

No. 607,501.

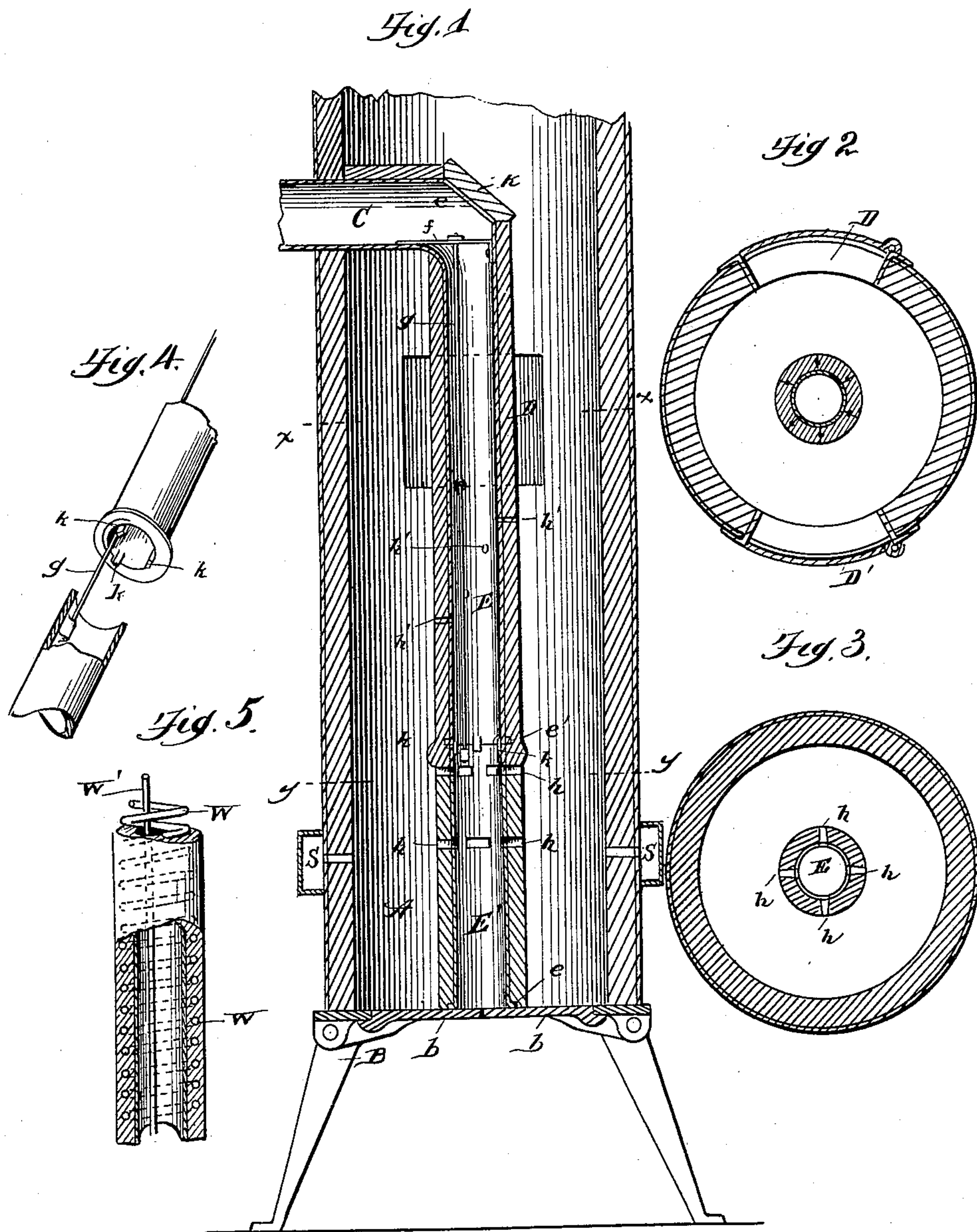
Patented July 19, 1898.

T. P. BYRAM.

CUPOLA.

(Application filed May 10, 1897.)

(No Model.)



WITNESSES

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CUPOLA.

SPECIFICATION forming part of Letters Patent No. 607,501, dated July 19, 1898.

Application filed May 10, 1897. Serial No. 635,854. (No model.)

To all whom it may concern:

Be it known that I, THEODORE P. BYRAM, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Cupolas; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to cupolas for melting iron, and has for its object an improvement in that class of cupolas known as "drop-bottom" cupolas; and the improvement consists in introducing the blasts from above to the center of the fire and in providing a means whereby the central blast-pipe is supported from above and is made in sections, so that the lowermost section, in which are the twyers, may be at any time removed for repairs or for other purposes, leaving the upper section suspended within the cupola. This suspended and centrally-arranged blast-pipe not only serves to conduct the air to the proper place for use as an air-blast, but it conducts it through a heated portion of the cupola and supports it during its passage to the heat of the cupola, and thereby heats the air to a high temperature, so that it becomes in reality a hot-air blast.

In the drawings, Figure 1 shows the cupola in sectional elevation. Fig. 2 is a cross-section of the cupola at the line $x x$. Fig. 3 is a cross-section of the cupola at the line $y y$. Fig. 4 is a detail showing the junction of the upper and lower sections of the blast-pipe. Fig. 5 shows a portion of the suspended blast-pipe with a coil of water-pipe surrounding it.

A indicates the cupola on a stand or base B and provided with drop-bottoms $b b$. At a suitable height, usually about ten or twelve feet above the bottom, there are preferably two charging-doors $D D'$. A single charging-door may be used; but with two charging-doors the charge may be more easily and accurately placed in the position which should be occupied by the several parts of it for economical work.

Along the vertical axis of the cupola is an air-pipe E, suspended from above. The man-

ner of suspension may be in any approved way, as by inserting through one side or over the top edge of the cupola a pipe C, which projects into the cupola to about the middle and there has attached to it, by means of suitable elbow, a drop-pipe E, made in two or more sections, and of these the lowest section E' is open at bottom to permit the ready escape of any material that may accidentally find its way into the interior. The lowest section is provided at the bottom edge with an external projecting flange e , on which rests the brick casing, which serves to protect the iron lining-pipe from the excessive heat of the fire. The section E, which has its lower terminal just above the twyer-openings, is also provided with a collar or flange e' , that serves as a support for the fire-brick. The lowest section E' is secured to the section above the twyers by means of projecting lugs k , riveted or otherwise held to the upper section and extending a short distance into the lower section. These lugs allow the lower section to slip downward out of engagement, if for any reason it is desired to move the lower section; but they hold the two sections in alinement, and the lower section is held suspended by the rod or rods g . At the junction of the upper and lower sections are the twyer-openings h , and of these there may be one or two or more rows, as may be desired. I also prefer to provide a number of openings h' at intervals through the suspended pipe E, through which a supply of oxygen may be fed into the fire above the twyers proper. These openings are comparatively small and scattered and are of aid in producing more perfect combustion and increase the heat to prepare successive charges of iron for quicker melting, after it reaches the melting-zone.

At the bend of the elbow there is a removable tile K, covering an opening through the elbow, through which access may be had to the upper end of the suspending-rod g .

There is preferably across the mouth of the elbow e^2 a spider or bar f , which sustains the upper ends of a holder or holding-rods g , that extend downward to the twyers h and there engage with lugs or spurs on the interior of the pipe and aid in holding the pipe in its suspended position. These rods g being located entirely within the pipe and within the

air-blast and surrounded entirely by the air are not subjected to an extremely high heat and easily sustain the lower section of the pipe.

5 The entire pipe, both below and above the twyers *h*, is surrounded by a coating of fire-brick, which protects it from the destructive action of the heat, and the inner side of it being constantly subjected to the moving air
10 is kept comparatively cool, although of course the heat of the cupola raises the pipe and its coating to quite a high temperature.

There may be one or more rows of twyers *h*, as may be desired, each twyer consisting
15 of a hole cutting through the iron pipe and through the brick casing which surrounds the pipe.

In addition to the central suspended blast-pipe and the central twyers opening out there-
20 from there may be employed, if desired, the usual twyer-openings through the external wall or casing of the cupola, such twyer-openings of the ordinary form being indicated at S S.

25 In Fig. 5 is shown a portion or section of the upper part of the blast-pipe, in which there is a coil of pipe *W*, embedded in cast metal or located inside the brickwork and forming a water-jacketed pipe. The return
30 *W'* of the water-pipe passes up through the inside of the blast-pipe, and provision is thus made for the circulation of water around the upper part or what may be termed the "per-
35 manent" part of the blast-pipe as distinguished from the lower section, which is removable. The upper part thus protected will enable the cupola to be used in melting charges that occupy so long a period of time that the use is considered a continuous use.

40 What I claim is—

1. In combination with a cupola, a blast-pipe having a vertical portion suspended therein, suspension-rods engaging suitable supports near the top of the vertical pipe, and
45 suitable suspension devices near the bottom

thereof and located within the blast-pipe, substantially as described.

2. In combination with a cupola, a blast-pipe made in sections and suspended therein, one of said sections being provided with twyer-
50 openings the section above the twyer-openings being provided with a collar adapted to support an inclosing casing of fire-brick, the section below the twyer-openings being inde-
55 pendently suspended by a rod extending up inside the upper sections and engaging a suitable sustaining device near the top of the upper section, and the section below the twyer-openings being provided with means adapted to support a casing of fire-brick, substantially
60 as described.

3. In combination with a cupola, a vertical blast-pipe suspended therein, suspension-rods engaging suitable supports near the top of
65 the vertical pipe and suitable suspension devices near the bottom thereof and located within the blast-pipe, and means whereby access may be had to the suspension device, substantially as described.

4. In combination with a cupola, a blast-
70 pipe suspended therein, provided with an air-inlet pipe at the top and with air-outlet openings between the inlet and the cupola-bottom, and having an open bottom against which the cupola-bottom closes, substantially as de-
75 scribed.

5. In combination with a cupola, a suspended blast-pipe provided with twyer-openings and made in sections, one of said sections being above the twyer-openings and being
80 provided with means whereby it may be cooled by flowing water, another of said sections being below the twyers and being removable, substantially as described.

In testimony whereof I sign this specifica-
85 tion in the presence of two witnesses.

THEODORE P. BYRAM.

Witnesses:

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