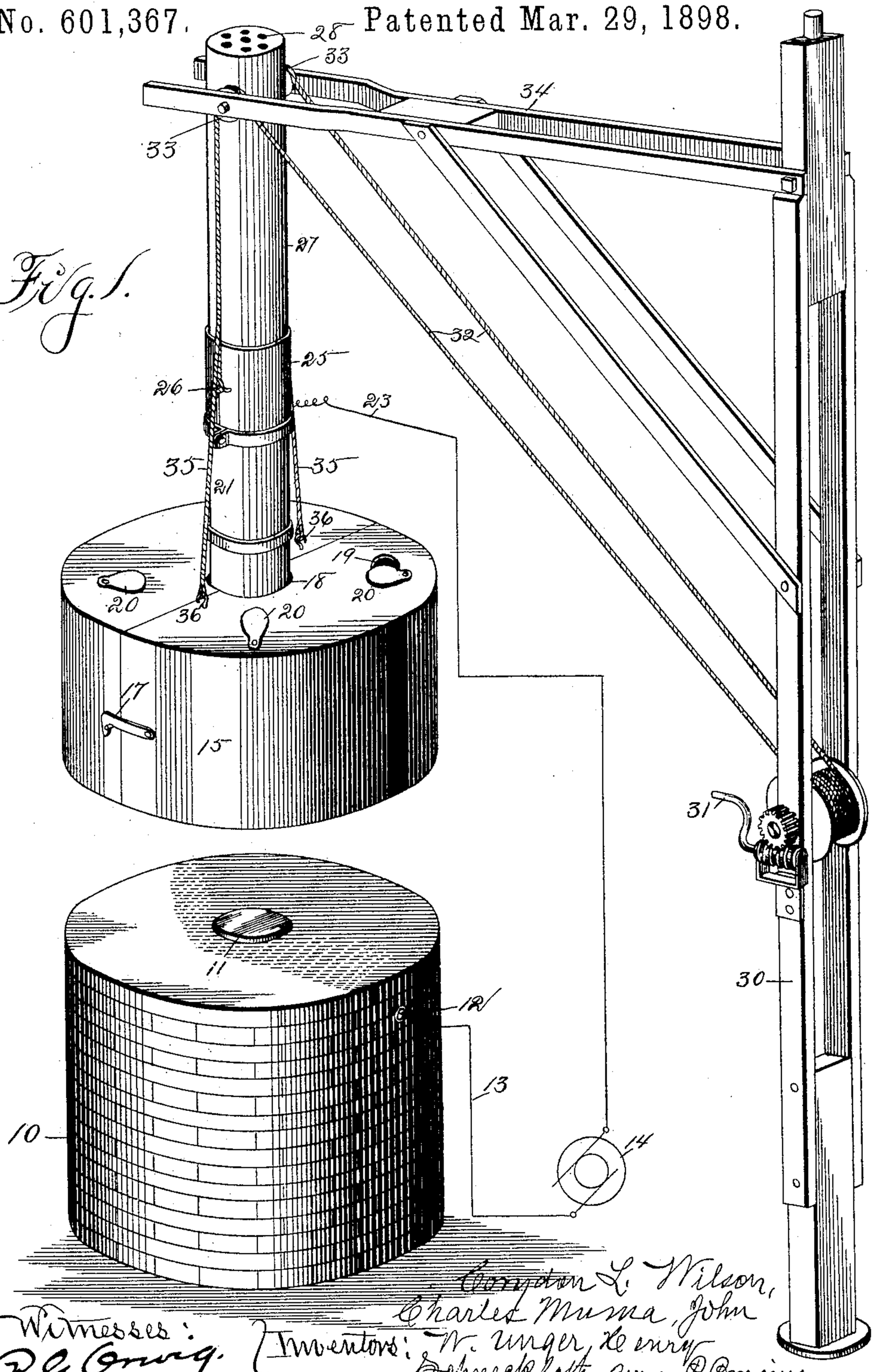
(No Model.) 2 Sheets—Sheet 1.

C. L. WILSON, C. MUMA, J. W. UNGER, H. SCHNECKLOTH, A. P. BROSIUS & J. C. KUCHEL.

ELECTRIC FURNACE FOR MANUFACTURING CALCIUM CARBID.

No. 601,367. Patented Mar. 29, 1898.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

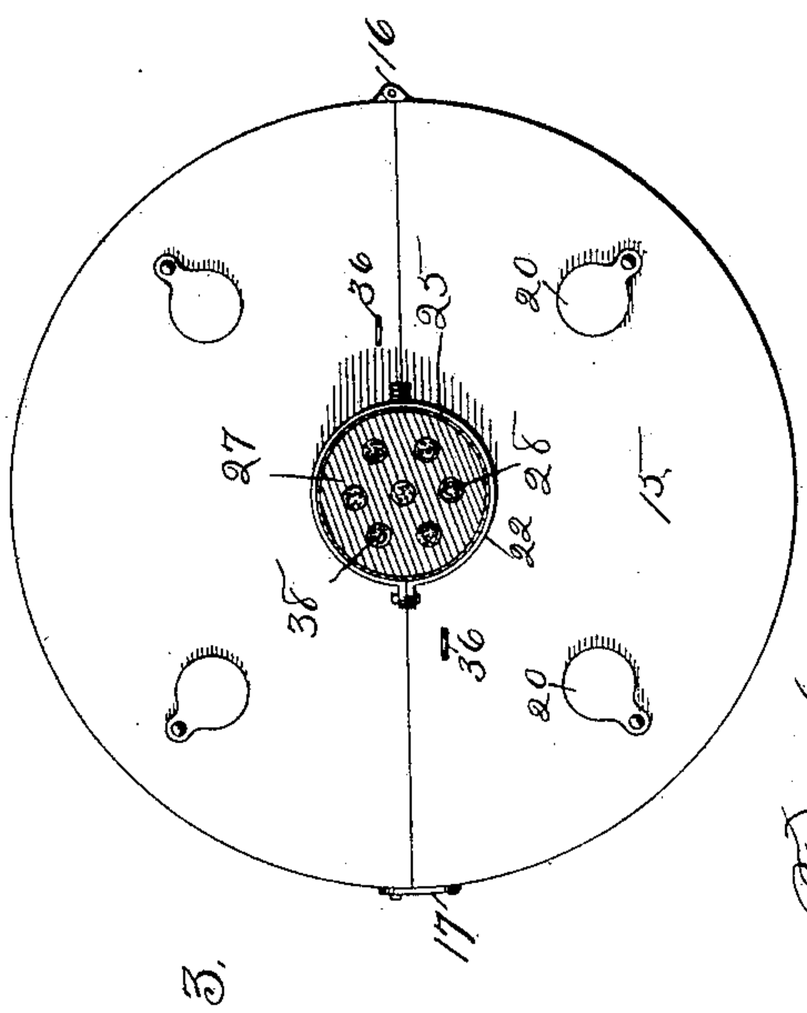


Fig. 4.

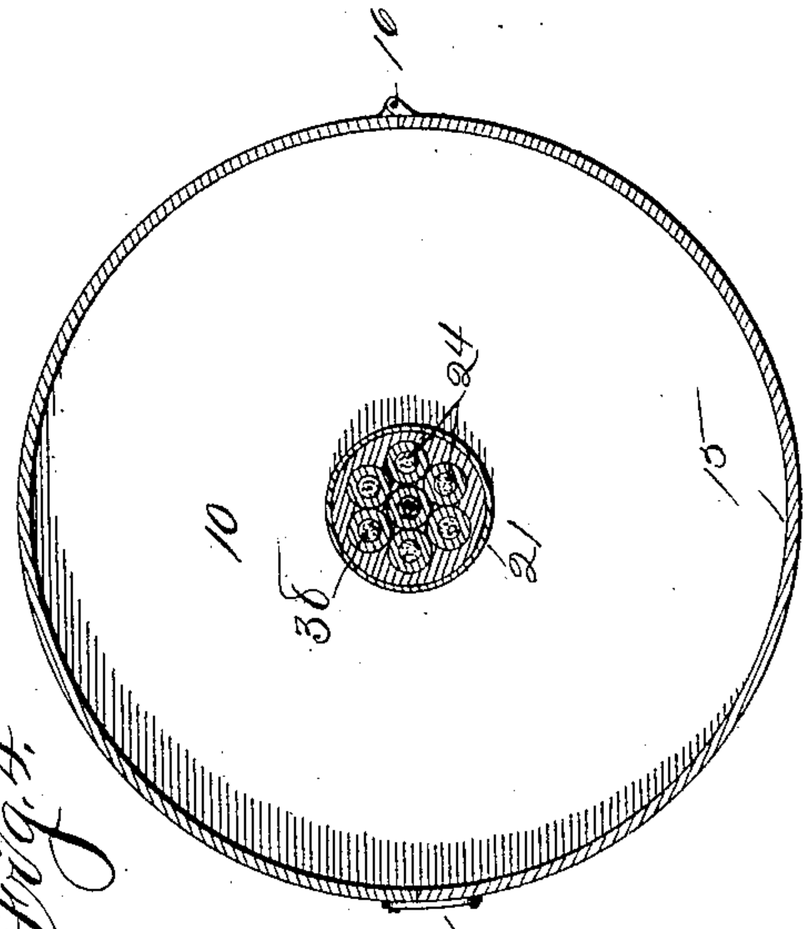
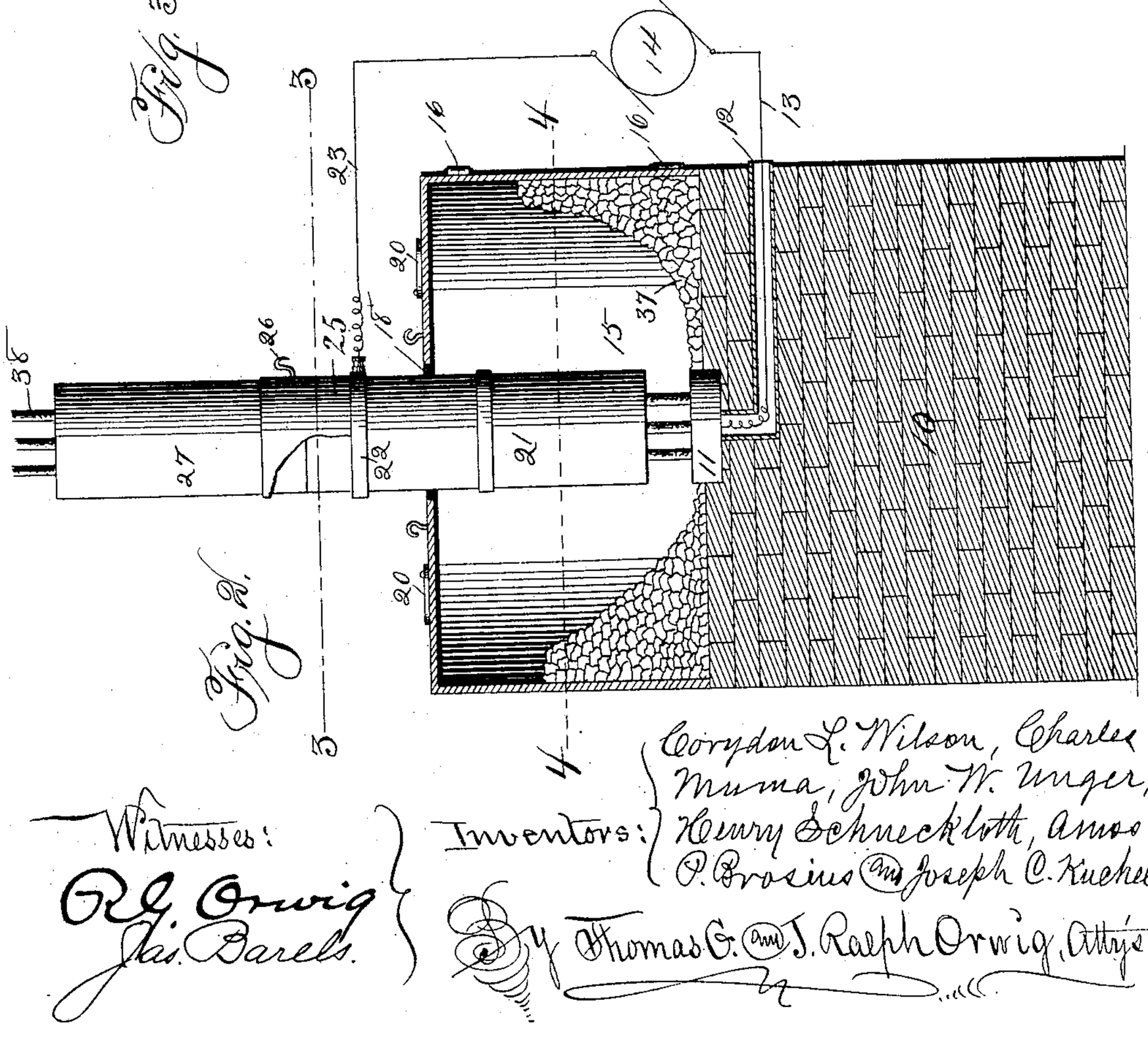


Fig. 2.



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UNITED STATES PATENT OFFICE.

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ELECTRIC FURNACE FOR MANUFACTURING CALCIUM CARBID.

SPECIFICATION forming part of Letters Patent No. 601,367, dated March 29, 1898.

Application filed February 13, 1897. Renewed February 4, 1898. Serial No. 669,599. (No model.)

To all whom it may concern:

Be it known that we, CORYDON L. WILSON, CHARLES MUMA, JOHN W. UNGER, HENRY SCHNECKLOTH, AMOS P. BROSIUS, and JOSEPH C. KUCHEL, citizens of the United States, residing at Holstein, in the county of Ida and State of Iowa, have invented a new and useful Electric Furnace for Manufacturing Calcium Carbid, &c., of which the following is a specification.

The object of this invention is to provide an electric furnace for reducing lime and carbon, which furnace shall be of simple, durable, and inexpensive construction and which may be rapidly and economically operated to produce a resultant product of calcium carbid of comparatively great purity.

A further object is to provide a furnace of this class in which lime and carbon previously compressed into stick form may be fed by hand in any desirable quantity and at the proper speed to produce the best results without subjecting the operator to the dangers attendant upon a direct contact with the electrode through which the lime and carbon is being fed.

Our invention consists, primarily, in the construction of a hollow electrode having at its upper end an insulator which is provided with openings to communicate with the openings of the electrode and the arrangement and combination therewith of means for raising and lowering the electrode and insulator jointly, so that the operator may by hand feed sticks of lime and carbon into the arc between the electrodes, and may also regulate the distance between the electrodes, so that the proper distance may be maintained at all times and the lime and carbon be fed to the arc in the proper quantities and at proper speed to produce the best results.

Our invention consists, further, in the construction, arrangement, and combination of the various parts of the furnace whereby the objects contemplated are attained, as hereinafter set forth, pointed out in our claims, and illustrated in the accompanying drawings, in which—

Figure 1 shows a perspective view of the completed furnace with the top thereof held elevated. Fig. 2 shows a central vertical section of the furnace ready for operation. Fig. 3 shows a horizontal section of the furnace, taken through the line 3 3 of Fig. 2. Fig. 4 shows a horizontal sectional view through the line 4 4 on Fig. 2.

Referring to the accompanying drawings, the reference-numeral 10 is used to indicate a base for the furnace, which is preferably made of brick. At its central top portion is an electrode 11, which may be of any suitable material.

12 indicates a pipe leading from the side of the furnace to the under side of said electrode to serve as a conduit for an electric cable 13, which leads from a dynamo or other source of electrical supply to the electrode.

The reference-numeral 15 is used to indicate a casing designed to rest on top of the base and to inclose and contain the mixture of lime and carbon while it is being reduced. This casing is divided vertically into two parts with hinges 16 at one side and a latch 17 at the opposite side. By this means the casing may be opened to discharge its contents of calcium carbid when finished. At its top is a central opening 18, through which the movable electrode is entered, as hereinafter described. We have provided a number of openings 19 in this top covered by the slides 20, through which access may be had to the interior of the casing from the top.

The reference-numeral 21 is used to indicate the upper sliding electrode. This is preferably composed of carbon, and at its upper end portion is a metal band 22, to which a cable 23 is connected and which leads to the dynamo or other source of electrical supply 14. This electrode has a number of longitudinal openings 24, extending entirely through it. We prefer to construct this electrode out of a number of carbons, each having a central opening and the whole held together by cement or other substance of like character. We have illustrated this arrangement in the drawings for the reason that we have found this method to be the most practical from a commercial standpoint. However, we may use any kind of material for forming this electrode and extend one or more holes or

openings therethrough, as desired. It is obvious that the construction of the hollow electrode may be varied in many ways. However, any shape of electrode through which a granular substance may be fed would be the equivalent of the electrode shown. At the top of this electrode is a metal collar 25, having two hooks 26 at opposite sides thereof, and 27 indicates an extension of the electrode made of some material which is a non-conductor of electricity but which is also provided with openings 28, which coincide with the openings in the electrode. The collar 25 serves to hold this extension 27 to the electrodes and maintain their proper relative positions.

We have provided means for raising the electrode and also the casing, as follows:

The reference-numeral 30 indicates a crane designed to be operated manually by means of the crank 31 and having two cables 32 to pass over pulleys 33, which are located at the outer end of the arm 34 of the crane. These cables are connected with the hooks 26, and two additional cables 35 are connected with these hooks and with two hooks 36, which are fixed to the opposite sides of the top of the casing. These cables 35 are of such a length that the electrode 21 will be drawn upwardly until its lower end is near the top of the casing before the said cables 35 will have reached their limit. Hence the electrode is first drawn upwardly to its limit and further operation of the crane will elevate the entire casing 15.

In practical operation we first place a layer of previously-made calcium carbid in granular form on the top of the base and along the sides of the casing, as shown in Fig. 2 and indicated by the reference-numeral 37. We then take a number of sticks (indicated by the reference-numeral 38) which are composed of a mixture of lime and carbon. These sticks are produced by first reducing lime and coal to a powder, then commingling them in suitable proportions, and then placing the mixture in suitable molds, where they are subjected to great pressure sufficient to form the mixture into comparatively firm sticks. The sticks thus formed are placed in the openings in the upper electrode and their lower ends rest upon the lower electrode. In practical use the upper end of this upper electrode is preferably separated from the furnace proper a considerable distance, so that a floor may be interposed between the operator and the furnace itself, thus protecting the operator from the intense heat of the furnace. When the current of electricity is turned on, it is obvious that an arc is formed between the two electrodes and that the lime and carbon in this arc will be subjected to intense heat, and will thereby be quickly melted. This molten product will obviously intermingle with the granulated calcium carbid in the furnace, and a body of molten calcium carbid will be formed in the interior of the casing. This body of molten material forms itself an excellent conductor of electricity, and as it rises in the chamber the crane is operated and the upper electrode is slowly elevated in order to maintain a proper distance between the top surface of the molten material and the under surface of the upper electrode, as required to form an electric arc. This process is carried on until the interior of the casing has been filled as much as may be desired, whereupon the current is shut off and the crane operated still further to raise the casing 15 off of the base. The product may then slowly cool and may be removed in the usual manner.

It is obvious that, if desired, the mixture of lime and carbon may be fed through the openings in the upper electrode in a powdered form, and the labor of compressing the mixture into sticks or rods may be dispensed with. It is obvious, further, that the operator may so regulate and control the supply of lime and carbon to the arc as to utilize the maximum capacity of the arc at all times. It is designed to have an electrical current of such a strength that when each of the openings in the upper electrode is filled with the sticks of lime and carbon and the electrodes separated about two inches a perfect arc will be produced and the lime and carbon be melted as rapidly as possible. However, a current of electricity will vary in strength, and the length of the arc will also be varied. Hence the best results cannot be produced by having each of the openings in the electrode filled with lime and carbon at all times. With the electrode shown, having a number of openings, the operator may vary the amount of lime and carbon contained in the arc at any one time by feeding the sticks of lime and carbon through only a part of the holes. When this is done, all of the current of electricity will pass over or through the sticks of lime and carbon that are placed in the arc, and hence the full force of the current will be passed through a less quantity of lime and carbon, and hence the same will be reduced as rapidly with a comparatively weak current as would a larger number of sticks with a maximum current. Furthermore, the operator is protected from the possibility of contact direct with the electrical current by means of the block of insulator at the top of the electrode.

Having thus described our invention, what we claim as new therein, and desire to secure by Letters Patent of the United States therefor, is—

1. An electric furnace for producing calcium carbid, comprising a base, an electrode mounted in the base, a second electrode slidingly supported above the base, and having a number of longitudinal openings extended therethrough, a source of electrical supply connected with the said electrode, a block of insulating material fixed to the upper electrode, and also provided with a number of

longitudinal openings arranged to coincide with the openings in the electrode so that a number of sticks of lime and carbon may be fed manually to the space between the electrodes, said upper and lower electrodes being so arranged that the said sticks passed through the upper electrode will rest upon the lower electrode until melted when they are free to run from between the electrodes, and means for raising and lowering the electrode and insulator jointly, substantially as and for the purposes stated.

2. An electric furnace for producing calcium carbid, comprising a base, an electrode in the base, a source of electrical supply, a metal casing divided vertically into two parts, a latch at the opposite side thereof from the hinges, a hook on each part, slides hinged to the top of the casing to cover openings therein, an electrode having one or more vertical openings, a metal band at its top, an electric cable leading therefrom to the said source of electrical supply, a metal collar at the upper end of the electrode to the projection above it, hooks at the opposite sides thereof, cables for connecting the said hooks with the aforesaid hooks on the casing, an insulator resting in the said collar and having openings to coincide with the openings in the electrode, a crane and two cables leading therefrom and to the said hooks in the collar, all arranged and combined substantially as and for the purposes stated.

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