, substantially as described.

5 4. A boiler having water-legs, and a smoke-box, connections between said water-legs and smoke-box, a combustion-chamber, an auxiliary casing attached to said smoke-box, a hood mounted on said boiler, a partition between said smoke-box and hood, air-tubes communicating with the atmosphere and the interior of said hood, a casing surrounding the said air-tubes, thermocouples located within said casing, and a draft-inducing device located in the outlet of said hood, substantially as described.

5. In a device of the character described, a water-tube, a vitreous or non-conducting lining surrounding the same, thermocouples supported upon said lining, another non-conducting lining inclosing said couples, and tubes of copper or other suitable material inclosing the whole, substantially as described.

6. A boiler provided with fire-tubes, water-tubes surrounding the same, thermocouples supported upon said water-tubes, a casing surrounding the whole, means for conducting air or other cooling medium around said casing, a hood supported upon said boiler, and

means for creating a draft in said hood, substantially as described. 30

7. A steam-boiler, having water-tubes projecting therefrom, a series of thermocouples supported upon said tubes a casing surrounding the latter and said couples, and means 35 for passing a cooling medium through said casing, substantially as described.

8. A casing, having an open-ended tube secured therein, thermocouples supported upon said tube, a casing inclosing said couples, 40 means for heating said last-mentioned casing and means for cooling said tube, substantially as described.

9. A boiler provided with water-tubes, fire-tubes passing through the latter, a series of 45 thermocouples supported upon said water-tubes, means for holding said couples in position, a casing in communication with said fire-tubes, open-ended tubes secured in said casing, thermocouples supported thereupon, 50 a casing inclosing said couples, and means for heating and cooling the latter, substantially as described.

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Witnesses:

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