

No. 103,465.

PATENTED MAY 24, 1870.

H. I. HOYT.

MACHINE FOR GENERATING AND CARBURETING HYDROGEN GAS.

Fig. 2

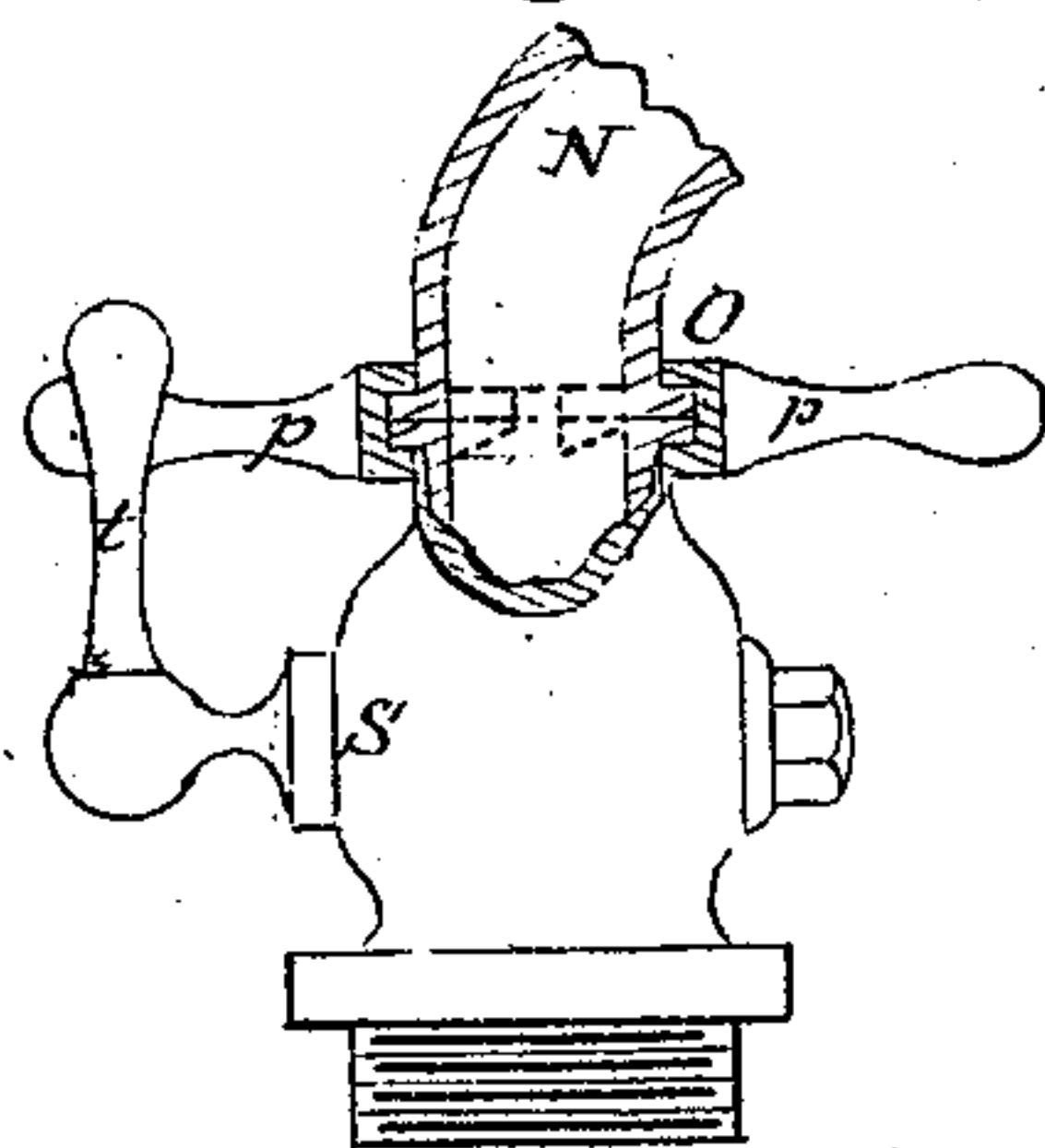
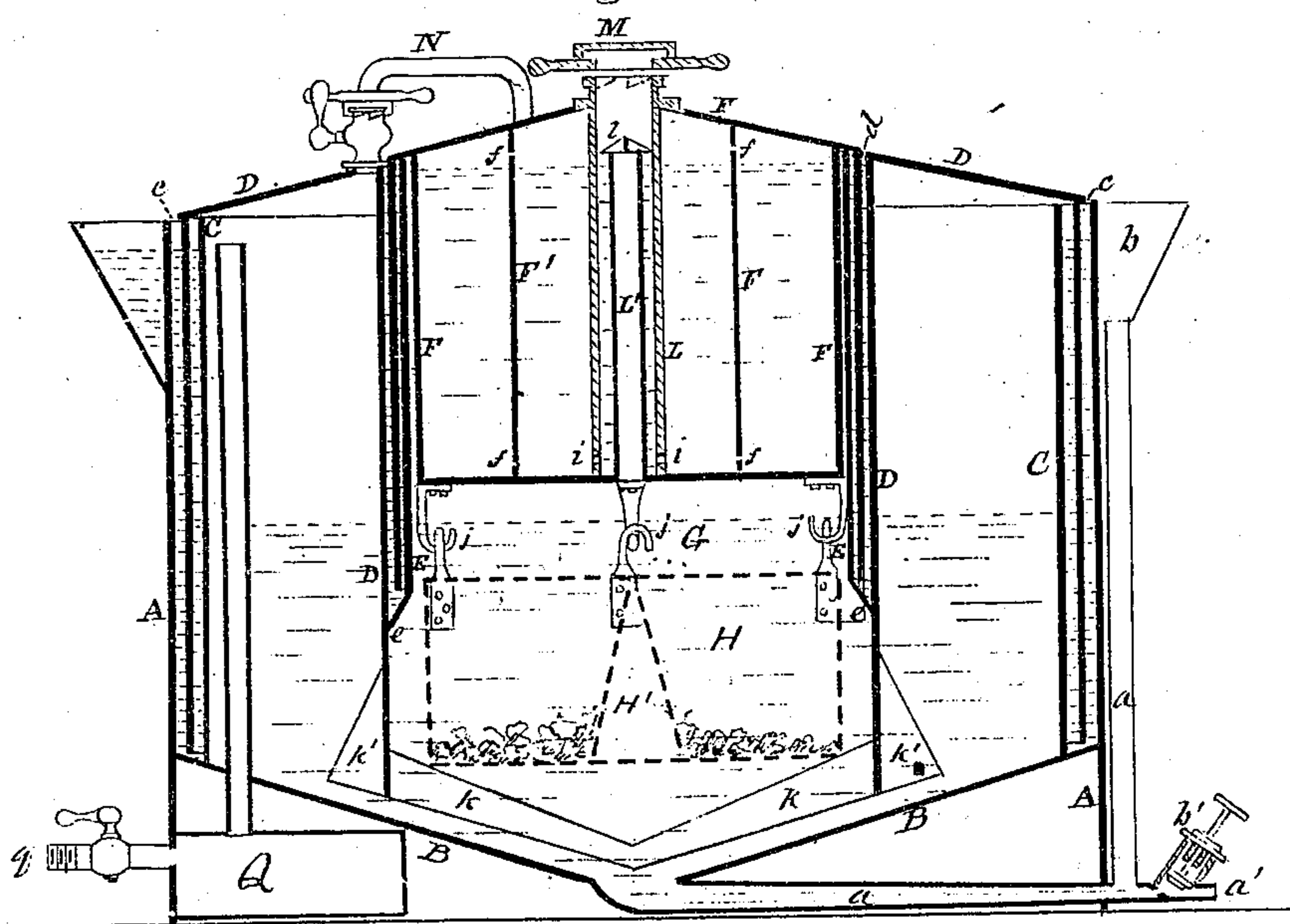


Fig. 1



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IMPROVEMENT IN MACHINES FOR GENERATING AND CARBURETING HYDROGEN GAS.

Specification forming part of Letters Patent No. **103,465**, dated May 24, 1870.

To all whom it may concern:

Be it known that I, HENRY I. HOYT, of Norwalk, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Machines for Generating and Carbureting Hydrogen Gas; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, and the letters of reference marked thereon, in which the same letter represents the same thing in each figure.

My invention relates to improvements upon machines for generating pure hydrogen gas by the action of dilute acid upon iron or zinc filings or chippings, and to devices in combination therewith for carbureting said gas before it leaves the apparatus in which it is generated by passing it through gasoline or other hydrocarbon liquid; and my improvements consist, first, in so constructing and arranging the wire basket for holding the metal chippings that it may be removed, recharged, and replaced without stopping the supply of gas to the burners; secondly, in so constructing and arranging the vessel which contains the carbureting-chamber that it can be removed from the apparatus without stopping the flow of gas to the burners; thirdly, in the construction and employment of a combined pipe and coupling and stop-cock for the pipe which connects the carbureting-chamber with the gas-holder, said coupling being so constructed and arranged that it cannot be disconnected for the purpose of removing the carbureting-chamber without closing the pipe from the gas-holder so as to confine the gas therein.

In the accompanying drawings, Figure 1 represents a vertical section of an apparatus containing my improvements, and Fig. 2 a sectional view of my improved pipe-coupling.

A is a cylindrical vessel, of any desired size, made of sheet metal, having an inverted conical bottom, B, from the apex of which a pipe, *a*, extends through the side of the cylinder and up to the top of the same on the outside, where it terminates in a funnel, *b*, for introducing the dilute acid.

At the bottom of the cylinder A, and at the outside thereof, this pipe *a* branches, and the

branch *a'*, provided with a miter-valve, *b'*, serves for drawing off the sediment deposited in the acidulated water. Within said cylinder A, and concentric therewith, is another cylinder, C, attached to the bottom B, and extending up flush with top of the cylinder A, forming a water-tight annular chamber, *c*, between said cylinders. Into this annular water-space the gas-holder D dips in the ordinary way. Said gas-holder is annular in form, having a cylindrical cavity or opening down through its center, for inserting the carbureting vessel and metal-holding basket. Within said cylindrical opening, and concentric therewith, is another cylinder, E, which is attached to the cylinder which forms the inner wall of the holder by a water-tight joint at *e*, forming an annular water-chamber between the said cylinder E and the inner wall of the annular gas-holder.

F is the carbureting-vessel, which contains the hydrocarbon liquid, through which the gas passes from the generating-chamber before passing into the holder. This carbureting-vessel F is surrounded by a cylinder, F', attached to the same cover which dips into the annular chamber *d*, thus forming a liquid joint or seal, to prevent the escape of gas from the generating-chamber around the outside of the carbureting-vessel. The said carbureting-vessel E is divided into two compartments by an annular partition, which compartments communicate with each other through openings *f f*, the gas being introduced into the inner compartment only.

G is the gas-generating chamber, immediately under the carbureting-chamber. H is a woven-wire basket for holding the metal turnings or chippings; and H', a cone of woven wire, rising from the bottom of said basket, to facilitate the upward flow of the gas and prevent it from passing out into the holder before passing through the carbureting-chamber.

The wire basket H is suspended to the carbureting-vessel by means of hooks *j j j*, or, when said hooks are detached, rests upon cross-slats *k*, which, as well as the wings or fans *k'*, attached to the inner cylinder of the holder, serve as agitators, to mix the acid and water by rotating the holder.

Extending down through the center of the carbureting-vessel to the bottom thereof is a

cylinder or tube, L, which is closed at the top by a screw or clamp cap, M, and is used for introducing the liquid hydrocarbon into the carbureting-chamber.

A smaller pipe, L', is located within the pipe L, its lower end opening to the gas-generating chamber, and its upper end being covered by a hood, l, to prevent the hydrocarbon liquid from entering the pipe L' when poured down the pipe L. The hydrocarbon liquid enters the carbureting-chamber through openings or perforations *i i*, and the gas, rising from the generating-chamber through the pipe L', descends around the outside of said pipe to the said perforations *i i*, through which it enters the carbureting-chamber at the bottom, thence passing up through the hydrocarbon liquid and over into the holder through the connecting-pipe N.

In order to admit of the removal of the carbureting-vessel from the apparatus, this connecting-pipe is made detachable; and in order to prevent the escape of gas from the holder when the pipe is detached, I employ a coupling device and a stop-cock in combination, so constructed and arranged that the pipe cannot be uncoupled without turning the stop-cock, so as to close that part of the pipe which connects with the gas-holder, and so preventing the escape of gas therefrom. This combined coupling device and stop-cock are most clearly shown in Fig. 2.

The coupling device consists of a clamp or shackle, O, provided with two handles, *p p*, and the stop-cock S is provided with a handle, *t*; and these devices are so arranged that the planes of rotation of the handles cross each other at right angles, and so that the handles of the coupling device cannot be turned to uncouple the connecting-pipe till the handle of the stop-cock has been so turned as to close the pipe leading to the gas-holder.

The hooks on the lower end of the carbureting-vessel engage with hooks on cross-rods on the top of the metal-holding basket, and as said hooks all turn in the same direction they may be made to seize or release the basket by partially rotating the said carbureting-vessel. By this means the carbureting-vessel may be removed from the apparatus, either with or without the basket, as may be desired; and in either case, the connecting-pipe N being uncoupled and that part entering the gas-holder being closed by the stop-

cock O, the flow of gas to the burners will be continued without interruption till the holder is exhausted, though the carbureting-vessel and metal-holding basket may both or either of them be removed from the apparatus.

Q is a condenser, through which the gas must pass from the holder before reaching the service-pipe *q*.

It will be seen that as the gas-holder rises it carries the carbureting-vessel and metal basket with it, so that when an excess of gas is generated the holder will lift the metal-holding basket out of the dilute acid, and no more gas will be generated till the holder again descends from exhaustion, thus rendering the apparatus automatically self-regulating. This feature, however, is not new, and I lay no claim to it.

In this application I have described several devices which are claimed jointly by John T. Earle and myself in an application for Letters Patent by us now pending in the Patent Office, all of which I disclaim as my sole invention. There are other devices described which are not new, and have been patented to others; I therefore disclaim everything described herein except what is hereinafter specifically claimed; but

I do claim as improvements invented by me, and desire to secure by Letters Patent—

1. The apparatus so constructed and the metal-holding basket so arranged that the latter can be removed from the apparatus without arresting the flow of the gas to the burners, substantially as and for the purpose described.

2. The apparatus so constructed and arranged that the carbureting-vessel may be removed from the apparatus, either with or without the metal-holding basket, without arresting the flow of gas to the burners, substantially as and for the purpose set forth.

3. The combined coupling device and stop-cock, constructed, arranged, and operating substantially as described.

4. The combined coupling device and stop-cock, in combination with the removable carbureting-chamber and the gas-holder, substantially as described.

HENRY I. HOYT.

Witnesses:

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