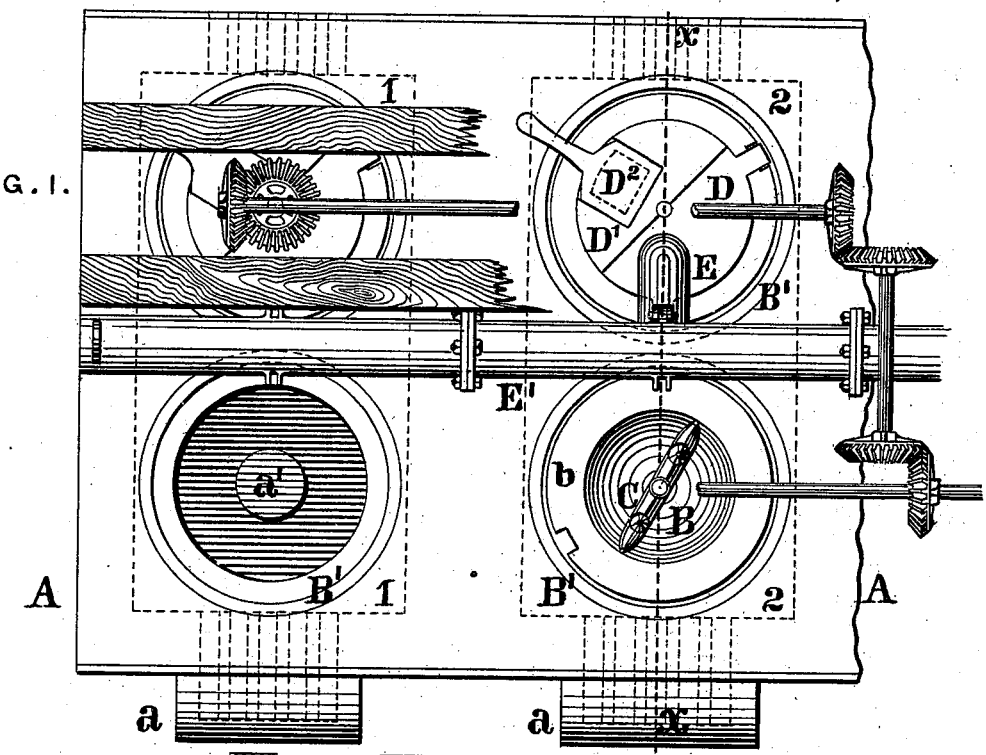
2 Sheets—Sheet.1.

H. BOWER.

Apparatus for the Manufacture of Ferrocyanide of Potassium.

No. 210,086. Patented Nov. 19, 1878.

FIG. 1.



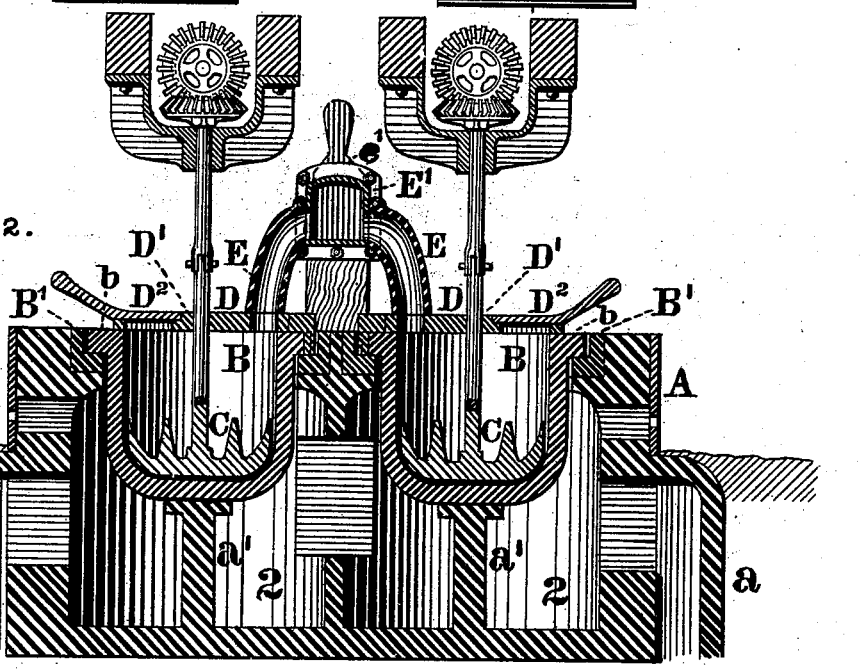


FIG. 2.

WITNESSES

William Mallon

INVENTOR

Henry Bower,

By J. Burnden Bell,

ATTORNEY

H. BOWER.

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FIG. 3.

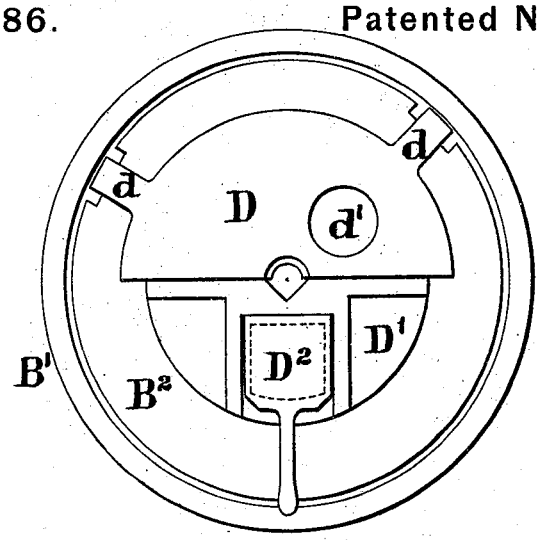


FIG. 4.

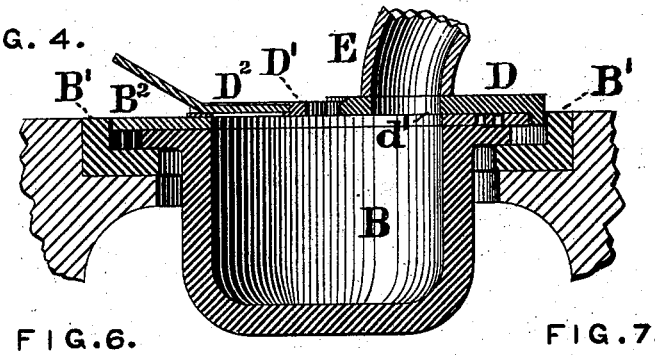


FIG. 6.

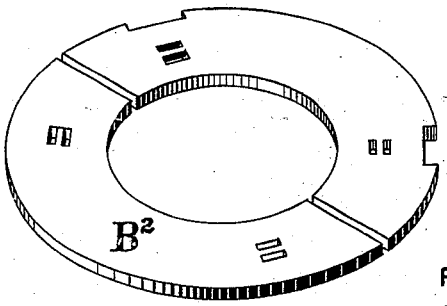


FIG. 7.

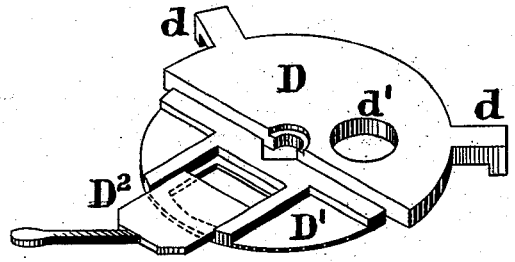
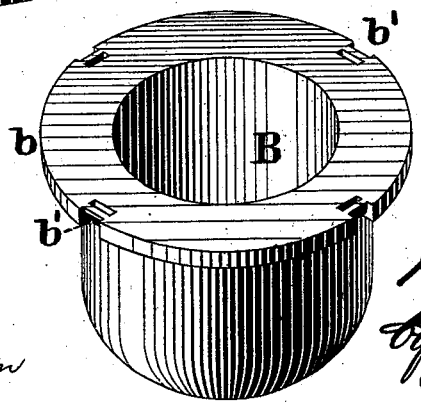


FIG. 5.



WITNESSES:

C. L. Parker

William Mallon

INVENTOR

Henry Bower,

by J. Thornton Bell,

ATTORNEY

UNITED STATES PATENT OFFICE.

HENRY BOWER, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN APPARATUS FOR THE MANUFACTURE OF FERRO-CYANIDE OF POTASSIUM.

Specification forming part of Letters Patent No. **210,086**, dated November 19, 1878; application filed August 26, 1878.

To all whom it may concern:

Be it known that I, HENRY BOWER, of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for the Manufacture of Ferro-cyanide of Potassium, of which improvements the following is a specification:

The object of my invention is to economize the time and material required in the process of manufacturing ferro-cyanide of potassium upon a large scale as an article of commerce, as well as to enable this process to be conducted with a greater degree of uniformity and accuracy than heretofore, and, further, to reduce the time, labor, and expense involved in the periodical renewal and repair of the apparatus employed in the decomposition of the animal matters treated in such manufacture.

To these ends my improvements consist in the combination of a gas-heating furnace, having its combustion-chamber divided into a series of separate compartments, and a series of calcining-pots, arranged in pairs in the several compartments of the furnace.

My improvements further consist in the combination of a heating-furnace, a series of covered calcining-pots, each provided with a gas-escape tube leading from an opening in its lid, and a draft-flue, having a regulating-damper, and communicating with the gas-escape tubes of the calcining-pots.

My improvements further consist in the combination of a heating-chamber, a calcining-pot, a supporting-ring, and a supporting-pier.

My improvements further consist in the combination of a calcining-pot, having a circular bearing-flange at its top, and a divided cover, composed of a rear section, provided with lugs for holding it in position, and an opening to communicate with a gas-escape tube, and a removable front section, having a sliding feed-door, all as hereinafter more fully set forth.

As ordinarily conducted, so far as my knowledge and information extend, the treatment of the nitrogenous animal matters used in the manufacture of ferro-cyanide of potassium is effected in calcining-pots, each of which is built into a furnace, having a grate upon which a coal-fire is maintained, the products of combustion circulating around the pot, and thence passing into a flue, by which the draft is maintained; and in some instances a pan, resting upon the hearth of a reverberatory furnace, has been employed. No sufficient provision has been made, so far as I am aware, for admitting of the escape of the gases generated in the calcining-vessel without the promotion of combustion therein. In apparatus so constructed a uniform application of the heat to all portions of the exterior of the pot is impracticable by reason of the unequal temperatures in different portions of the furnace, and much difficulty is experienced in maintaining a regular evolution of heat from the fuel during the operation, even with the exercise of due care and attention on the part of the fireman. Moreover, considerable delay and expense are involved in the removal of the pots when worn so thin as to be no longer serviceable, and the insertion of new ones, as the brick-work of the furnace upon which the pot is supported must be torn out in each instance and new bricks inserted. The combined result of the imperfect method of supporting the pots and the unequal application of heat thereto is distortion and irregular wear, and as, even in the most perfect apparatus that can be devised for the conduct of the process, the metal of the pots must necessarily be consumed while in service, it is important, in point of economy, that its utilization as a combining element shall be effected with as small an amount of loss from other causes as is practicable. In the apparatus hereinafter described I have sought to avoid the objections above cited, and have found, in practice, that it accomplishes in a satisfactory manner the ends for which it is designed.

In the accompanying drawings, Figure 1 is a plan or top view of an apparatus embodying my improvements; Fig. 2, a vertical transverse section through the same at the line *x x* of Fig. 1; Fig. 3, a plan or top view, showing the supporting-ring and cover of the pot; Fig. 4, a vertical central section through the pot, cover, and supporting-ring; Fig. 5, a view in perspective of the pot; Fig. 6, a similar view of the ring on which the cover rests, and Fig. 7 a similar view of the cover.

To carry out my invention I provide a gas-heating furnace, preferably connected with gas producers and regenerators of the Siemens type, having determined by the test of continuous practical operation that such construction is well adapted to the purpose. The combustion-chamber A of the furnace is divided by transverse partitions into a series of separate compartments, 1 2, two or more being used, according to the extent of the manufacture to be conducted, and the several compartments having no communication one with the other, the partition-walls extending without openings from top to bottom of the combustion-chamber. Each of the compartments of the chamber A has leading into it, at each side, air and gas ports, communicating through flues *a* with the regenerators beneath, in the usual manner of the Siemens furnace, and in each compartment I place two cast-iron calcining-pots, B, of cylindrical form, with a rounded bottom and entirely open at top, around which extends a circular flange, *b*, having lifting-pieces, *b'*, formed in it near its periphery. Each of the pots B is supported at top by a cast-metal supporting-ring, B', built into the brick-work of the furnace, upon which its flange *b* rests, and at bottom upon a fire-brick pier, *a'*, on the floor of the combustion-chamber. By this arrangement the pot can be conveniently and quickly removed and a new one substituted, as required, without disturbing any portion of the furnace, and when in use is maintained in position without any tendency to sagging or distortion by its equal circumferential bearing on the supporting-ring and its central support on the pier. The pots are provided with stirrers C, rotated by gearing in the usual manner, the shafts of the stirrers passing through openings in the covers of the pots. These covers are formed in two sections, the rear section D, which is designed to remain permanently in position while the pot is in use, having lugs or projections *d* formed upon it, which fit into notches formed in the flange *b* of the pot, or preferably in a ring, B^2, the inner diameter of which corresponds with that of the pot, and which rests on the flange *b*. An opening, *d'*, is formed in the section D, communicating with the lower end of a gas-escape tube, E, the upper end of which communicates with a draft-flue, E', extending longitudinally above the combustion-chamber A, and leading into a suitable stack or chimney. The outer end of the draft-flue E' is open to the atmosphere, and is governed by a regulating-damper, *e'*, by which the draft in the flue may be modified as desired. By this means the gases evolved in the decomposition of the nitrogenous matters of the charge are carried off without inconvenience to the workmen or others in the vicinity of the apparatus, and without tendency to the promotion or support of combustion within the pot, such degree of draft being maintained as is just sufficient to draw off the gases without tendency to introduce a supply of air.

As ordinarily constructed, there is no regulation of the draft in the tube which conveys away the evolved gases, and, if the draft is made sufficiently strong to remove the gases, it tends to draw in air through the joints and interstices between the pot and its lid, and thereby to support combustion in the pot instead of removing the gases unconsumed.

It will be seen, therefore, that the regulating-damper performs an essential function in the operation of the apparatus in this regard.

The front section D of the cover which is removable to admit of the withdrawal of the stirrer and the metal produced by the treatment of the charge, rests upon the flange *b* or the ring B^2, if the latter be used, and abuts against the rear section D at the center line of the pot, recesses being formed in the two sections to admit of the passage of the stirrer-shaft. An opening is formed in the section D^1, which opening is covered by a sliding door, D^2, through which the charge is introduced from time to time as required.

In the operation of the apparatus there is a uniform degree of heat maintained by the combustion of the gas in the several compartments of the furnace and a uniform application of heat to the surface of the pots in such compartment, as there is no tendency to the evolution of different degrees of temperature therein, nor liability to accidental or negligent variation of the general temperature, such as exists in furnaces of the ordinary description. The improved facilities afforded for removing and inserting the pots effect an important saving of time and expense in the frequent renewals necessarily incident to the calcining process, which will be readily apparent to those familiar with the practical difficulties attendant upon the use of the ordinary apparatus, and the greater durability of the pots resultant upon the system of support, which relieves them from unequal strains, and the regular application of heat to their surfaces correspondingly reduces the frequency of such renewals.

I am aware that the calcination of nitrogenous animal matters in a closed vessel provided with a rotating stirrer and heated by a furnace into which it is built is not new, and do not, therefore, broadly claim an apparatus for the conduct of such process.

I claim as my invention, and desire to secure by Letters Patent—

1. The combination, in an apparatus for the manufacture of ferro-cyanide of potassium, of a gas-heating furnace having its combustion-chamber divided into a series of separate non-communicating compartments, and a series of calcining-pots suspended in pairs in the several compartments of the furnace, substantially as set forth.

2. The combination, in an apparatus for the manufacture of ferro-cyanide of potassium, of a heating-furnace, a series of covered calcining-pots, each having a gas-escape tube leading from an opening in its lid, and a draft-flue

communicating with the gas-escape tubes of the calcining-pots, and provided with a regulating-damper for governing the draft therefrom, substantially as set forth.

3. The combination, in an apparatus for the manufacture of ferro-cyanide of potassium, of a heating furnace or chamber having a supporting-ring built into its top and a vertical supporting-pier upon its floor, and a calcining-pot, which is suspended at top by a circumferential flange on the supporting-ring and rests at bottom on the supporting-pier, substantially as set forth.

4. The combination, in an apparatus for the manufacture of ferro-cyanide of potassium, of a calcining-pot having a circumferential top flange, a supporting-ring within and upon which said flange rests, and a divided cover composed of a rear section, having lugs to retain it in position and an opening to communicate with a gas-escape tube, and a removable front section, provided with a sliding feed-door, substantially as set forth.

HENRY BOWER.

Witnesses:
J. SNOWDEN BELL,
WILLIAM MALLON.