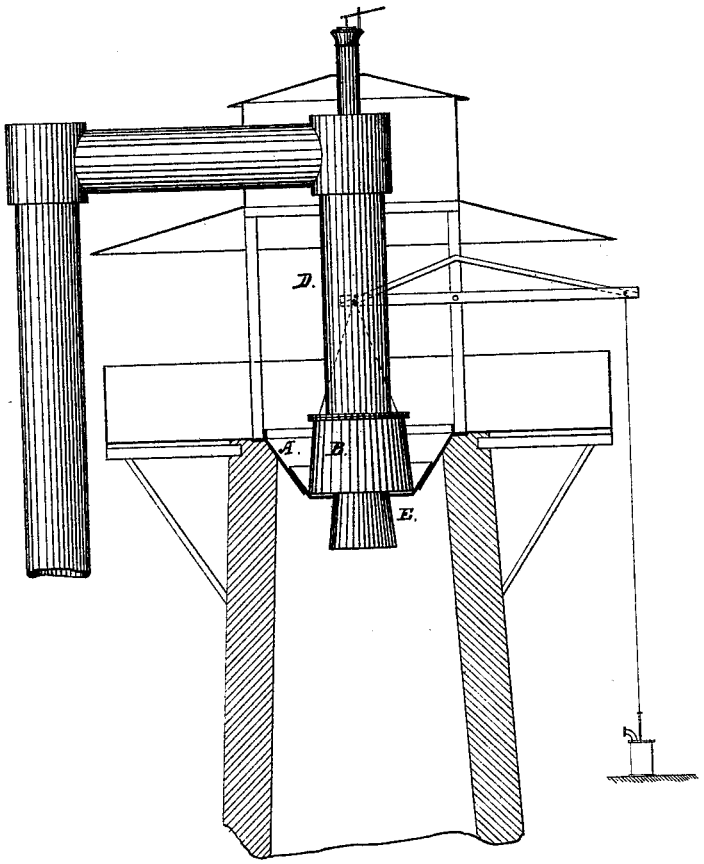
3 Sheets—Sheet 1.

D. N. JONES.

Gas-Check for Blast-Furnaces.

No. 202,730. **Patented April 23, 1878.**

Fig. 1



Witnesses:
Cyrus Elder
David Declor

Inventor:
Daniel N. Jones.

D. N. JONES.

Gas-Check for Blast-Furnaces.

No. 202,730. Patented April 23, 1878.

Fig. 2.

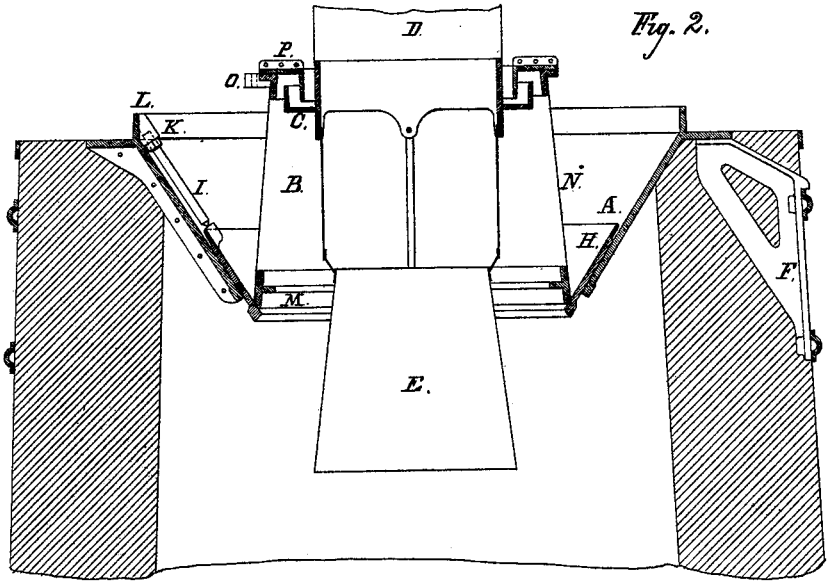
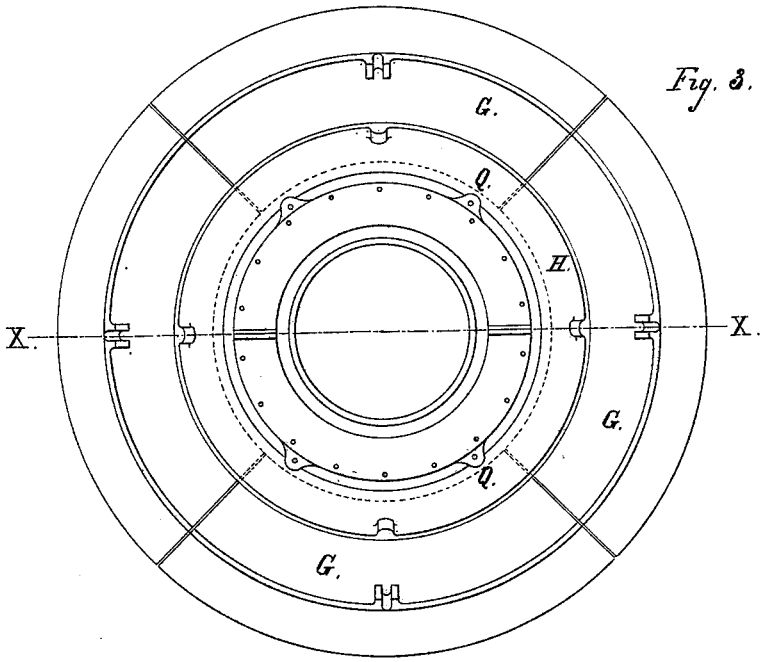


Fig. 3.



Witnesses:
Lyman Elder
David Taylor

Inventor:
Daniel N. Jones.

3 Sheets—Sheet 3.

D. N. JONES.

Gas-Check for Blast-Furnaces.

No. 202,730. Patented April 23, 1878.

Fig. 4

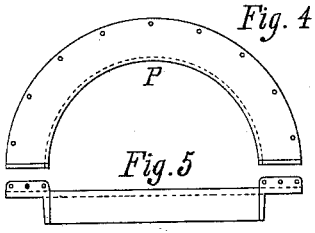


Fig. 5

Fig. 6

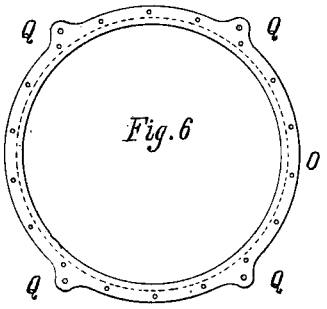


Fig. 7

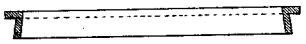


Fig. 8

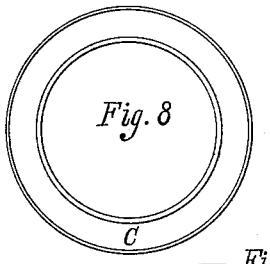


Fig. 9

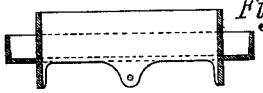


Fig. 10

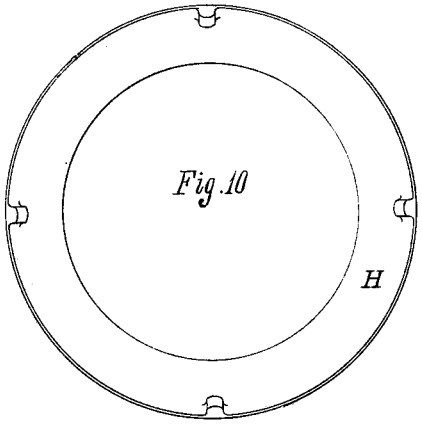


Fig. 11

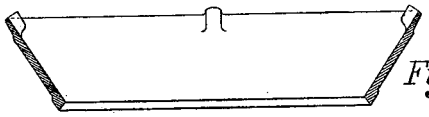


Fig. 12

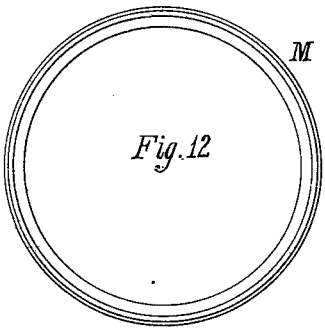


Fig. 13

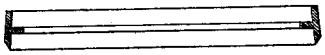


Fig. 15

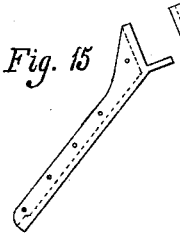
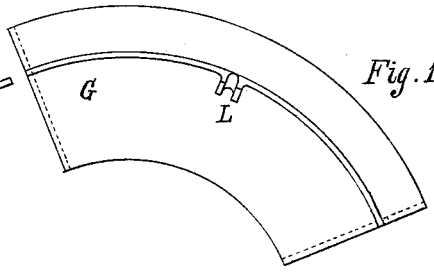


Fig. 14



Witnesses;
Lyman Evener
David Peelor

Inventor;
Daniel N. Jones.

UNITED STATES PATENT OFFICE.

DANIEL N. JONES, OF JOHNSTOWN, PENNSYLVANIA, ASSIGNOR OF ONE-HALF HIS RIGHT TO CAMBRIA IRON COMPANY.

IMPROVEMENT IN GAS-CHECKS FOR BLAST-FURNACES.

Specification forming part of Letters Patent No. **202,730**, dated April 23, 1878; application filed October 6, 1877.

To all whom it may concern:

Be it known that I, DANIEL N. JONES, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented certain Improvements in Blast-Furnaces, of which the following is a specification:

The object of my invention is to prevent the escape of waste gases during the intervals between charging a closed-top blast-furnace supplied with a hopper, an elevating-bell, and a pipe hung centrally for conducting away the gases generated in the furnace, which I effect by sealing the bell upon the hopper at its lower part with a gas-tight joint, and closing the upper part of the bell upon the central gas-pipe during the intervals between charging, in the manner hereinafter described.

A further object of my invention is to prevent injury to the lining and walls of the furnace, which results from the ordinary method of charging, and at the same time to control, as may be desired, the distribution of the stock when fed into the furnace, which I effect by elevating the bell instead of depressing it, as is the usual method, which elevation of the bell causes the stock to flow from the hopper toward the center of the furnace.

I also, when desired or necessary, suspend from the lower end of the central gas-pipe an iron cylinder, against which the material charged is directed, to which cylinder such shape may be given by increasing its size from the top to the bottom, thus making it cone-shaped, as will distribute the stock more or less toward the sides of the furnace, as may be desired.

In the accompanying drawings, which represent my apparatus, Figure 1, Sheet 1, is a vertical transverse section through the upper part of a blast-furnace, showing the general arrangement of my improvement. Fig. 2, Sheet 2, is a vertical transverse section through the top of a blast-furnace provided with my improvement. Fig. 3, Sheet No. 2, is a plan of the same. Fig. 4, Sheet No. 3, is a plan of center seal-ring. Fig. 5, Sheet No. 3, is an elevation of same. Fig. 6, Sheet No. 3, is a plan of upper flange of bell. Fig. 7, Sheet No. 3, is an elevation of same. Fig. 8, Sheet No. 3, is a plan of the gas-pipe cup. Fig. 9, Sheet No. 3, is a vertical transverse section of the same. Fig. 10, Sheet No. 3, is a plan of the bottom ring of the hopper. Fig. 11, Sheet No. 3, is a vertical transverse section of the same. Fig. 12, Sheet No. 3, is a plan of the bottom ring of the bell. Fig. 13, Sheet No. 3, is a vertical transverse section of the same. Fig. 14, Sheet No. 3, is a plan of one of the sections forming the upper part of the hopper. Fig. 15, Sheet No. 3, is an end elevation of the same.

A represents a hopper, the lower part of which is closed by the movable bell B, the upper part of which bell, during the intervals of charging, dips into the ring-shaped cup C, fastened to and around the lower part of the gas-conduit pipe D. The cup C is kept full of water, sand, or other suitable material, so that no escape of gas can take place at that point during the intervals between charging, while the bell rests upon the hopper, to prevent the escape of gas at the lower end.

In order to introduce the requisite stock into the blast-furnace, the stock is filled into the hopper and the bell is then raised by any suitable mechanism. This may be done by means of the beam and links shown in Fig. 1, Sheet No. 1. This beam may be worked by a winch and hand-power, or by a cylinder and piston, operated by steam, water, or blast pressure.

In charging the furnace by the elevation of the bell, the hopper A has a tendency to throw the stock toward the center of the furnace; and when this is not desired, I correct it by suspending from the gas-pipe D the distributer E, in order to deflect the stock toward the center or the circumference of the furnace in any desired degree. This distributer E is an iron cylinder, and may be of uniform diameter, or may be enlarged or diminished in size toward its lower end, for the purpose of giving the required direction to the stock. As the distributer E is increased in size toward the lower end the more the stock will be thrown toward the circumference, and its diminution will have the contrary effect, and thus by varying the form of this distributer the stock can be placed in any desired locality without injury to the sides of the furnace from falling material.

The distributer E, as I prefer it, is suspended from the gas-pipe D by means of bars or chains, leaving open spaces between the distributer and gas-pipe for the exit of gases from the furnace through the gas-pipe; but it may be constructed as a prolongation of the gas-pipe, supplied with sufficient openings for the exit of the gases, as aforesaid.

I prefer to carry the hopper A on a number of brackets, F, fastened to the iron binding of the furnace-stack, instead of letting it rest merely on the perishable brick lining of the stack.

In order to better compensate for expansion, the hopper A is made of several pieces. The upper portion may be made, as shown in Fig. 3, Sheet No. 2, out of four sections, G. One of these sections is shown in detail in Figs. 14 and 15, Sheet No. 3. The lower part of the hopper A is formed by the continuous ring H, which is held in position by means of the screw-bolts I. These bolts I bear against lugs provided on the ring H, and are set up by means of nuts K, operating against jaws L cast on the hopper-sections G.

Figs. 10 and 11, Sheet No. 3, show the hopper-ring H in detail.

I prefer to build up the bell B in the manner shown in Fig. 2, Sheet No. 2. It consists of the cast-iron bottom ring M, to which is riveted a cylinder or truncated cone, N, provided on top with the cast-iron flange O, upon which is bolted the center seal-ring P. The lower part of the bottom bell-ring M is made to fit gas-tight into the lower hopper-ring H. Figs. 12 and 13, Sheet No. 3, show this bottom bell-ring in detail. The cast-iron flange O is provided with the lugs Q, to receive chains, rods, or other appliances, whereby to raise or lower the bell.

Figs. 6 and 7, Sheet No. 3, show the flange O in detail. The seal-ring P bolts gas-tight onto the flange O, and is made, by preference, in two or more pieces, in order to facilitate the introduction or withdrawal of the gas-pipe D whenever circumstances render this necessary.

Figs. 4 and 5 show one section of the center seal-ring P in detail.

The gas-pipe cup C is shown in detail in Figs. 8 and 9, Sheet No. 3, and is provided with lugs, from which is hung, by bars or chains, the distributer E.

I am aware that waste gases have been taken away from blast-furnaces by means of pipes suspended from above and reaching into the top of the furnace, and make no claim therefor. I am also aware that gas has been taken away from the sides of a closed-top furnace, charged by dropping the bell.

I claim as my invention—

1. A closed-top furnace with elevating-bell sealed on a central gas-conduit pipe, substantially as set forth.

2. The combination of a central gas-conduit pipe, D, having upon its periphery a ring-shaped cup, C, containing water, sand, or other suitable material, to obstruct the passage of gases, with a bell, B, and hopper A, substantially as set forth.

3. The combination of a hopper, A, a bell, B, and central gas-conduit pipe D with the distributer E, substantially as and for the purpose hereinbefore set forth.

DANIEL N. JONES.

Witnesses:
CYRUS ELDER,
DAVID PEELOR.