No. 640,531. Patented Jan. 2, 1900.

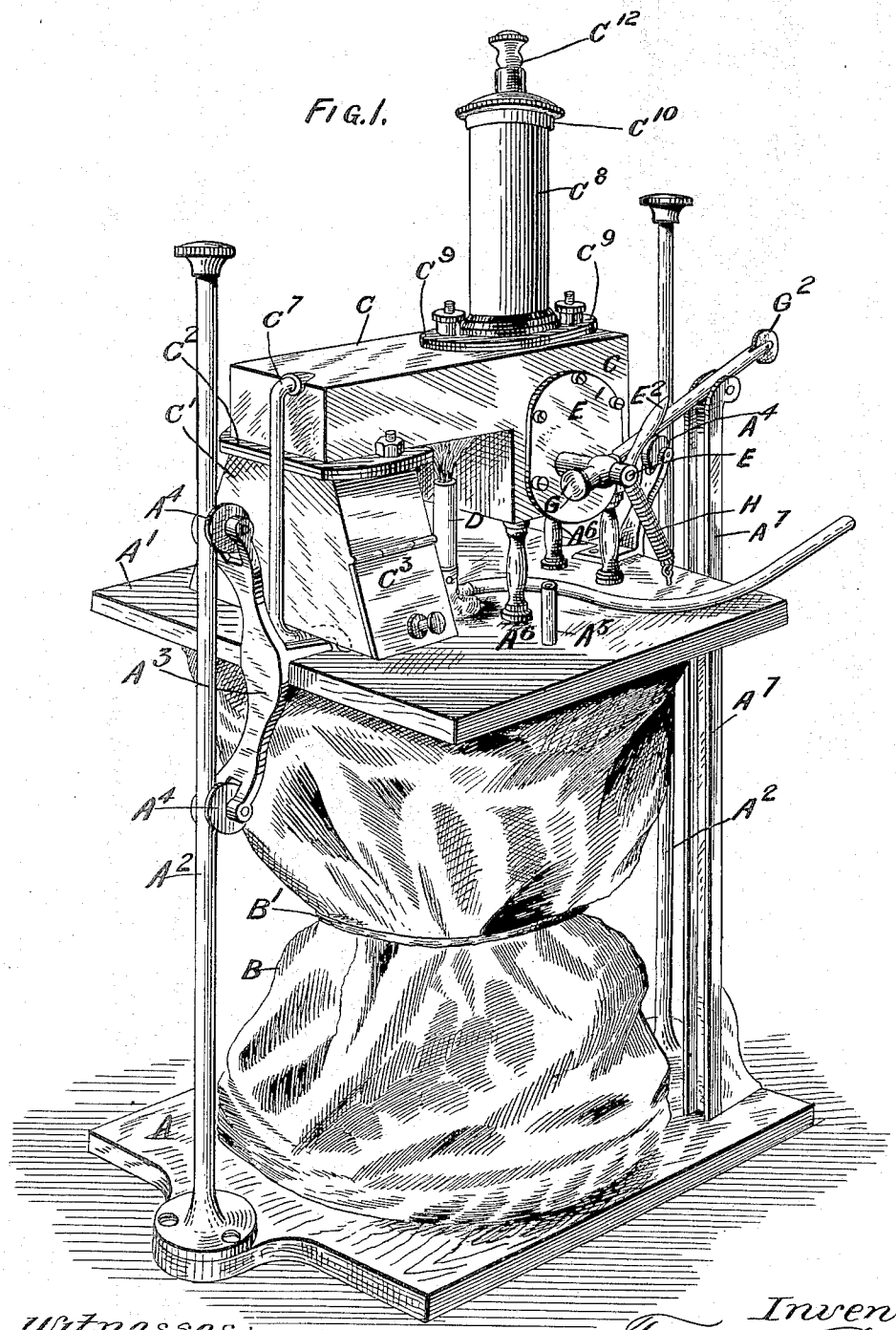
F. BROWN.

APPARATUS FOR MAKING OXYGEN.

(Application filed Aug. 3, 1899.)

(No Model.) 3 Sheets—Sheet 1.

FIG. 1.



Witnesses:
Franck L. Durand
H. K. Boulder

Inventor:
Frederick Brown,
By H. K. Boulder,
Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 640,531. Patented Jan. 2, 1900.

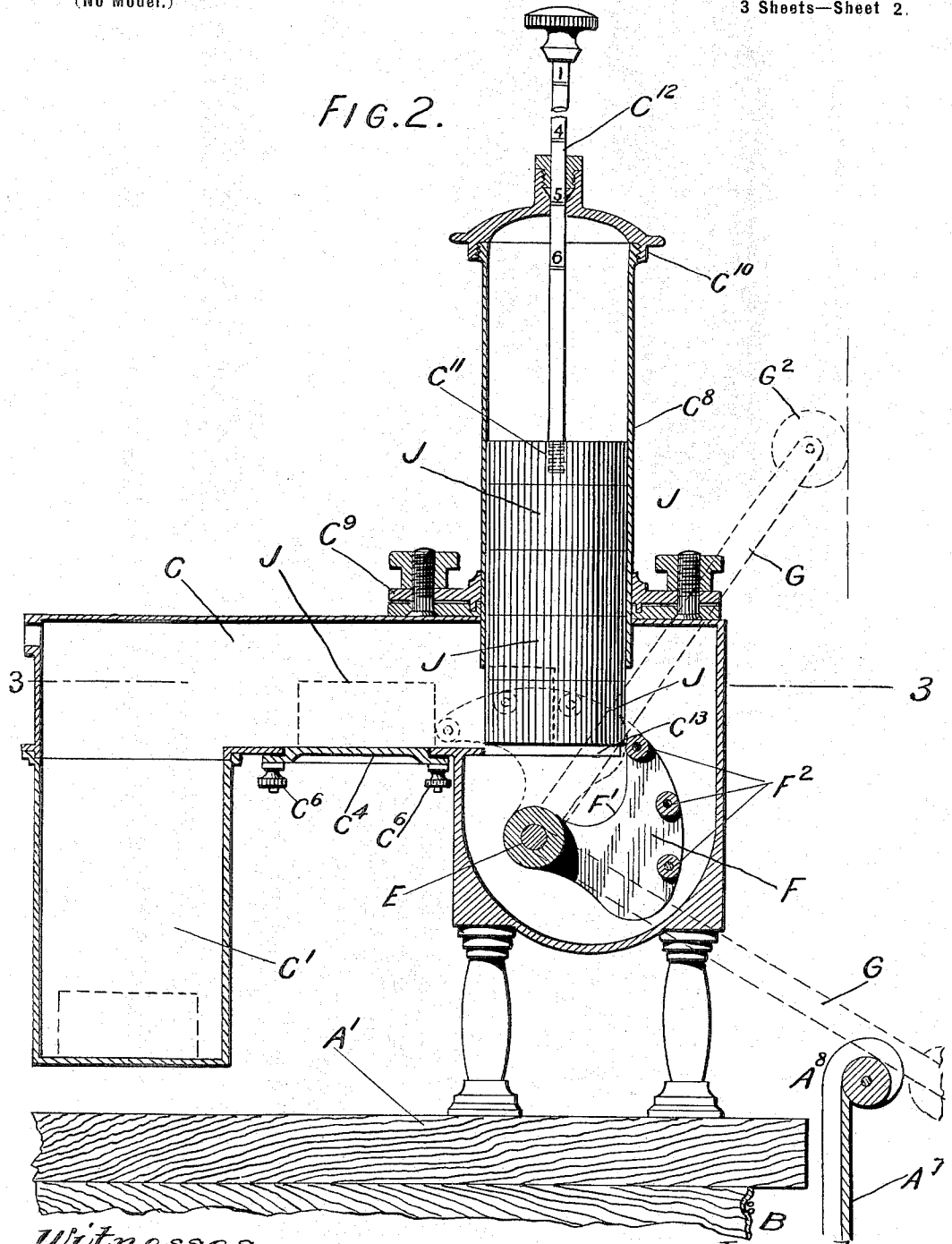
F. BROWN.

APPARATUS FOR MAKING OXYGEN.

(Application filed Aug. 3, 1899.)

(No Model.) 3 Sheets—Sheet 2.

FIG. 2.



Witnesses.
Franck L. Durand.
H. K. Boulter

Inventor
Frederick Brown
By Wm. E. Boulter Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 640,531. Patented Jan. 2, 1900.

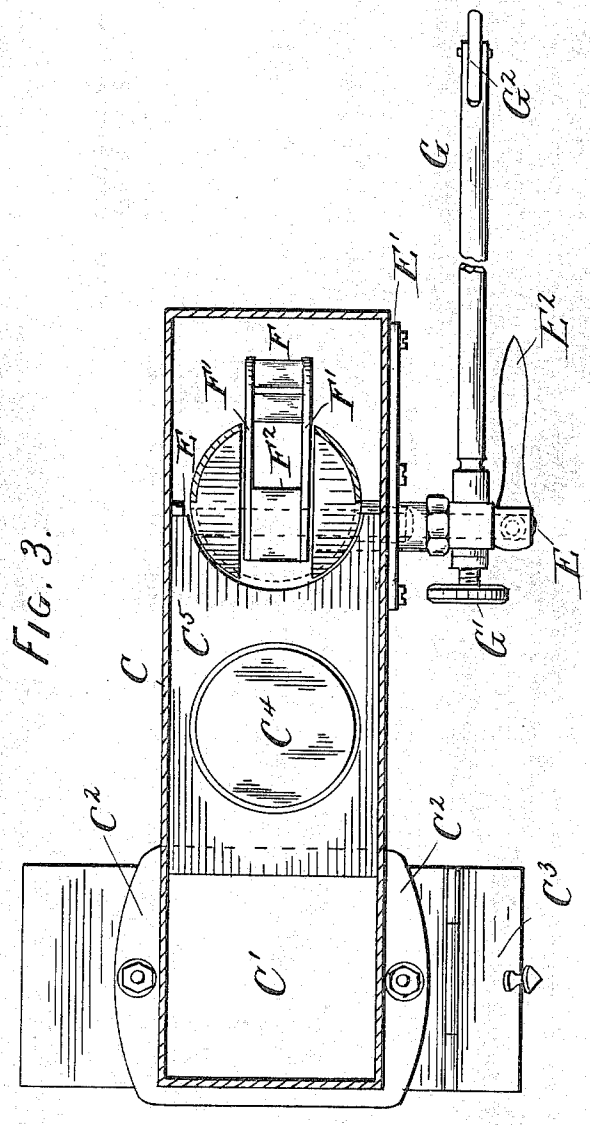
F. BROWN.

APPARATUS FOR MAKING OXYGEN.

(Application filed Aug. 3, 1899.)

(No Model.) 3 Sheets—Sheet 3.

FIG. 3.



Witnesses
H. K. Boulter
C. Smith

Inventor
Frederick Brown
By Wm. E. Boulter
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FREDERICK BROWN, OF LONDON, ENGLAND, ASSIGNOR OF ONE-HALF TO FREDERICK JOSEPH STEDMAN, OF SAME PLACE.

APPARATUS FOR MAKING OXYGEN.

SPECIFICATION forming part of Letters Patent No. 640,531, dated January 2, 1900.

Application filed August 3, 1899. Serial No. 726,037. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK BROWN, a subject of the Queen of England, residing at London, England, have invented certain new and useful Improvements in or Relating to Apparatus for Use in the Production of Oxygen or other Gases, (for which I have made application for Letters Patent in Great Britain under No. 21,067, dated October 6, 1898,) of which the following is a specification.

This invention relates to improvements in apparatus for use in the manufacture or production of oxygen gas or other gases which can be produced by the application of heat to chemical compounds in the form of cakes or charges, whereby a continuous supply of gas may be obtained, the apparatus working automatically.

In carrying out my invention I provide a closed chamber adapted to receive charges or cakes of material adapted to give off oxygen gas on the application of heat thereto, the material preferred in the case of oxygen being a mixture of dioxid of manganese and chlorate of potash. These charges are supplied to the chamber, preferably through a tube or hopper, and are successively and automatically moved within the chamber, so that they are brought to a portion of the chamber, which is heated by a heating device outside the chamber. Each charge when it has given off its gas is discharged into a chute or receiver in order to make way for the following charge. The mechanism for automatically feeding the charges may be of any convenient form, although the device hereinafter described is well adapted for the purpose, being extremely simple in construction and operation.

It is preferred to combine the apparatus with a bag or other gas-container and to so connect the charge-feeding mechanism with it that the apparatus is rendered self-regulating. In this case it is desirable that the capacity of the gas-container should be such that one charge of gas-producing material should be capable of giving off sufficient gas to fill the container, the connections being so arranged that as the gas produced by, say, the first charge is consumed the container will collapse and when it is partly or nearly empty will operate the feeding device to bring a second charge into position, whereupon the gas will be again produced and the bag will become again gradually inflated.

In the accompanying drawings, Figure 1 is a perspective view of one construction of apparatus according to this invention. Fig. 2 is a vertical longitudinal section through the center of a portion of the apparatus shown in Fig. 1, and Fig. 3 is a sectional plan on the line 3 3 of Fig. 2.

Like letters indicate like parts in all the figures.

A and A′ are boards between which an expansible gas-container B is situated. The gas-container B is made of gas-tight fabric and is provided with an elastic band B′, which causes the container when it collapses to fall together compactly. Guide-rods A^2 are attached to the board A and in conjunction with groove-pulleys A^4, carried by brackets A^3 upon the board A′, form guides for the latter when it travels up and down, according to the amount of gas in the container B. The weight of the board A′ and the apparatus which it carries serves to drive the gas from the container through an outlet A^5 at an approximately constant pressure. This action may be assisted by placing a spring inside the container in such a manner that it tends to draw the ends of the container together.

Supported upon the board A′ by pillars A^6 is a chamber C, leading at one end to a box or receiver C′, which is attached to the chamber C by a flanged joint, as at C^2, and provided with a gas-tight door C^3. A portion of the chamber C is adapted to be heated, as by the Bunsen burner D, and in order that the heat shall be confined as much as possible to that part of the chamber an opening is made in the bottom of the chamber C and a plate C^4, formed of a metal which is a good conductor of heat—say gun-metal—is inserted, insulated all around its edges, as at C^5, by asbestos or other material which is a bad conductor of heat. The plate C^4 is attached to the bottom of the chamber C by bolts and nuts C^6. A pipe C^7 affords communication between the chamber C and the gas-container B.

E is a shaft passing through the lower por-

tion of the chamber C and journaled in the sides thereof. For convenience a portion of one side of the chamber C is cut away and a plate E′ is bolted on, so that by detaching the plate E′ the shaft E and its appurtenances may be bodily removed. Upon the shaft E is a cam F, formed of two plates F′, having rollers F^2 mounted between them in order to diminish friction when the cam is working. A handle E^2 is mounted upon the end of the shaft E outside the chamber C, and the shaft also carries a lever G. This lever may be fixed in any desired position relatively to the shaft E by means of a screw G′. The lever G carries at the end remote from the shaft E a disk or roller G^2, adapted to run in the channel of a guide A^7, fixed to the board A. A spring H, one end of which is attached to the board A′, while the other is fastened to the lever G, tends to pull the latter downward, and consequently to rotate the shaft E in a clockwise direction.

Upon the top of the chamber C is mounted a tube C^8, attached to the chamber by a flanged joint, as at C^9. This tube projects into the chamber C and is cut away at the bottom to allow for the passage of the cam F. (See Figs. 2 and 3.) A screw-cap C^{10} closes the top of the tube C^8, and the rod C^{12} of a plunger C^{11} passes out at the top of the cap.

Glands or stuffing-boxes are fitted where necessary to prevent the escape of gas.

The operation of the apparatus is as follows: Charges J of the material, either in the form of cartridges or cakes or contained in cups or similar receptacles, are placed in the tube C^8, the cap C^{10} and plunger C^{11} being of course removed for that purpose and then replaced. It will be noticed (see Fig. 2) that if the shaft E is rotated far enough in a clockwise direction the cam F is brought clear of the tube C^8, and consequently the pile of charges will fall down the tube C^8 until stopped by the ledges C^{13}, which are so placed in the tube that the bottom of the lowest charge is level with or slightly higher than the heated portion of the chamber C. If now the shaft E be turned backward, the cam F will push the lowest charge from under the pile onto the heated portion C^4. (See dotted position in Fig. 2.) In starting, this is done manually by means of the handle E^2. The gas generated by the heated charge fills the container B, which thereupon expands and gradually carries the apparatus upward. (As illustrated in Fig 1, the apparatus is nearing the end of its upward motion.) As the apparatus rises the lever G passes up the guide A^7 until it reaches the top. The spring H then keeps the lever G in contact with the top of the guide A^7, a roller A^8 being interposed to lessen friction, and as the apparatus continues to rise the shaft E is rotated by the action of the spring H. Before the container B has risen to its full extent the continued rotation of the shaft E withdraws the cam F from under the lowest charge, and the pile of charges consequently again falls in the tube C^8. As the gas is used from the container B the latter collapses and the board A, with the apparatus thereon, descends, causing backward rotation of the shaft E, which results, when the container is nearly empty, in the cam F pushing another charge from under the pile onto the heated portion C^4 of the chamber C. The apparatus now rises again and the cycle of operations is repeated. Each fresh charge as it is pushed by the cam F onto the heated plate C^4 causes the remains of the exhausted charges or the cup containing them to pass along and fall into the box or receiver C′, whence they may be removed when desired through the door C^3. The plunger C^{11} assists the downward movement of the charges J in the tube C^8, and it is found convenient to graduate or mark the plunger-rod C^{12}, so that it may give an indication of the number of charges remaining in the apparatus.

Although the apparatus illustrated shows the feeding mechanism operated and controlled by the gas-container, it is in some cases convenient to operate it by other means—for instance, by clockwork. In such cases the capacity of the gas-container would preferably be considerably larger in proportion to the amount of gas given off by one charge than is the case in the example above described, and the gas-container would be provided with a safety-valve or equivalent apparatus for preventing undue increase of pressure.

The various parts of the apparatus are preferably so constructed that they may be readily detached and packed in a small space for convenience in transport.

I claim—

1. In an apparatus for the production of gas, the combination of a closed chamber, means for heating a portion of such chamber, a feeding device within the chamber, an expansible gas-container, a conduit between the latter and the closed chamber, and means outside the closed chamber and controlled by the gas-container for automatically operating the feed device to cause the latter to feed charges of material successively to the heated portion of the chamber.

2. In apparatus for the production of gas the combination of a closed chamber, means for heating a portion of such chamber, a shaft located in the chamber, a cam upon the shaft, an expansible gas-container, a conduit extending from the gas-container to the chamber and an operative connection between the container and the cam-shaft substantially as set forth.

3. In apparatus for the production of gas the combination of a closed chamber having an insulated portion, means for heating said portion from without the chamber and a tubular extension, an automatic feeding device for bringing the charges successively to the

heated insulated portion, and an expansible gas-container, a conduit leading from the gas-container to the chamber and an operative connection between the container and the automatic feeding device substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of the two subscribing witnesses.

FREDERICK BROWN.

Witnesses:
HAROLD WADE,
HARRY B. BRIDGE.