

(No Model.)

J. B. ROOT, Dec'd.

H. M. Root and W. S. CHURCH, Administrators.

BLOW PIPE APPARATUS.

No. 377,467.

Patented Feb. 7, 1888.

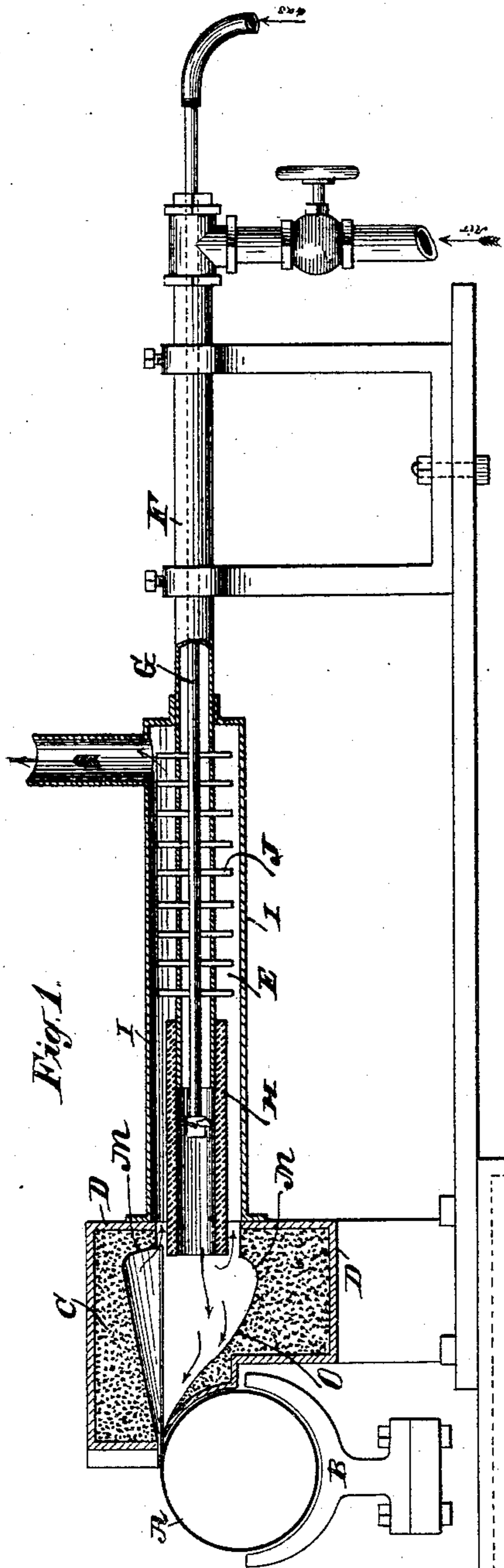


Fig. 1.

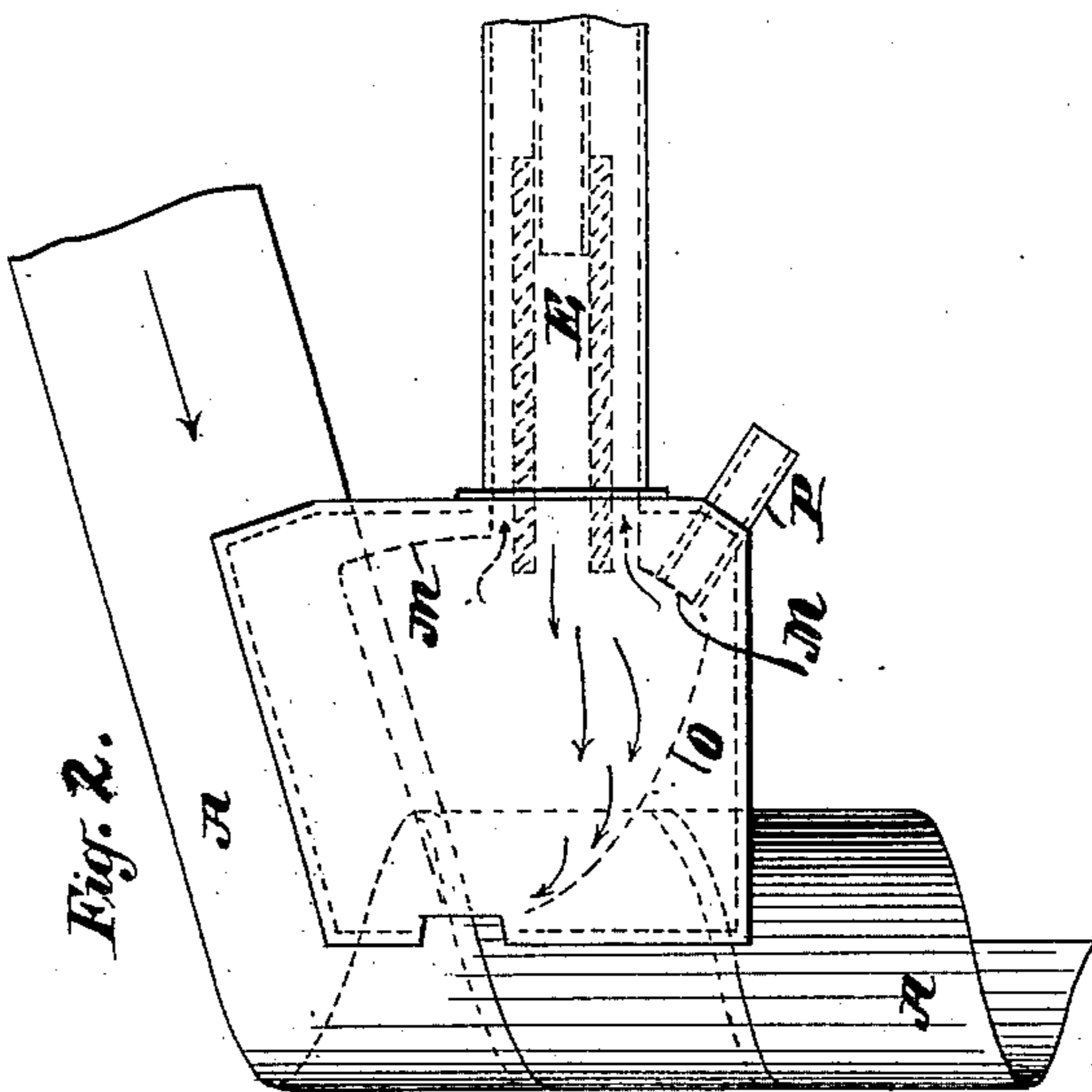


Fig. 2.

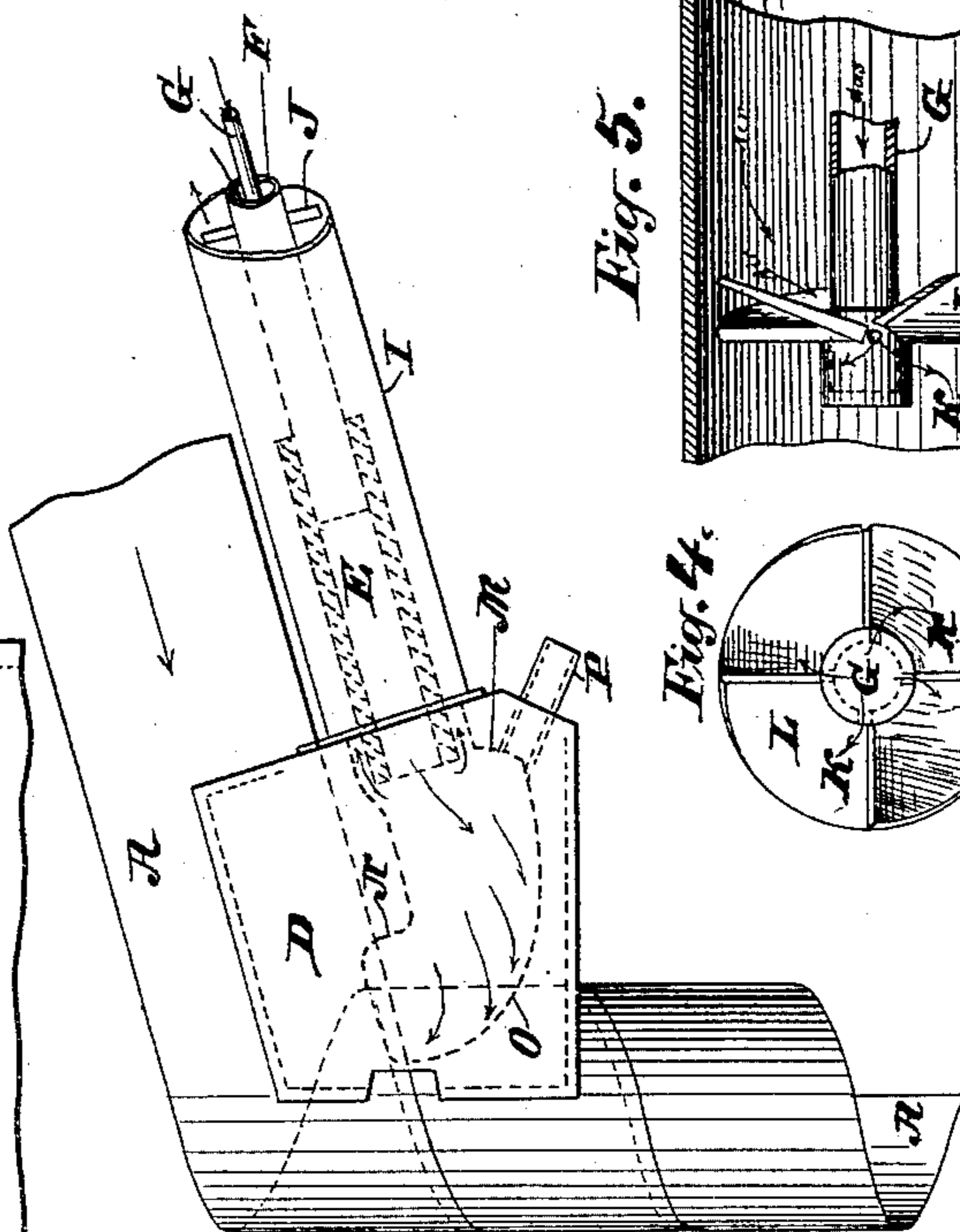


Fig. 3.

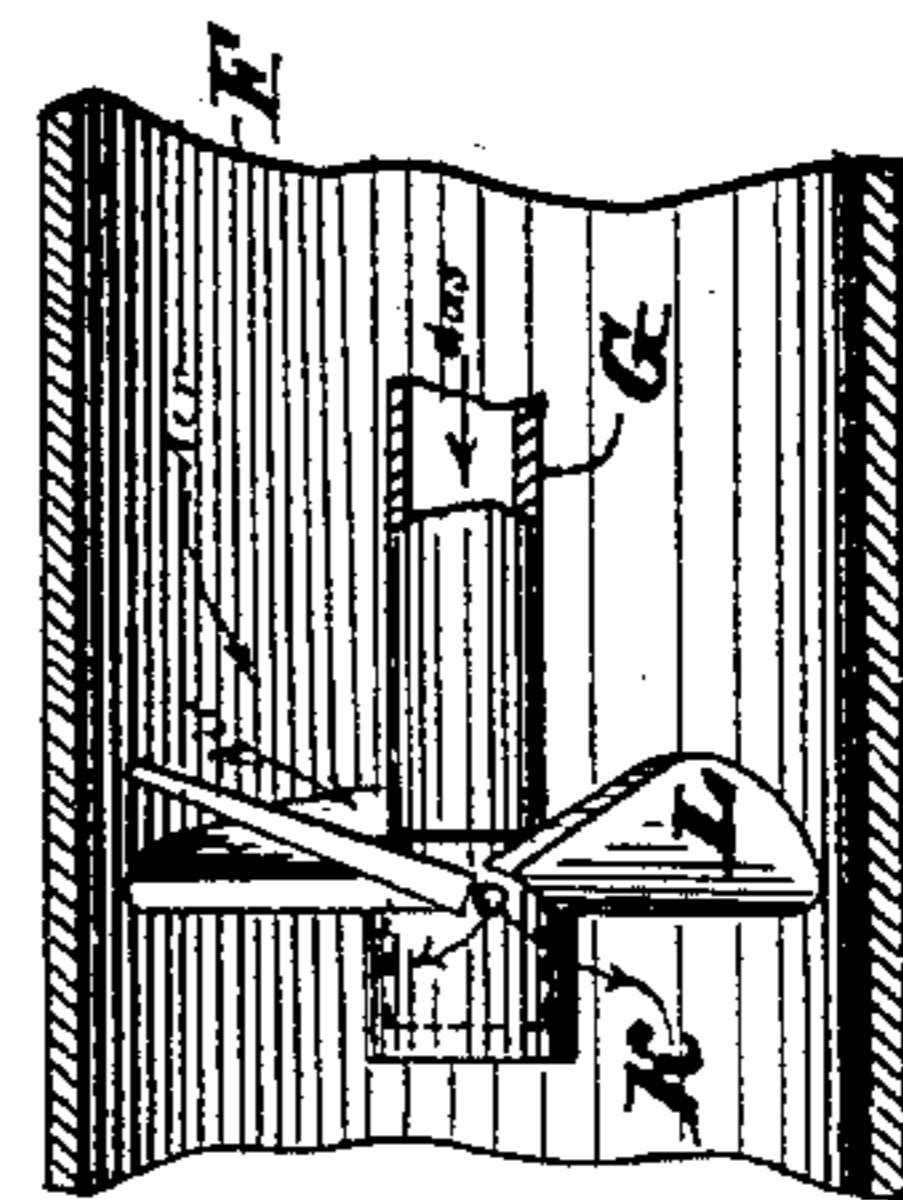


Fig. 4.

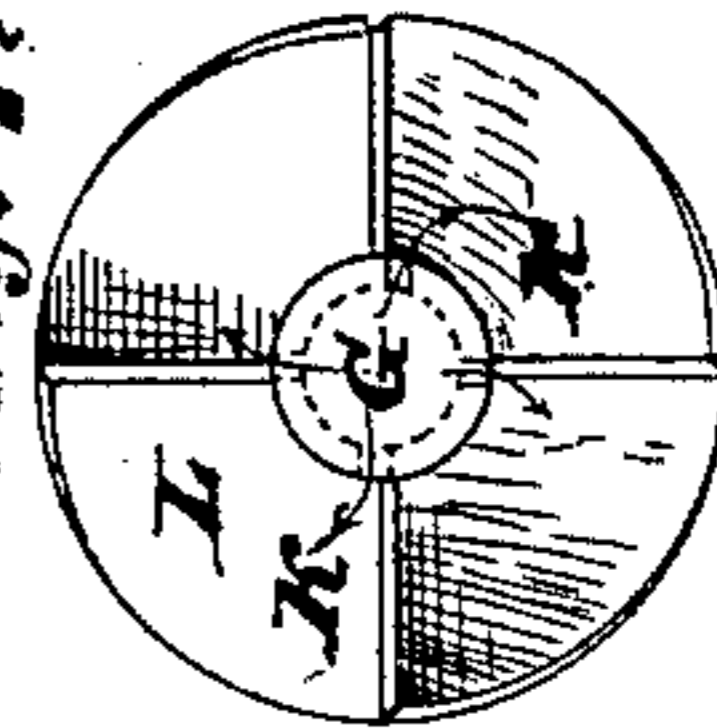


Fig. 5.

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UNITED STATES PATENT OFFICE.

HANNAH M. ROOT AND WILLIAM S. CHURCH, OF PORT CHESTER, NEW YORK,
ADMINISTRATRIX AND ADMINISTRATOR OF JOHN B. ROOT, DECEASED.

BLOW-PIPE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 377,467, dated February 7, 1888.

Application filed August 8, 1887. Serial No. 246,375. (No model.)

To all whom it may concern:

Be it known that JOHN B. ROOT, formerly of Port Chester, in the county of Westchester and State of New York, deceased, did invent certain new and useful Improvements in Blow-Pipe Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The said JOHN B. ROOT invented and patented, in United States patents issued to him in his life-time, improved machines for spirally shaping sheet-metal blanks into the form of cylindrical pipes or tubing, the spiral seam of such pipe being formed by welding together the opposite overlapping edges of the strip of metal or blank. In connection with such machinery he also invented and patented a blow-pipe apparatus for heating the edges of such a blank as it passes through the forming-machine and preparatory to its edges being welded together.

It is to an improved form of apparatus of this kind that the present invention specially relates—that is, to blow-pipes and similar heating apparatus when used for bringing metal blanks to a welding heat, or for in like manner heating similar articles by the direct application to such articles of a heating jet or flame—and it is not, therefore, proposed to confine the present invention to the particular use here described.

The invention has for its object to increase the heating efficiency of the blow-pipe flame when thus used—that is, a flame produced by the union of a fuel gas and oxygen, ordinarily some form of hydrogen gas and air. In order to attain a high heat in such structures, one of the essential conditions is that the air and gas shall be most intimately and suddenly mixed, so that the resulting combustion shall be violent and intense and the heat produced availed of to the fullest extent; and it is the object of this invention to construct the blow-pipe and furnace apparatus with reference to securing these ends.

The first feature of invention consists in providing the gas-supplying pipe with lateral openings that cause the gas to escape into the air-pipe in a direction substantially at right

angles to the direction of the incoming air, and in providing the air pipe or passage with wings or guides located in front of the said openings, and so arranged as to give the air a spiral direction into the jets of gas escaping laterally from the gas-pipe, thereby producing a swirl or eddy into which the gas and air will be drawn and suddenly and thoroughly mixed.

The second feature consists in providing the nozzle of the blow-pipe, or the furnace part of the heating apparatus, with a converging device or refractor constructed and arranged to concentrate the heat of the jet upon the article or upon some particular point or part of the blank or article to be heated.

The said Root discovered that in applying the jet of a blow-pipe flame directly to the parts to be heated the full heating power of the jet is not availed of, but that when the jet is caused to impinge upon a surface arranged to deflect the flame and direct it upon the blank in a direction somewhat lateral to its natural course the heating power of the jet is more fully availed of than where the jet is directly applied.

The third feature of invention consists, therefore, in combining with a blow-pipe a structure inclosing the blow-pipe nozzle, and constructed and arranged so as to deflect the heating-jet in the manner indicated.

The fourth feature of invention consists in providing the furnace structure at the blow-pipe, which converges the heat of flame and which deflects it upon the parts to be heated, with a flue or pipe for conveying away the products of combustion, and which is arranged around the blow-pipe in such manner that such products act to heat the air and gas that is supplied to the blow-pipe, thus making the blow-pipe regenerating in action.

In the drawings, Figure 1 represents an elevation view of a heating apparatus adapted to heat the edges of a pipe-blank as it is spirally wound up into cylindrical form, the blow-pipe and its furnace structure being in central vertical section. Fig. 2 is a plan view of the main parts of the same. Fig. 3 is a plan view of a modified form of the same. Figs. 4 and 5

are enlarged detail views of the end of the gas-pipe where the gas and air meet.

This heating apparatus has been used by the said Root for the purpose of manufacturing spirally-made pipe in conjunction with mechanism adapted to spirally wind a sheet-metal blank into cylindrical form with its opposite edges overlapping, which mechanism is also provided with welding devices for uniting such edges as they are brought to welding condition by the heating apparatus.

A represents the blank of such a pipe, B being a part of the shaping and supporting mechanism of the welding-machine.

C is what we term the "furnace," it being a structure composed of fire-brick placed within a supporting-shell, D, and arranged around the nozzle of the blow-pipe, and constructed to concentrate and direct the heating-jet upon the overlapping edges of the blank where they come together.

E is the blow-pipe, which is composed of the air conductor or pipe F and the gas-pipe G, arranged within the air-pipe. The air-pipe is provided with a nozzle, H, made of plum-bago or other like refractory material, as it is within or at the end of this nozzle that the mixed gases unite or burst into flame.

I is a pipe surrounding the blow-pipe, with a space between them. This pipe I is secured to the shell D of the furnace, and the space between it and the air-pipe is continuous to the interior of the furnace. The other end of this pipe is provided with a flue for conveying the waste products of combustion away.

J indicates copper or other heat-conducting pins, which serve to take up the heat from the waste products and impart it to the air and gas passing through the blow-pipe, thus making the blow-pipe regenerative in its action.

The end of the gas-pipe is closed and provided with lateral openings K. To one side of each of these openings are wings or blades L, set at an inclination and separated from each other, as shown in Figs. 4 and 5. These wings are for the purpose of dividing up and turning the column of air into the jets of gas forced out laterally from the gas-pipe, the result being that an action of the gases is produced akin or similar to a swirl or rotary current, which causes the entire body of air and of gas to be very suddenly and completely mixed. The relative arrangement of the holes K and the blades L may be variously changed; but the arrangement here shown will suffice to illustrate the principle of this feature of the invention.

The interior of the furnace structure consists of a chamber peculiarly shaped to direct the flame or jet of the blow-pipe upon the parts of the edges of the blank passing through the furnace. First, the rear walls, M, or those parts of the walls that directly face or are at an equal radial distance from the point where the flame is applied, are curved, as shown, so as to concentrate the heat at one place—the

edges of the blanks in the present case. In Figs. 1 and 2 the interior shape of this chamber is substantially conical and the surface M is spherical. In Fig. 3 this converging surface consists of two parts, M and N, this space of the heating-chamber being here reduced as much as practicable. By this form of chamber the heat is concentrated upon the parts to be heated, and the heating-power is thereby more fully employed than where such a concentrating or reflecting surface is not used in combination with a blow-pipe. In the second place, the furnace or heating chamber is provided with a curved deflecting-surface, O—that is, this surface acts to deflect the heating-jet from its natural course laterally against the edges of the blank—the result being that a greater amount of the heat is imparted to the blank than where the jet is directly applied. The blow-pipe will be so arranged with reference to such deflecting-surface that its jet will first impinge thereon, and when deflected will be thrown laterally upon the blank.

Figs. 2 and 3 show different arrangements of the blow-pipe with reference to the deflecting-surface. As the burning proceeds, the pressure of the gases in the heating-chamber causes much of the products of combustion to escape backward through the pipe I and heat the gas and air.

P is a peep-hole or pipe through which the blanks may be observed.

By these means is produced a blow-pipe apparatus by which the heating power of the gases is more fully availed of than has been the case with the common forms of such apparatus. The gases are highly heated before being mixed, and where they come together they are so intimately and suddenly mixed that their combustion is practically perfect, and hence develops the highest degree of heat. The deflecting-surface O serves to direct the heated gases of the jet so that the blank will best take up the heat, and the surface M acts to concentrate the heat-rays upon the blank.

What is claimed as new is—

1. In combination, in a blow-pipe, an air-pipe, and a gas-pipe arranged within the air-pipe and provided with lateral openings K and wings L, arranged substantially as described.

2. The combination, with the blow-pipe, of the furnace provided with a heating-chamber of substantially conical shape, with an opening at one side for the entrance of the edge of the blank to be heated and having at the opposite side the curved deflecting-surface O, against which the jet impinges and by which said jet is deflected laterally upon the blank, as and for the purposes hereinbefore set forth.

3. In combination with the blow-pipe, the furnace C, provided with a heating-chamber formed at the rear with the heat-concentrating surface M, and on the side opposite to that through which the edge of the blank projects into the chamber with the lateral curved deflecting-surface O, placed in the path of the

jet, so that the latter shall be deflected by it laterally upon the blank, as and for the purposes hereinbefore set forth. and the furnace structure C, arranged substantially as described.

4. In combination with the blow-pipe E, provided with the openings K and wings L, the furnace structure C, arranged substantially as described.

5. In combination with the blow-pipe E, having pins J, the outer regenerating pipe, I,

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