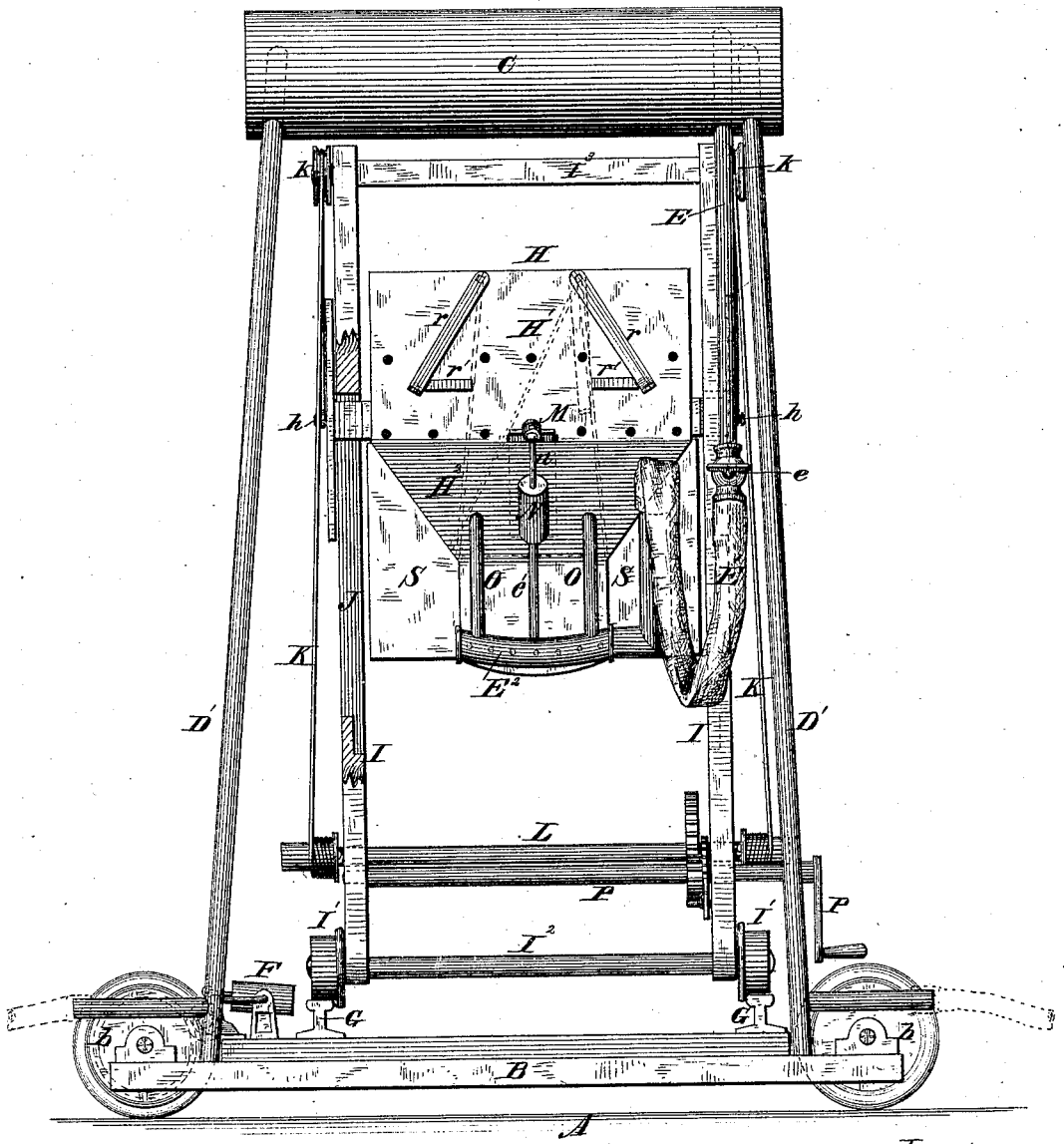
4 Sheets—Sheet 1.

A. Q. ROSS.

Gas-Retort Charger.

No. 212,573. Patented Feb. 25, 1879.

Fig 1.



Witnesses.

Harry King

W. W. Morris

Inventor.

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By L. Hill.

His Atty.

4 Sheets—Sheet 2.

A. Q. ROSS.
Gas-Retort Charger.

No. 212,573. **Patented Feb. 25, 1879.**

Fig 2.

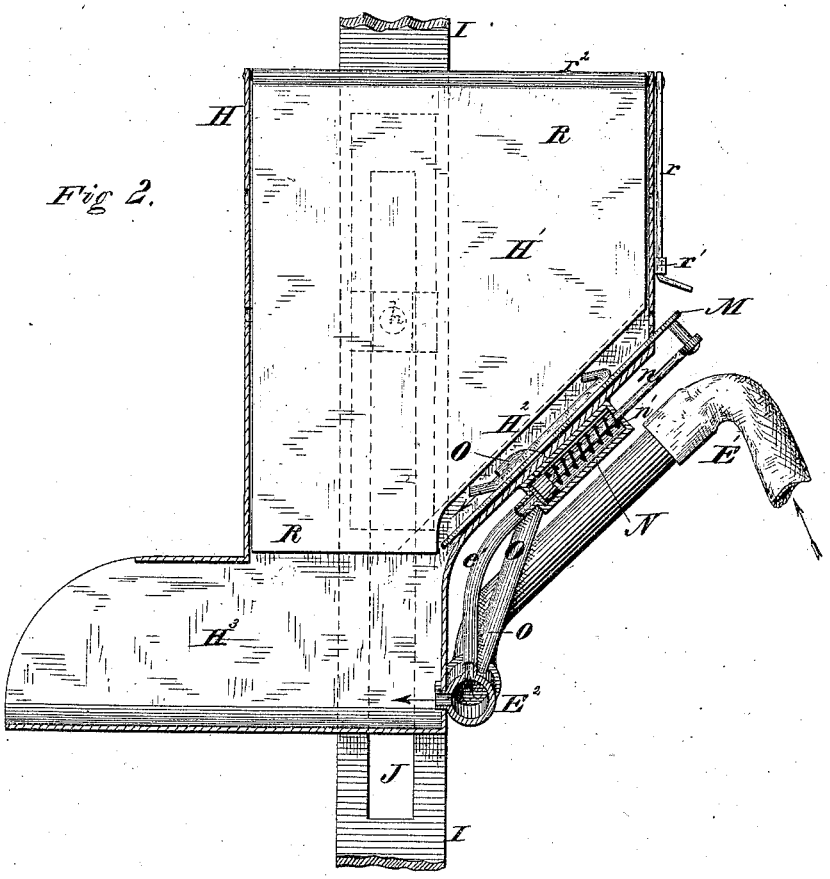
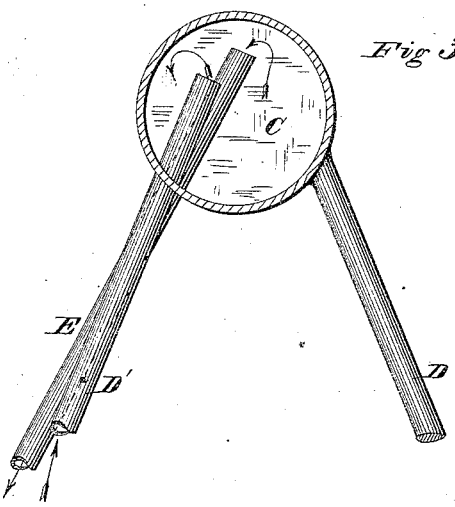


Fig 3.



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4 Sheets—Sheet 3.

A. Q. ROSS.
Gas-Retort Charger.

No. 212,573. Patented Feb. 25, 1879.

Fig 4.

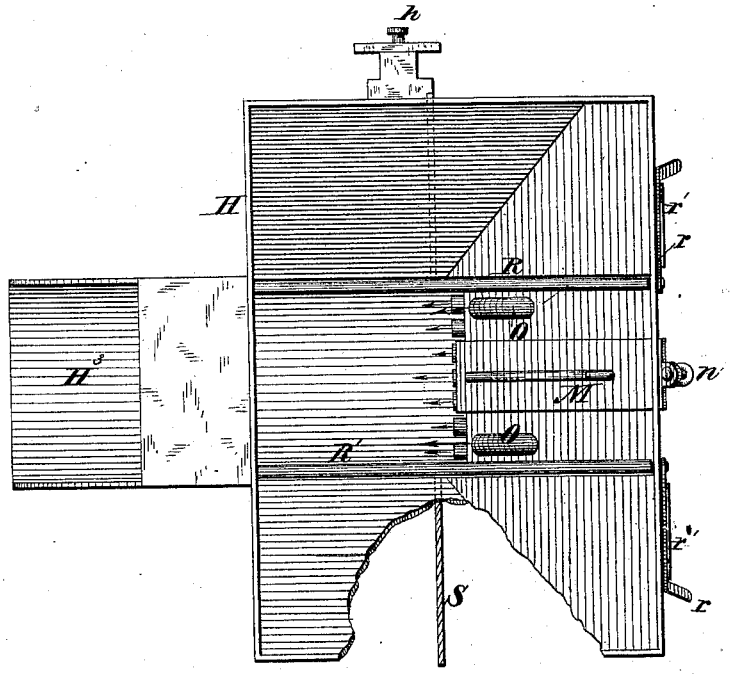
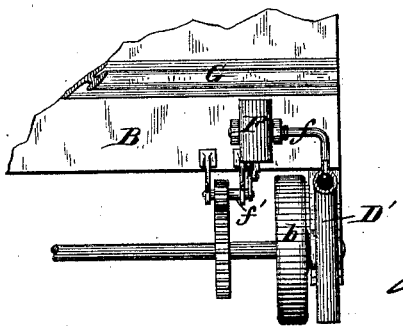


Fig 5.



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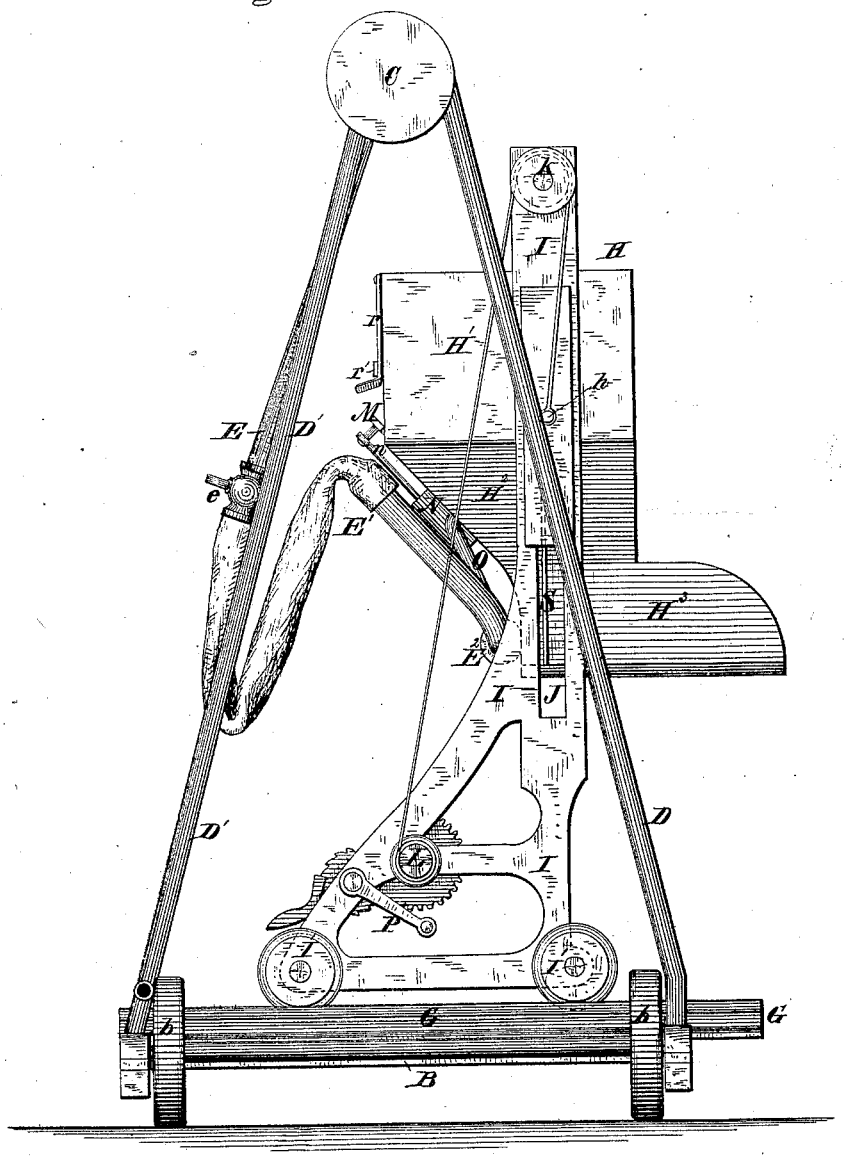
4 Sheets—Sheet 4.

A. Q. ROSS.
Gas-Retort Charger.

No. 212,573. Patented Feb. 25, 1879.

Fig. 6



Witnesses.

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D. W. Ross

Inventor.

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His Atty.

UNITED STATES PATENT OFFICE.

ABBOTT Q. ROSS, OF CINCINNATI, OHIO.

IMPROVEMENT IN GAS-RETORT CHARGERS.

Specification forming part of Letters Patent No. **212,573**, dated February 25, 1879; application filed September 21, 1878.

To all whom it may concern:

Be it known that I, ABBOTT Q. ROSS, of Cincinnati, in the county of Hamilton and State of Ohio, have invented a certain new and Improved Gas-Retort Charger; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a rear elevation, a portion of one of the charger-frame standards being in section. Fig. 2 is a vertical section of the charger and transverse blast-pipe, taken at right angles to said pipe. Fig. 3 is a cross-section of the reservoir, showing portions of the pipes in elevation. Fig. 4 is a top-plan view of the charger, a portion being removed to exhibit the shield. Fig. 5 is a detached top-plan view of the locomotive apparatus for moving the truck and its attachments along the guide-rails parallel to the front of the retorts. Fig. 6 is a side elevation of the charger.

Similar letters of reference in the several figures denote the same parts.

This invention relates to that class of gas-retort chargers in which a charge of coal for a retort is separated from the mass of fuel, moved forward to the retort, and blown in by the action of a blast of steam, compressed air, or other gaseous or aeriform fluid, on the general principle set forth in my application for Letters Patent of the United States filed May 27, A. D. 1878.

The present invention is an improvement or series of improvements upon the mode of operation and mechanism employed therefor shown and described in my former application above referred to, and consists as follows: first, in an improvement in the mode of operating by the blast, by using a controlling cock or valve capable of instantaneous opening and blowing the coal in by a series of graduated blasts, decreasing successively in force, whereby the coal will be spread evenly and uniformly over the floor of the retort; secondly, in combining, in one vessel having a single charging-conduit, a series of charge-chambers which can be emptied successively into said conduit, whereby several charges can be moved up to the bench at once and delivered into the retorts by the same blast apparatus; thirdly, in a combined charger, conduit, and blast-pipe vertically adjustable to permit the delivery of the coal from the same conduit into retorts at different elevations; fourthly, in an improved form of agitator for feeding the coal down from the charger into the conduit; fifthly, in the employment of direct blasts of steam, compressed air, or its equivalent, for forcing the coal down from the charger into the conduit; sixthly, in a shield for protecting the workmen from accidental injury; and, lastly, in the several subordinate combinations and elements of construction and operation, as hereinafter set forth.

In the drawings, A indicates one of a pair of guide-rails laid in the gas-works parallel to the front face of the retorts, and at a suitable distance therefrom, to enable the charging-machine to be run back and forth from one bench to another, as may be required. B is a truck or platform mounted on four wheels, *b b*, which rest upon the rails A.

The truck with its connections may be moved along the rails by hand, or by the power of a small engine, as hereinafter described.

C is a reservoir of suitable size and shape, and of sufficient strength to safely sustain a steam or air pressure of at least forty pounds to the square inch. It is mounted at a suitable height to clear the moving parts below, and is supported by four inclined standards, D D′, one or more of which may be tubular, as shown at D′, and serve to deliver the steam or compressed air into the reservoir from a boiler, compressor, or other source. The collars or branches to which the supply-pipes are to be attached in such case are shown in Fig. 1, where the supply-pipes are indicated by dotted lines. The steam or compressed air thus fed into the reservoir is taken therefrom through a pipe, E. The ends of all these pipes project up into the reservoir to a suitable height to prevent the water of condensation in the reservoir from entering them, as clearly shown in Fig. 3 and in dotted lines in Fig. 1, and the reservoir may be provided with a cock for the purpose of drawing off the water of condensation from time to time, as may be necessary.

F is a small steam or air engine mounted

on the movable platform B, and supplied with steam or air from one of the pipes D′ by means of a branch, *f*. The piston-rod of the engine may be connected to a double crank on the shaft of the traction-wheels, or to a crank on a small intermediate shaft, *f′*, which drives the larger shaft by gearing, as shown.

G G are two guide-rails arranged on the platform at right angles to the rails A, and serving to guide the charger H back and forth toward and from the retorts. The frame of the charger is constructed with two side standards, I I, sufficiently spaced or spread at their lower ends to accommodate the axles of four wheels, I^1 I^1, on which the frame is mounted, and to furnish a broad base upon which the frame and its attachments are steadily and firmly supported. The wheels are arranged on the ends of two fixed axles, I^2, which serve also as cross-beams for the base of the frame. A single cross-beam, I^3, answers for the upper end of the frame. This frame, thus constructed, is moved back and forth on the rails G by hand; or, if preferred, the motive power of the steam or air may be employed therefor in any suitable manner.

The charger proper is mounted on trunnions *h*, which project through or into vertical guides J in the side standards, I, and are connected to cords or chains K, which pass over pulleys *k*, and down to a winding-shaft, L, controlled and operated, through gearing, by a windlass, P, provided with a ratchet and pawl to prevent back movement. By turning the windlass the charger can be raised or lowered to bring its discharge-orifice in line with the mouth of any retort to be charged. A screw or other known mechanism for elevating and lowering bodies may be used in lieu of the cords and pulleys, and will be the mere equivalents thereof.

The upper part of the charger H is constructed in the form of a rectangular box, H^1, and the lower part in the form of a hopper, H^2, having a vertical front and inclined or tapering side and rear walls, as shown; and it discharges into a conduit, H^3, the front of which is open and adapted to enter the mouths of the various retorts to be charged. The coal falls from the charger into the conduit, and is blown thence into the retort by the action of a jet or jets of steam or compressed air conducted from the reservoir through a flexible jointed or telescopic pipe, E^1, controlled by an instantaneously-acting valve, *e*. The blast-jets open into the rear of the conduit from a transverse branch, E^2, of the pipe E^1. The flexible pipe enables the charger to be run back and forth and raised or lowered without interfering with the action of the blast apparatus. Inasmuch as the blast will enter the retort with great force, and is liable to be deflected from the rear walls thereof out around the sides of the conduit, so as to endanger the workmen, I attach a guard or shield, S, to the bottom and sides of the charger, as shown, to arrest and deflect away the return movement of the steam, air, or gases. The shields may be attached to the supporting-frame of the charger, or even to the platform B, if preferred, instead of attaching them to the movable charging-vessel itself.

The coal in the charger is liable, sometimes, to choke and fail to feed down properly, and therefore I make provision for forcing it down when required. To this end I arrange a sliding plate, M, on the inner side of the rear inclined wall of the part H^2, said plate being guided in any suitable manner and provided with downward-inclined spikes or teeth, as shown in Fig. 2. I operate this plate, in one direction, by the action of steam or compressed air introduced from pipe E^2, by a branch, *e′*, into a steam-cylinder, N, and there moving a piston upward, as shown in Fig. 2, said piston being connected to the slide M by a rod, *n*, and being moved downward when the steam is cut off by the action of a spiral spring, *n′*, contained within the upper end of the cylinder. I also force the coal down by the direct action of steam or compressed air introduced through the walls of the part H^2 by means of pipes O, leading from the pipe E^2, and having their discharge ends bent down, as shown in Figs. 2 and 4. These two means of forcing the feed of the coal may be used separately or conjointly, as preferred.

The charger is divided into three compartments by two hinged and swinging partitions, R R′, controlled by levers *r* on the outside of the charger, which can be locked in position behind a projection, *r′*, or by a pin or other suitable means.

The nearly vertical dotted lines in Fig. 1 show the normal position of the partitions when the charger is fully charged, and the diagonal dotted line in the same figure indicates the position of the right-hand partition when the middle compartment has been emptied and the right-hand compartment is discharging. The left-hand partition will be swung in the reverse direction to dump the coals from the left-hand compartment into the conduit. With a charger thus constructed three full charges can be conveyed to the bench at once; the middle charge can be blown out without disturbing the others; then one of the partition-valves can be swung over, allowing the coals in one side compartment to dump into the conduit and be discharged into a second retort; and, finally, both partition-valves can be swung in the reverse direction, allowing the coals of the remaining compartment to dump and be discharged into a third retort, the charger being raised or lowered meanwhile to admit the conduit into the several retorts. The charger can be slightly rocked on its supporting-trunnions to vary the distance to which the coals will be projected, and thus facilitate their uniform deposition over the floor of the retort.

The shape of the charger—a vertical-sided box mounted on a tapering hopper above the horizontal conduit—not only adapts it to the introduction and use of the partition-valves

above described, but also enables it to accommodate a full charge or charges of coal, and cause the mass of coal to press down with sufficient weight to facilitate the feed materially.

It will be observed that the coal from all three compartments is dumped into the same narrow conduit and discharged by the same blast contrivance, thus simplifying and reducing the cost and weight of the machinery.

It remains now only to describe the mode or process which I employ in the use of this improved apparatus. This process or mode of operation consists in discharging a portion (say the first quarter) of each charge by the entire force of the steam, which, when opened instantaneously, or exploded, as it were, against the coal, by throwing the valve wide open, will project it to the rear portion of the retort; then discharging the next quarter of the charge with about three-quarters of the force of the steam, by throwing the valve three-quarters open, which will deposit that part of the charge directly in front of the coals already blown in; then discharging the next quarter with about half the steam-force, which will deposit that portion of the coals immediately in front of the others; and, lastly, discharging the remainder of the charge with about one-quarter of the steam-force, which will deposit that portion of the charge inside of the iron mouth-piece in front of the other coals.

I find that with forty pounds of steam, and with a two-inch pipe discharging through twelve one-half inch jets I can, in the manner herein indicated, deposit the charge uniformly over the entire floor of the retort; but the ordinary steam throttle-valve will not answer at all for this operation, as its action is not sufficiently quick. The steam must be instantaneously liberated or exploded upon the coal, and as instantaneously cut off. I therefore employ the throttle-valve patented by Benjamin F. Wilson, January 27, A. D. 1874, No. 146,796, which admirably answers the purpose.

With this valve a man can, in a few minutes, learn to deposit the charge just as he desires, by merely opening and closing the valve properly. The opening and closing of the valve to discharge the coal operate the agitator M at the same time, and thus perform two important functions.

It is obvious that any form of throttle-valve may be used which will operate instantaneously. I do not limit myself to the particular one herein described, but recommend it as the best now known to me.

It is also obvious that any form of steam-engine or compressed-air or gas engine, or other motor, may be employed for moving the machine on the guide-rails, instead of the oscillating engine shown in the drawings. So, too, the construction of the frame-work may be modified according to the pleasure of the builder, provided it be made to accommodate the operating mechanism. And, in general, I do not limit myself to the precise details of construction shown, but consider as the equivalent thereof any other construction which the skill of the workman may suggest, or which may be devised by the inventor to accomplish the same results in substantially the same manner.

In particular, I do not limit my improved mode or process of charging the retorts to any specific mechanism, but have described the mechanism herein shown as one practical means for carrying it into operation.

In an application for Letters Patent filed September 20, A. D. 1878, and now pending, I have shown and claimed, broadly, a steam or air piston combined with springs, for the purpose of actuating the agitator of the charger. I therefore do not broadly claim herein the combination of a piston and spring for such purpose, but only their combination when both are contained within the walls of the cylinder, whereby the spring will be guided in its movement and protected from casual injury.

Having thus described my invention, I claim as new—

1. The mode of charging a gas-retort by steam or compressed air, as herein described, consisting essentially in exploding the steam or air against the coal, and then decreasing the blast in force, substantially as described.

2. The discharge-conduit and blast-pipe, in combination with a series of charge-compartments to be emptied successively into said conduit, substantially as described.

3. The combined charger, conduit, and blast-pipe, in combination with mechanism for raising and lowering them together, whereby the several charges are adjustable to the height of their respective retorts, and delivered into the same without the necessity of recharging the apparatus during the operation, substantially as described.

4. The combination of the movable partitions with the charger and conduit, whereby any one of the several compartments may be brought into communication with the conduit and blast apparatus, for the purpose of discharging its contents into the retort.

5. The agitator M, in combination with the charger, and with a steam or air cylinder containing a steam or air space on one side of the piston, and a spiral spring on the other side, for the purposes herein set forth.

6. The direct-blast pipes O, with their downward-discharge orifices, in combination with the charger, as and for the purpose described.

7. The combination of the shield or shields S with the charger and blast apparatus, substantially as described.

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Witnesses:
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M. CHURCH.