

(No Model.)

H. M. PIERCE.

PROCESS OF MANUFACTURING CHARCOAL AND KILN THEREFOR.

No. 284,059.

Patented Aug. 28, 1883.

Fig. 2.

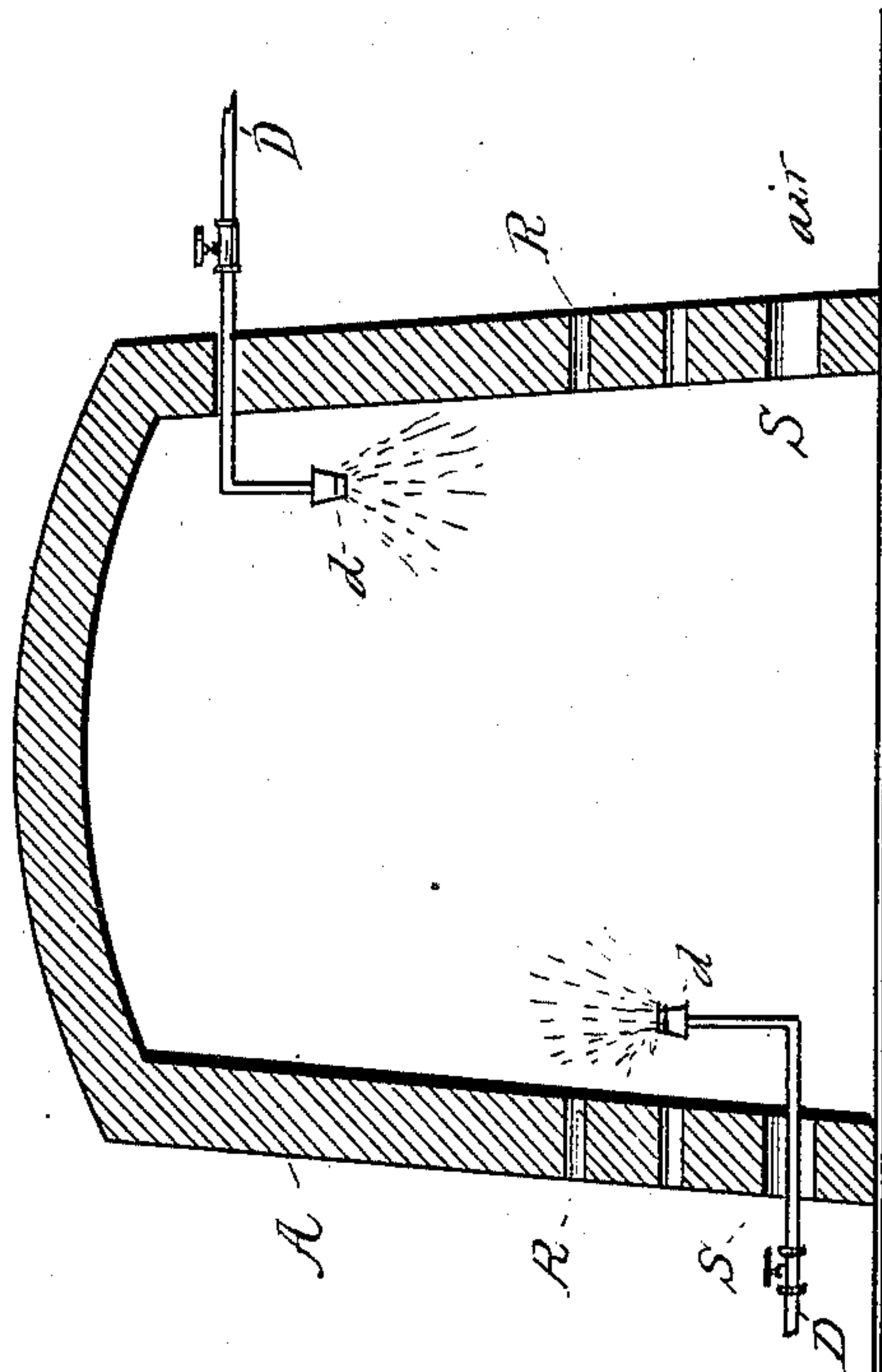
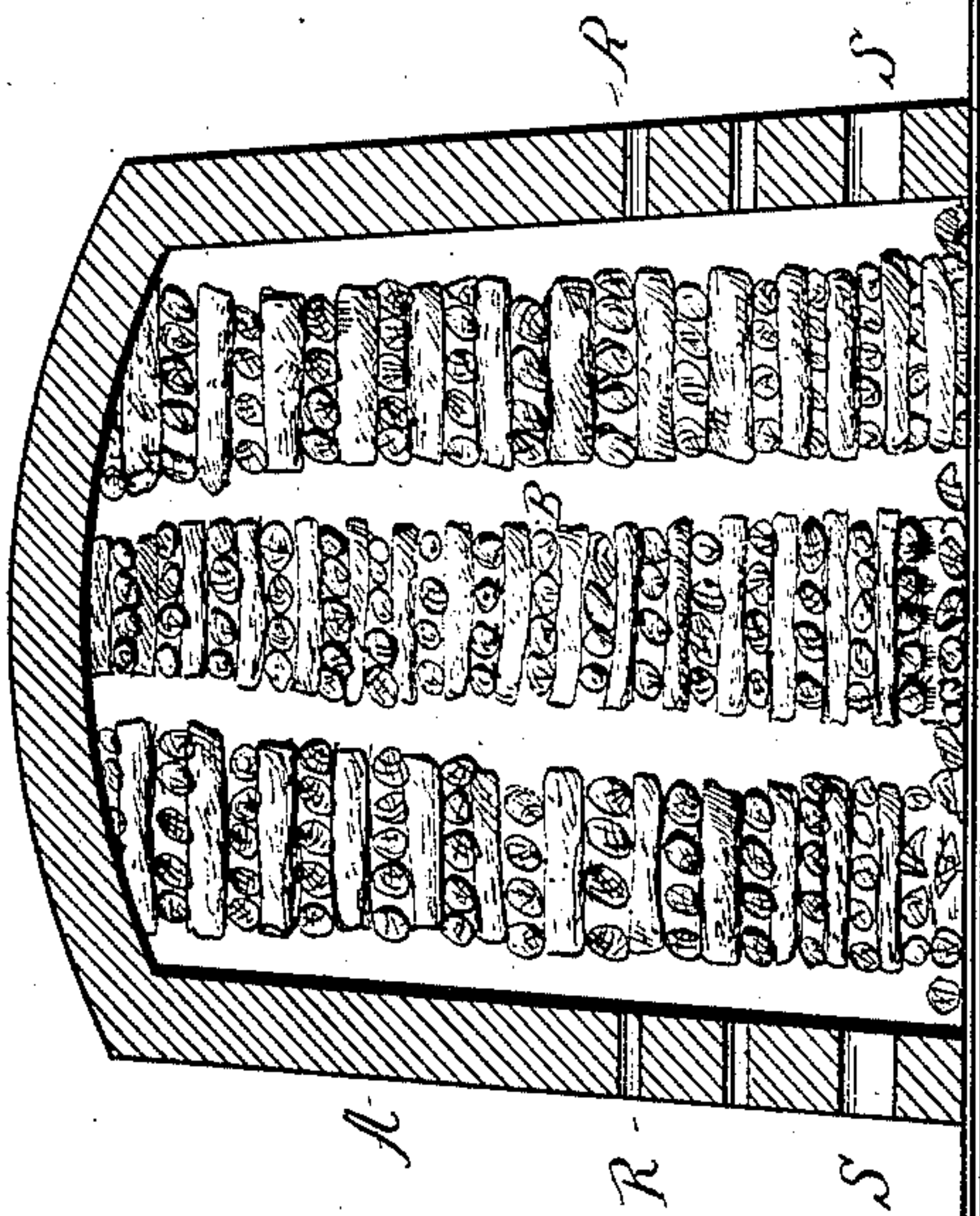


Fig. 1.



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Inventor:  
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Att'y.



# UNITED STATES PATENT OFFICE.

HENRY M. PIERCE, OF CHICAGO, ILLINOIS.

PROCESS OF MANUFACTURING CHARCOAL AND KILN THEREFOR.

SPECIFICATION forming part of Letters Patent No. 284,059, dated August 28, 1883.

Application filed June 2, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY M. PIERCE, 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 Processes of Manufacturing Charcoal and Kilns therefor; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

The object of this invention is to produce and maintain a uniform temperature in all parts of a charcoal-kiln during the process of the carbonization of wood.

It is the universal custom, in making charcoal in brick ovens or kilns, to pile the wood as compactly as possible in charging the kiln, with the view of economizing space. It invariably follows that after the carbonization of the wood so piled has proceeded far enough to have reduced the upper portion of the charge to charcoal the continuance of the charging process is retarded and sometimes wholly arrested by the matting together of this first-made charcoal with the remaining uncharred compactly-piled wood. The few interstices left in the wood as originally ranked in the oven having been thus completely filled up, the circulation of heat is brought to a standstill. The reduction of the remaining portion of the charge to charcoal becomes a very difficult matter. This is only effected by burning through the charcoal first made and through the compactly-piled wood, and by forcing the fire and gaseous products toward the bottom of the kiln, to the injury of the kiln itself and at the expense of both time and coal.

With the view of determining the measure and the causes of the bad results and difficulties under the system of making charcoal now in general use, and of ascertaining the exact facts in the case, a series of exhaustive experiments were carried on through a period of many months in connection with the largest battery of charcoal-kilns in the United States. The average result was that when the upper

part of the charge—say one-third of the entire kiln-charge—had been reduced to charcoal the heat, by Brown's pyrometer, stood from 800° to 1,000° Fahrenheit in the top of the oven, and from 100° to 250° Fahrenheit within, say, three feet of the bottom of the oven. These experiments not only gave me the measure of the serious defects of the old system, but clearly indicated the causes that led to the bad results under that system—such as light charcoal, less charcoal per cord than should be obtained, a large percentage of each charge left in form of wood or brands in the bottom of the kiln, ashes in various parts of the kiln, &c.

By this invention I remedy the defects heretofore present in the manufacture of charcoal, or, rather, I produce and operate for the first time in this special branch of industry a complete simple method of making charcoal without loss of time in its production, and with a decided increase in the quality and quantity per cord of wood. This I accomplish, first, by so piling the wood in the kiln as to provide spaces that shall admit of the free circulation of the heat throughout the entire charge; and, secondly, by producing and maintaining this circulation of heat throughout the entire charge through the agency of steam, air, or any other suitable gas. Experiments made on this improved method of making charcoal indicate throughout the entire process of the carbonization of a kiln of wood differences in temperature of less than 100° Fahrenheit in the top, bottom, and central parts of the oven. The charring was carried on evenly and simultaneously through the entire charge. By this improved method I do not, indeed, occupy all the space in the charring-oven, but what is lost in this respect is more than made good by increased yield of charcoal in quality and quantity and in the saving of time.

Having stated the nature and object of my invention, I will now proceed to more particularly describe it with reference to the accompanying drawings, in which—

Figure 1 represents a vertical section of a kiln or oven in which the wood is piled in accordance with my improved method. Fig. 2 represents a vertical section of a kiln or oven provided with two steam-jet nozzles and pipes.



The walls A of the kiln are provided near their base with holes S S for the admission of air, and at suitable points above the base with holes R R for the escape of the volatile products of the dry distillation of wood. One or more pipes, D D, having jet-nozzles *d d*, are provided at the top and bottom of the kiln for the admission of jets of steam to aid in the circulation of the hot gaseous products, &c., for maintaining a uniform temperature and carbonization of the wood. The wood B is piled in the kiln in such manner as to leave flues and numerous interstices for the circulation of hot gaseous products, as below more specifically described. The wood is piled in columns extending from bottom to top, and placed at short distances from the walls of the kiln and from each other in order to provide vertical flues, and in each column the sticks are laid in a reticulated manner—that is, the sticks in each successive layer or course are laid at right angles to those in the preceding one—thereby providing spaces between the sticks of wood throughout the entire charge, whereby every portion thereof may be permeated and acted upon by the fire and hot circulating gaseous products resulting from the dry distillation of the wood. Excepting the holes S S and R R, that are left open for the admission of air and the subsequent escape of gases, the kiln is sealed up. Fire is then communicated to the top or the bottom of the charge. The charring, however, invariably begins at the top of the charge, and I therefore prefer to fire at the top of the kiln. After the process of carbonization has fairly and fully commenced and moist gases have begun to issue from the vents R R, steam, superheated or otherwise, is admitted to the kiln through the pipes D D and nozzles *d d* in opposite directions at top and bottom. The introduction of jets of steam produces a rapid dissemination and circulation of heat and gases in all parts of the kiln through all the interstices of the charge. The heat-circulating medium is applied continuously from the stage of the charring process at which it is turned on until the entire contents of the kiln or oven have been reduced to charcoal. The circulating agent—in this instance steam—is then turned off, the kiln hermetically sealed, and the contents allowed to cool.

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

1. In the production of charcoal, the method of charging the kiln, which consists in piling the sticks of wood in courses in a reticulated form from bottom to top, and so as to provide channels or flues from bottom to top of the kiln in different portions of the charge for the purpose of causing a free circulation of heat and gaseous products through all portions of the charge and producing charcoal of uniform quality.

2. In the manufacture of charcoal, the method of charging the kiln, which consists in piling the wood in columns at suitable distances from the side walls and from each other to form flues, and in laying the sticks in the columns in reticulated form from bottom to top of the kiln, and thereby forming suitable interstices for the free circulation of heat and gaseous products through all portions of the charge and causing a rapid and uniform charring thereof.

3. The method of manufacturing charcoal, which consists in charging the kiln with wood laid in reticulated form, and with flues extending from bottom to top of the kiln, firing the charge, and admitting jets of steam or other gaseous fluid into the flues, and thereby causing a circulation of the heat and gaseous products through all the interstices of the charge, whereby it is rapidly and uniformly heated and reduced to charcoal of even quality.

4. In the manufacture of charcoal, the method of uniformly heating the charge, which consists in forcing into the fired charge jets of steam or other gaseous medium at top and bottom in opposite directions, and thereby disseminating and circulating the heat and gaseous products through the interstices of the charge.

5. The combination, with a kiln having the wood arranged therein as described, of the injectors D D *d d*, located on opposite sides of the kiln, one at the top and the other near the bottom, whereby a uniform temperature is maintained within the kiln from top to bottom, as set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

HENRY M. PIERCE.

Witnesses:

DENNIS CHURCH,  
WILLARD WARNER.