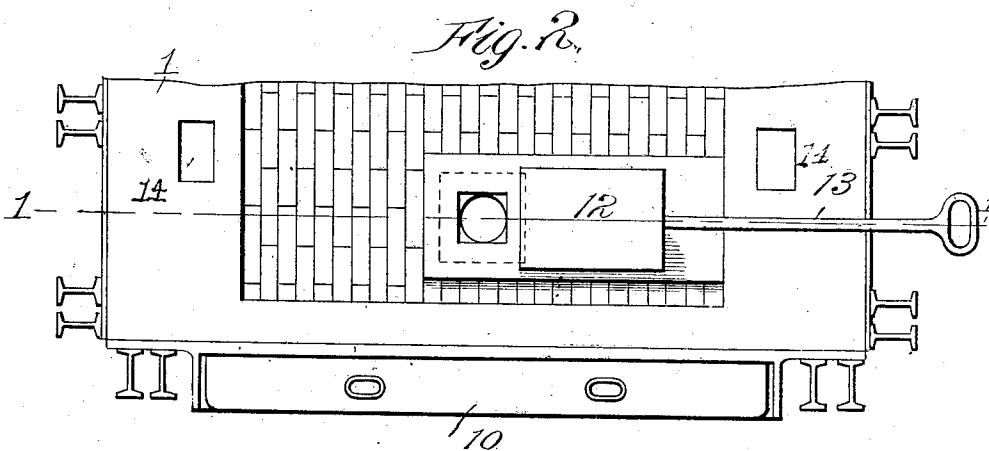
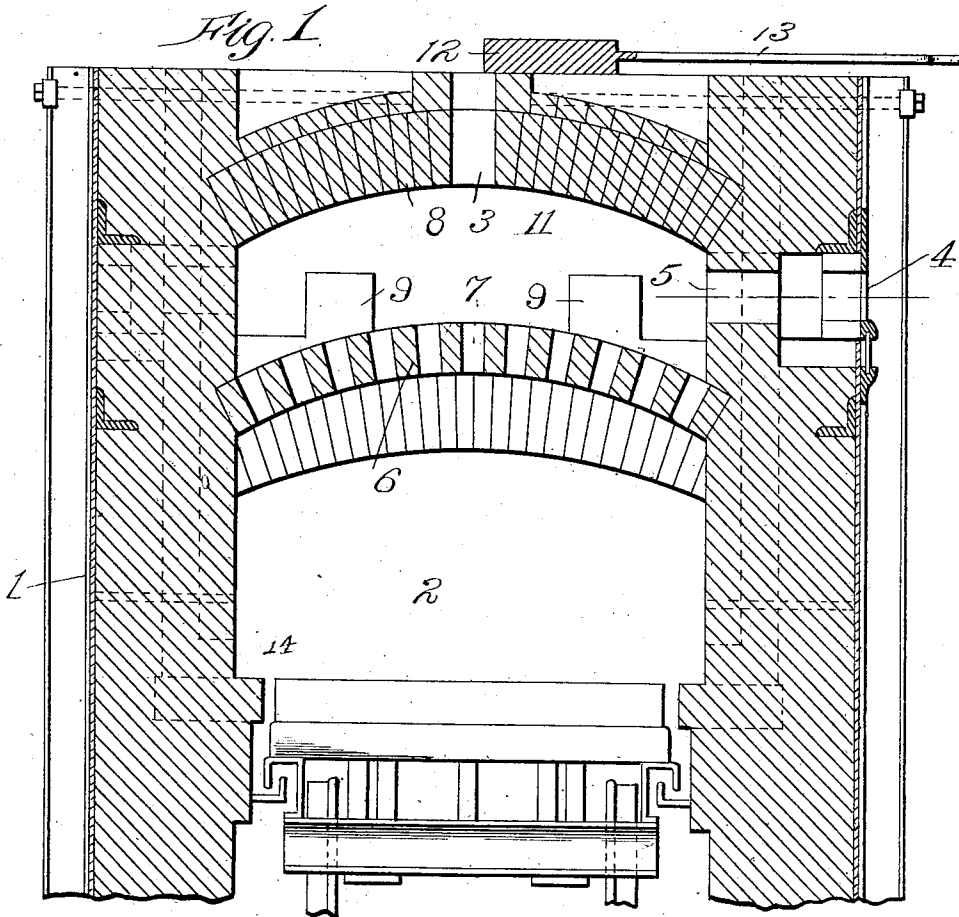


W. S. QUIGLEY.
FURNACE.
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UNITED STATES PATENT OFFICE.

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FURNACE.

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To all whom it may concern:

Be it known that I, WIRT S. QUIGLEY, a citizen of the United States of America, residing at Rockaway Park, county of Queens, State of New York, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

My invention relates to "heat treating" furnaces, such as are used for annealing, or for heat treating materials for hardening and tempering, etc., and particularly to what are known as "over-fired" furnaces, in which the combustion chamber is located above the heating chamber so that the heat generated in the combustion chamber will be discharged downwardly into the heating chamber. In furnaces of this character, especially for those used for work requiring accurate and controllable temperature, such as heating for hardening and tempering purposes, it quite frequently becomes desirable to suddenly check a rise or to lower the temperature of the furnace. Heretofore the only method of securing either of these results has been to close off the burner or other heat producing arrangement and open the doors leading from the outer air to the heating chamber. But this method is not efficient nor always permissible for the reason that the heat remaining stored up in the combustion chamber, which is necessarily heated to a degree higher than that of the heating chamber, is sufficient to keep up or even increase the temperature of the heating chamber for a period of time after the burners are shut off, and by opening the doors unequal and too sudden cooling is effected. Briefly stated, my invention aims to secure accurate control of the temperature of furnaces of this type and further to provide for the uniform lowering or checking of the temperature of such furnaces.

My invention accordingly resides in the combination with an over-fired furnace having a heating chamber and a combustion chamber above the heating chamber, in free communication therewith, of means for controlling the heat of such furnaces comprising a regulating relief passage in the top of the combustion chamber which may be partially or wholly opened, and which when so opened is arranged to permit the escape of the heat from the combustion chamber without passing into or through the heating chamber, the relief passage being independent of the means of escape normally afford-

ed by the exit flues, with which the heating chamber is provided.

Various other objects and features of the invention will appear as the reading of the specification proceeds.

The accompanying drawings typify the invention in the preferred form, but I wish it to be understood that various changes and modifications may be made without departing from the true spirit and scope of the invention.

In the drawings: Figure 1 is a vertical cross section of an annealing furnace embodying the invention taken on line 1—1 of Fig. 2, parts being broken away, and Fig. 2 is a broken plan view of a portion of the same.

In the drawings like reference characters are used to indicate like parts.

The drawings illustrate an annealing furnace of the "over-fired" type in which the furnace body 1 is provided with a heating chamber 2 in the lower portion thereof and with a combustion chamber 11 directly above the heating chamber, the heat in this case being supplied by one or more hydrocarbon burners (a recess for one of which is shown at 4) discharging into the combustion chamber through burner openings (one of which is shown at 5) preferably disposed in the side of the combustion chamber, as shown. The two chambers are preferably separated more or less by an arched wall 6 but free communication is allowed for between the chambers by providing this arch with openings 7 therein. For the purpose of directing the heat in the combustion chamber down into the heating chamber, the combustion chamber is preferably provided with an arched roof 8. Baffles 9, 9, may be provided for breaking up the blast from the burner and deflecting the incoming products of combustion.

As pointed out in the introductory statement, it has only been possible to control the heat of furnaces of this type heretofore by shutting off the burner or opening up the door or doors 10 at the end or ends of the heating chamber. It is obvious that regulation by opening door 10 will make a sudden drop, especially near the doors, caused by the inrush of cold air, and not gradually hold or reduce the temperature as usually desired, while if the burners are stopped without opening the door, the heat pent up within the combustion chamber will

be effectively radiated down into the heating chamber for a considerable time even after the burners have been cut off. As, in the present day work, accurate heat treatment is absolutely necessary, such as for annealing, hardening and tempering purposes, and as it is frequently desirable to secure the sudden but even stopping or lowering in temperature of the furnace, I have provided for the accomplishment of this result by the placing of a relief passage or opening 3 in the roof of the combustion chamber substantially at the top of the arch and therefore at the highest point in said chamber. This relief passage is provided with a controllable gate or valve 12, the regulation in the present instance being accomplished by providing the slide valve 12 with handle 13. Any other convenient mechanism could be substituted, and the location of the relief passage might be varied.

The operation of the invention will be readily understood from the foregoing. During the normal operation of the furnace the relief passage in the top of the combustion chamber will be closed and the hot gases will pass off by the usual flues 14. At any time that a sudden checking in temperature is desirable, the slide valve 12 or other closure will be shifted to open up the relief passage. The burners also will usually be shut off. When this is done, it will be clear that free escape will be provided for the heat within the combustion chamber, thereby "spilling" the heat, as it is termed, and bringing about a lowering of the temperature in the furnace, or at least preventing its further rise. It will be evident that not only does this "spilling" process permit the free escape of the heat in the combustion chamber, but also of the heat in the heating chamber, on account of the free communication allowed between the two chambers. Normally the products of combustion escape from the furnace by way of one or more exit flues 14 shown in dotted lines in Fig. 1, extending from the heating chamber to the exterior of the furnace. In the preferred arrangement these exit flues extend from the bottom portion of the heating chamber up through the side walls to the top of the furnace thus providing circulation of the gases of combustion from the combustion chamber, down into the heating chamber and up to and through the top of the furnace, and when the relief opening or openings (the number depending upon the size of the furnace) are open, the heat and products of combustion are no longer forced to traverse this usual path through flues 14, but naturally seek the shortest course and are allowed to escape direct out through the top of the combustion chamber by way of relief passage 3.

In case a sharp drop of temperature

should be required, the slide 12 may be withdrawn to open passage 3, and the furnace door 10 may be simultaneously opened. This would produce an updraft of cold air through the furnace that would produce a sudden chilling and would only be done in extreme cases.

Having described my invention, I claim:

1. A furnace comprising a heating chamber, a combustion chamber above the heating chamber and in free communication therewith, a burner discharging into the combustion chamber, an exit flue or flues extending from the heating chamber and forming a normal means of escape for products of combustion, and the combustion chamber having a relief opening and means for controlling the same arranged when open to form a means of escape of products of combustion direct from the combustion chamber independent of the exit flue or flues.

2. A furnace comprising a heating chamber, a combustion chamber above the heating chamber and in free communication therewith, a burner discharging into the combustion chamber, exit flues extending from the heating chamber to the exterior of the furnace forming the normal means of escape from the furnace of products of combustion, the combustion chamber having a relief opening in the top thereof arranged to form a means of escape for products of combustion direct from the combustion chamber wholly apart and independent of the escape afforded by the exit flues, and an adjustable closure to the said relief opening.

3. A furnace comprising a heating chamber, a combustion chamber above the heating chamber, a burner discharging into the combustion chamber, a wall between the combustion chamber and heating chamber provided with openings to permit the products of combustion from the burner to pass on down into the heating chamber, the combustion chamber being provided with a relief opening in the top thereof arranged when open to permit the heat in the combustion chamber to escape direct through the roof of such chamber, and an adjustable closure controlling the said relief opening.

4. A furnace comprising a heating chamber, a combustion chamber above the heating chamber, a burner discharging in through the side of the combustion chamber, a wall between the combustion chamber and heating chamber provided with passes therein, to permit heat in the combustion chamber to pass on down into the heating chamber, an arched roof to the combustion chamber provided with a relief opening therein substantially at the highest point of the arch arrangement when open to permit free escape of the heat in the combustion chamber, and an adjustable closure to the said relief opening.

- 5 A furnace body having a heating chamber in the lower part thereof and a combustion chamber above the heating chamber in free communication with the same, a burner discharging inwardly through the side of the combustion chamber, the combustion chamber having an arched roof for directing the heat down into the heating-chamber, said roof having a relief opening
10 therein substantially at the top of the arch arranged to provide free escape for the heat in the combustion chamber when the same is open, and an adjustable closure for said relief opening.
15 6. A furnace comprising a furnace body provided with a heating chamber in the lower part thereof, and with a combustion chamber above the heating chamber, an arch separating the two chambers, provided with openings therein to permit free communication between the chambers, a burner discharging inwardly through the side of the combustion chamber, the combustion chamber having an arched roof to direct the products of combustion down into the heating chamber, the said roof being provided with a relief opening therein substantially at the top of the arch arranged when open to permit free escape of the heat confined within the combustion chamber, and an adjustable closure for the relief opening slidably mounted on the top of the furnace body.

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Witnesses:

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