

No. 654,175.

Patented July 24, 1900.

D. S. MCGREGOR & S. B. LOCKLIN.

J. S. BAMFORD, Administrator of D. S. MCGREGOR, Dec'd.

FURNACE.

(No Model.)

(Application filed Aug. 24, 1898.)

2 Sheets—Sheet 1.

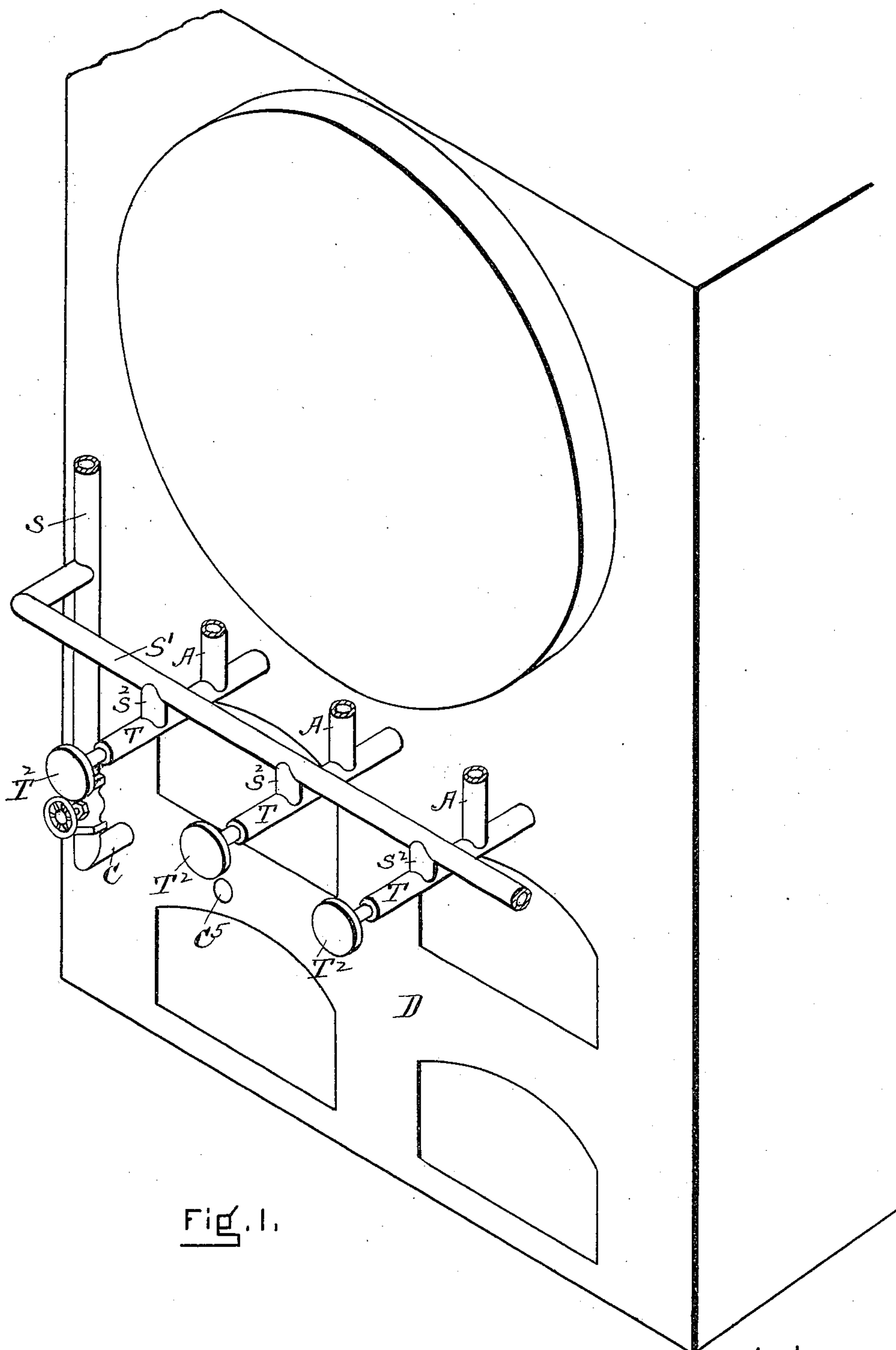


Fig. 1.

WITNESSES

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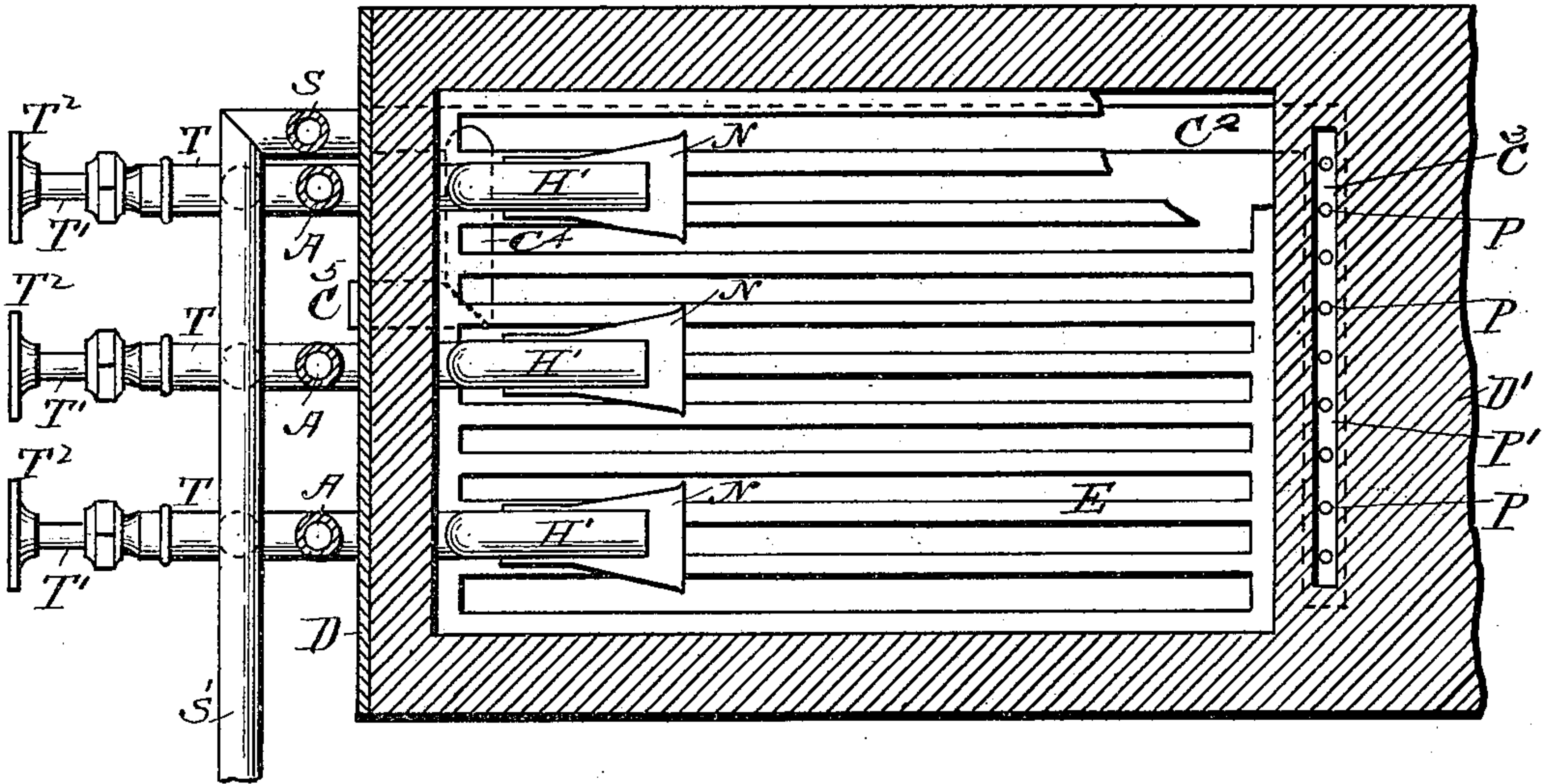
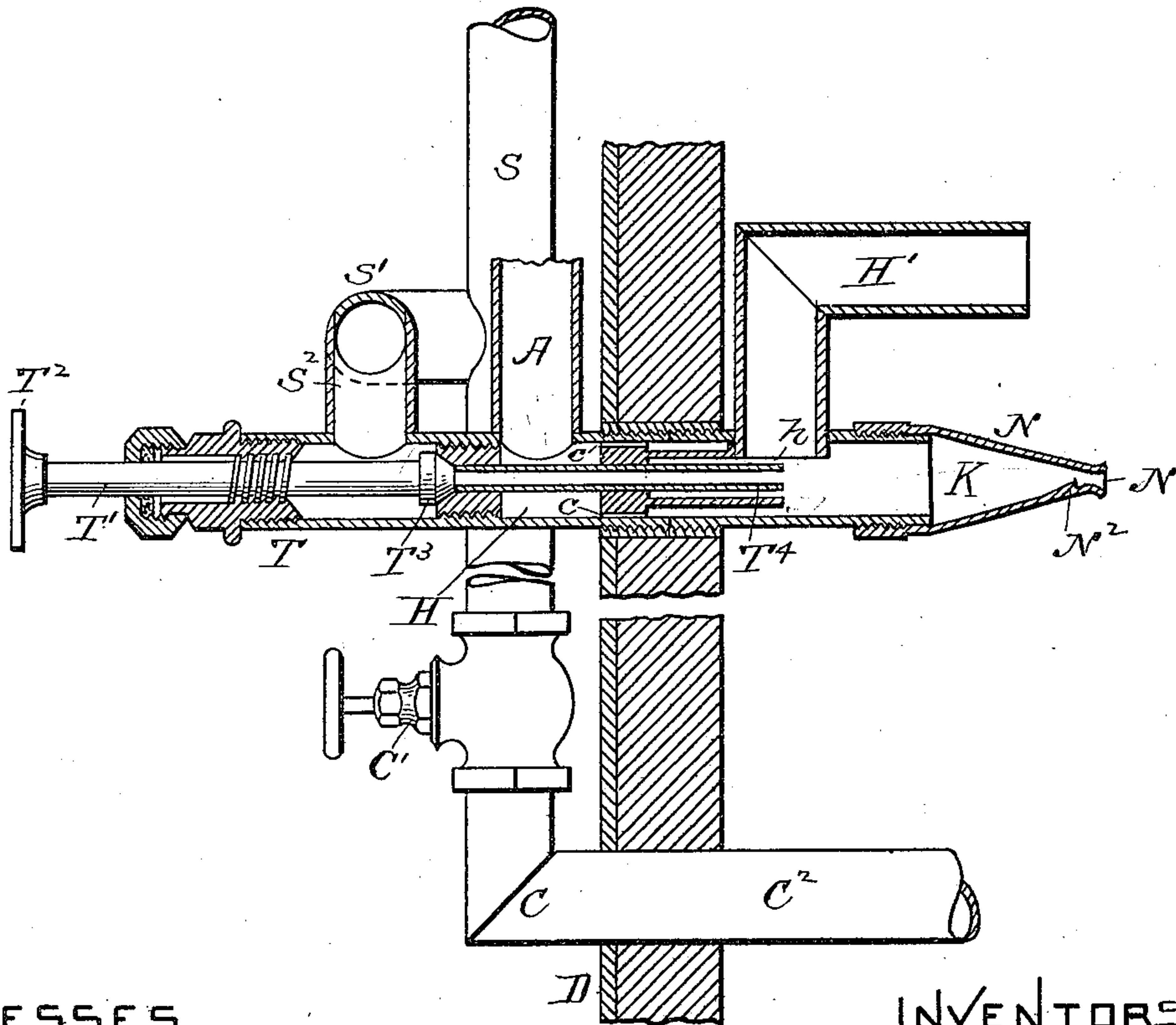


Fig. 2.



WITNESSES

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Fig. 3. Daniel S. McGregor  
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# UNITED STATES PATENT OFFICE.

DANIEL S. MCGREGOR AND SAMUEL B. LOCKLIN, OF BOSTON, MASSACHUSETTS; JOHN S. BAMFORD ADMINISTRATOR OF SAID MCGREGOR, DECEASED.

## FURNACE.

SPECIFICATION forming part of Letters Patent No. 654,175, dated July 24, 1900.

Application filed August 24, 1898. Serial No. 689,413. (No model.)

*To all whom it may concern:*

Be it known that we, DANIEL S. MCGREGOR and SAMUEL B. LOCKLIN, of Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Furnaces, of which the following, taken in connection with the accompanying drawings, is a specification.

Our invention consists in certain appliances to be used in connection with furnaces by the aid of which combustion is much improved and the smoke and other combustible matter are completely utilized by conversion into a smokeless product of combustion, the object being to prevent the formation of smoke in furnaces by commingling in the fire-box certain combination of hot and cold air and steam. This object is attained by the mechanism shown in the accompanying drawings, in which—

Figure 1 is a sketch in perspective showing the arrangement of the steam and air pipes leading into the fire-box. Fig. 2 is a horizontal section showing the fire-box and steam and air pipes. Fig. 3 is a vertical section showing details enlarged.

In the drawings we have shown our apparatus as applied to a steam-boiler furnace; but we do not wish to confine ourselves to this application, as our invention, slightly modified, will apply to any furnace.

Our object is to prevent the formation of smoke by securing perfect combustion, and this may be done in almost any furnace by the use of our system of introducing air (hot and cold) and steam properly proportioned and commingled.

In the drawings, D represents the front of a boiler-furnace. S is a steam-pipe leading from any convenient part from which steam may be taken. The lower end of this pipe connects with the pipe C, which passes in under the grate E, Fig. 2, and is indicated by the letter C<sup>2</sup>. Thence it passes to the pipe C<sup>3</sup> in the bridge-wall D'. The pipe C<sup>3</sup> is perforated, as indicated at P P, through which steam passes to the slot P' in the upper face of the said bridge-wall. An air-pipe C<sup>5</sup> C<sup>4</sup> passes through the front wall of the furnace and enters the steam-pipe C<sup>2</sup>, as shown

in Fig. 2. The steam-pipe S has a valve at C', by which the amount of steam admitted to the bridge-wall is regulated. If desirable, a regulating-valve may be applied to the cold-air pipe C<sup>5</sup> C<sup>4</sup>, so that the amount of air admitted to the bridge-wall may also be regulated, as well as the proportion of steam and air. The amount of combined air and steam, as well as the proportions to pass in by the bridge-wall, are to be governed by the kind of fuel and the condition of the fire.

We will now describe the devices for introducing air and steam into the fire-box from the front.

The steam-pipe S has a branch S' leading along the front, as shown in Figs. 1 and 2, which has connections S<sup>2</sup> S<sup>2</sup> S<sup>3</sup>, leading to pipes T T T. Each of the pipes T has a valve T<sup>3</sup>, controlled by the valve-stem T' and hand-wheel T<sup>2</sup>. The pipes T are all alike and are each provided with the same connections and are constructed and arranged as shown in detail in Fig. 3. The number of these pipes can be varied to suit the style and size of the furnace. Referring to Fig. 3, the pipe T receives steam from the pipe S and its connections and delivers it to the pipe T<sup>4</sup>, the amount being regulated by the valve T<sup>3</sup>. A pipe A admits cold air to the space H, surrounding the steam-pipe T<sup>4</sup>, and passing through the passages c c enters the commingling-chamber K, where it mingles with the steam from the pipe T<sup>4</sup>. Hot air and gas of incomplete combustion from the interior of the fire-box pass through the pipe or conduit H' into the space h near the outlet of the steam-pipe T<sup>4</sup> and the cold-air passages c c and thence to the chamber K in the nozzle N, where the steam, cold air, and hot air and gas all combine and pass into the fire-box through the opening N', across the path of the products of combustion at the rear of the combustion-chamber. The nozzle N has near its orifice N' a deflector N<sup>2</sup>, which serves to interrupt the free flow of the air and steam, and thus causes it to be still more thoroughly mixed.

The several air-pipes can have valves or dampers of ordinary construction, so as to completely control the amounts of hot and

cold air to be admitted in conjunction with the steam.

We claim—

In a furnace of the class described, the combination of a commingling-chamber, a nozzle communicating therewith and arranged to discharge into the combustion-chamber above the fuel, gas and air conduits communicating with the commingling-chamber, a steam-jet arranged to induce currents of air and gas through said air and gas conduits, and means for delivering commingled air and steam

across the path of the products of combustion at the rear of the fuel-chamber, substantially as and for the purpose set forth.

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In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, on this 27th day of July, A. D. 1898.

DANIEL S. MCGREGOR.  
SAMUEL B. LOCKLIN.

Witnesses:

EDWARD S. DAY,  
FRANK G. HATTIE.