

G. H. BENJAMIN.
METHOD OF BESSEMERIZING COPPER MATTE.
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900,345.

Patented Oct. 6, 1908.

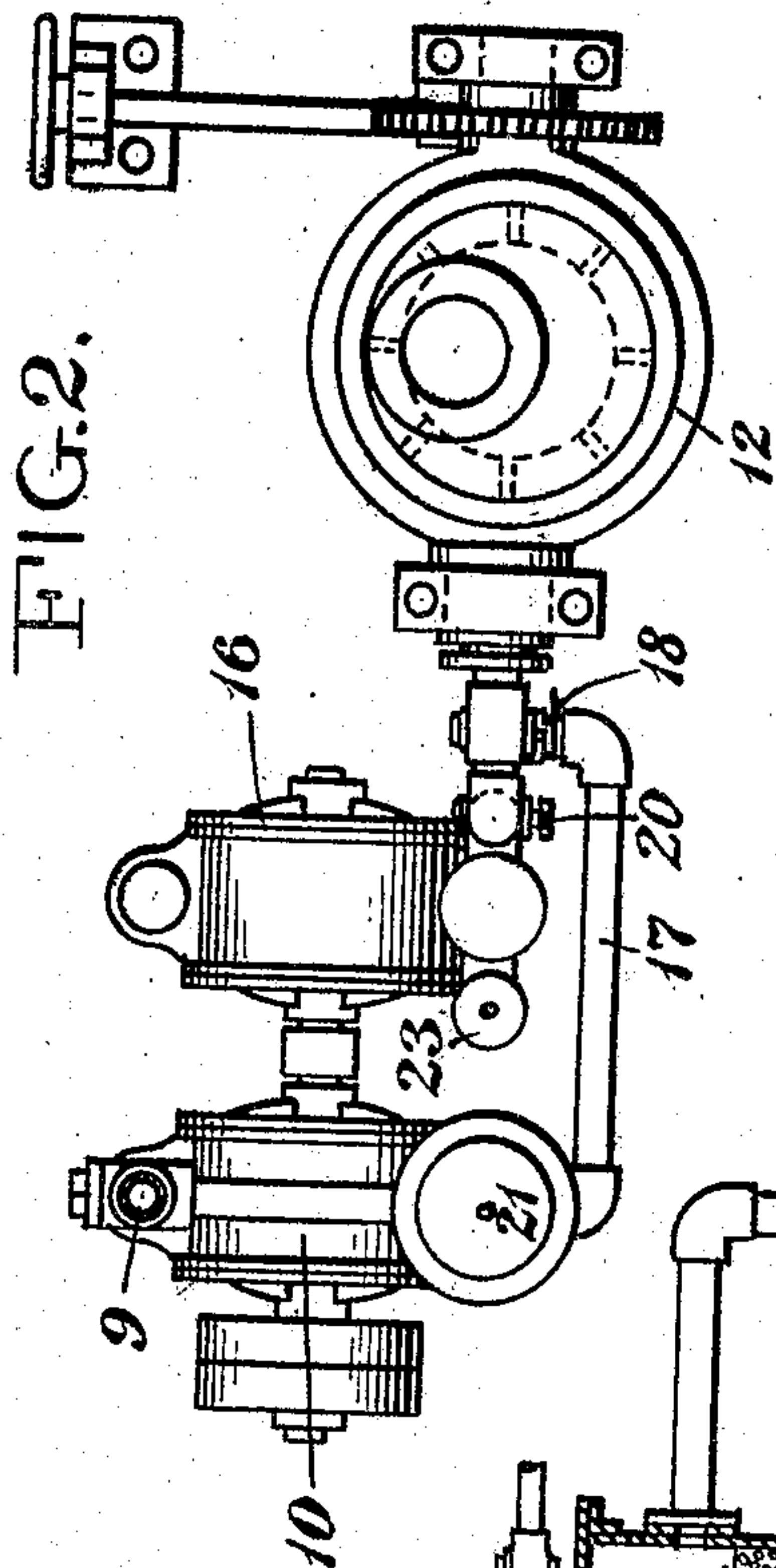


FIG. 1.

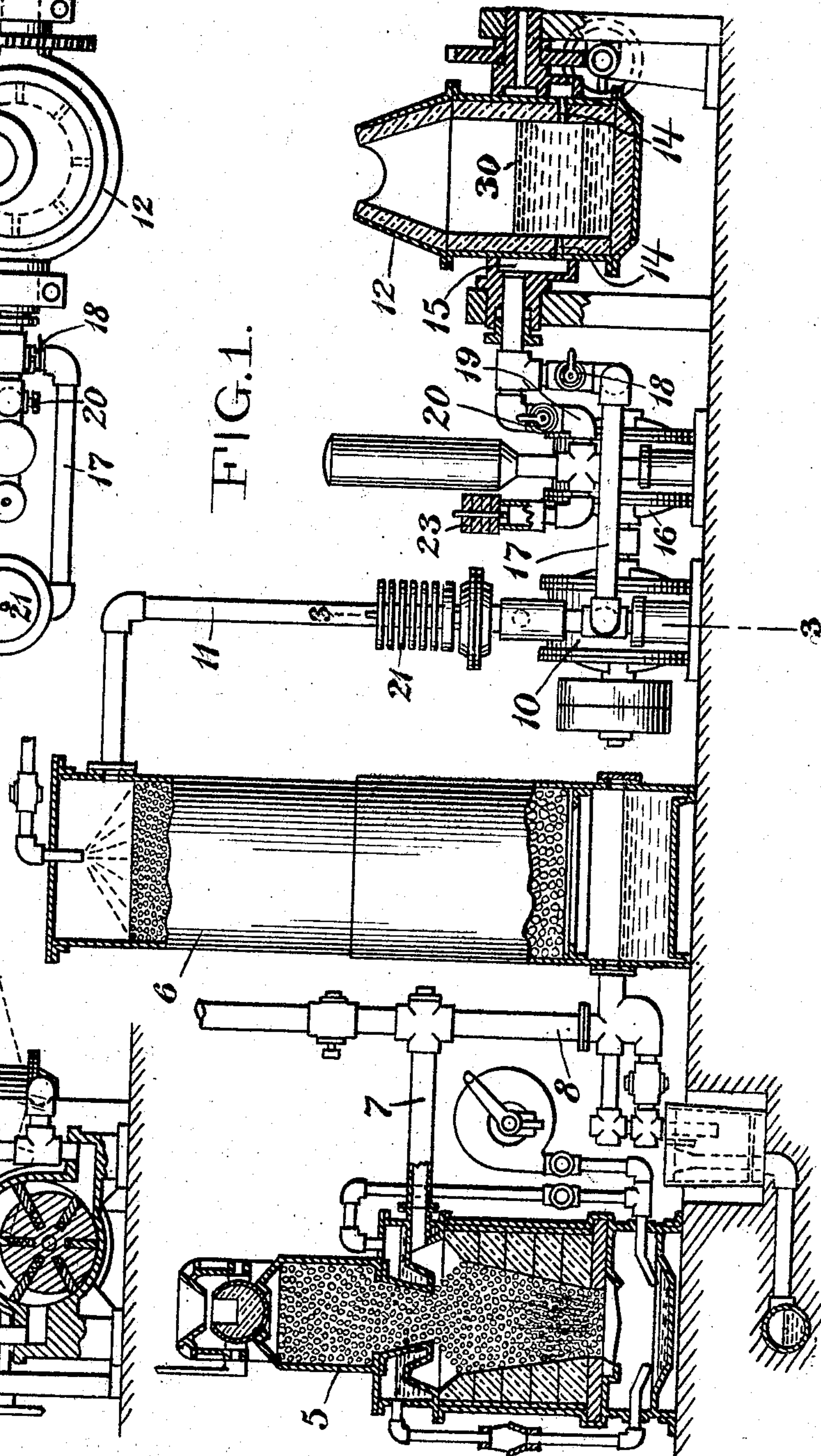
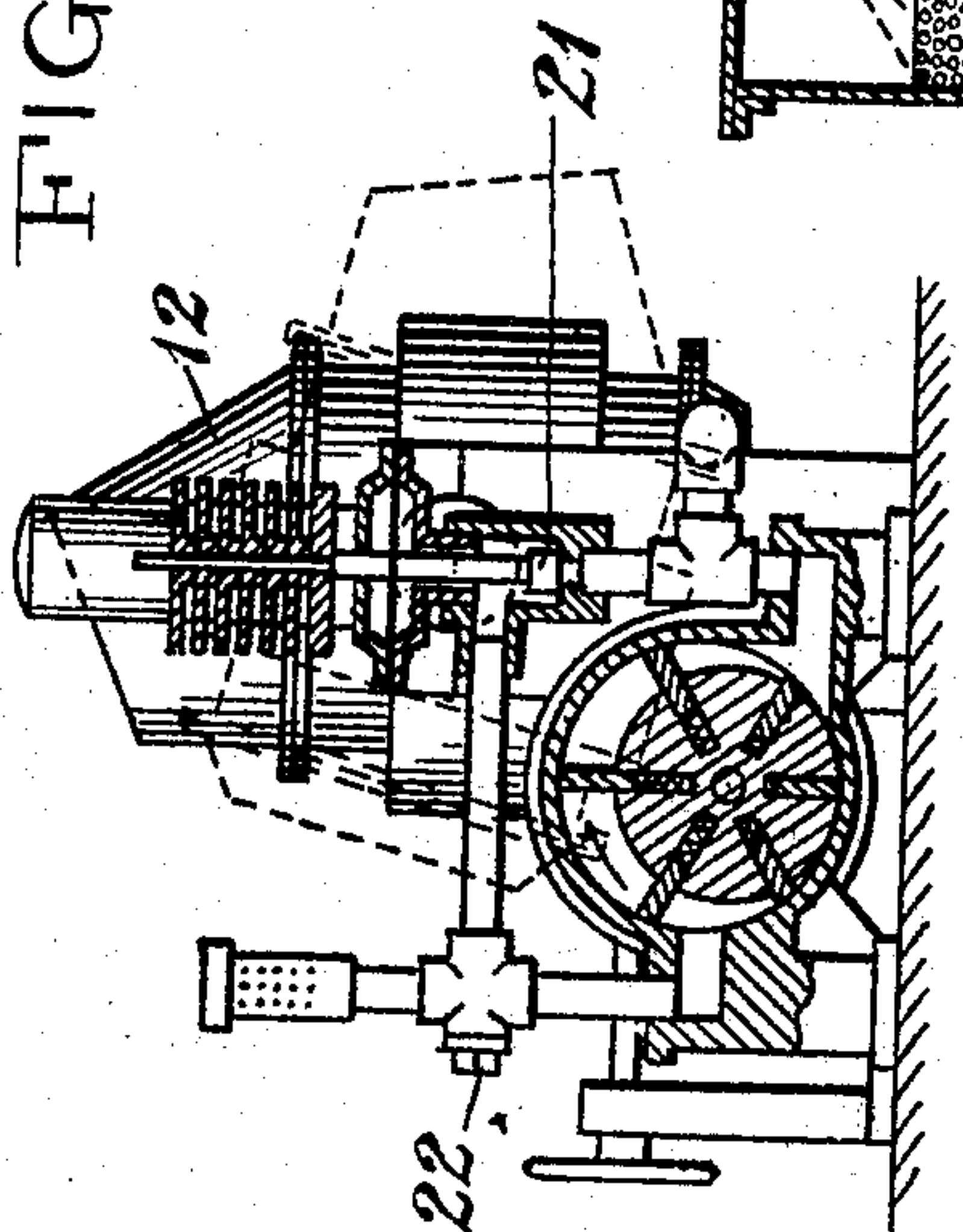


FIG. 3.



WITNESSES:

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METHOD OF BESSEMERIZING COPPER MATTE.

No. 900,345.

Specification of Letters Patent.

Patented Oct. 6, 1908.

Application filed December 8, 1906. Serial No. 346,912.

To all whom it may concern:

Be it known that I, GEORGE HILLARD BENJAMIN, a citizen of the United States, residing in the city, county, and State of New York, have invented a Method of Bessemerizing Copper Matte, of which the following is a specification.

My invention consists of a method of treating copper matte for the production of commercial metal.

The objects of my invention are:—First: to do away with the introduction of a solid reducing fuel into the converter after the oxidation of the iron and sulfur has been effected. Second: to provide readily controllable means for maintaining the heat of the copper and effecting the final reduction of the oxidized copper. Third: a method of operation in which the reducing agents employed are in the form of gas and readily controllable to insure positive results.

Broadly considered, my improved method consists in first introducing an air blast to oxidize the iron and sulfur of the matte, and in connection with the lining of the converter form a slag, and subsequently, through the introduction of a reducing gas capable of generating a high temperature, maintain the temperature of the copper in the converter and reduce any oxid of copper which has been formed in the preliminary step, and thereby produce a commercial metal.

The accompanying drawings will serve to illustrate my invention, in which

Figure 1 is a vertical elevation, also showing the producer, scrubber, and converter in partial section; Fig. 2 is a plan view of the pumps and converter; and Fig. 3 a side view and partial section, taken on the line 3—3 of Fig. 1, looking from the left.

In the drawings: 5 indicates a gas producer of any well known type, preferably such as will produce a gas high in carbon and hydrogen, that shown in the drawings is known as the "Otto" type.

6 is a scrubber of the usual construction. The scrubber is not essential, but when used serves to purify the gas. The scrubber takes gas from the producer through pipes 7, 8, and delivers it to the induction orifice 9 of the gas pump 10, through the pipe 11.

12 indicates a converter of the usual type, provided with the twyers 14. These twyers may be fed with gas, or gas and air, delivered into the chamber 15 from the gas pump 10 and air pump 16. The gas pump is con-

nected through a pipe 17, connected to its induction orifice in which is a valve 18. The air pump is connected through a pipe 19, connected to its induction orifice in which is a valve 20.

In order to maintain the pressures of the gas, the gas pump is provided with a regulating valve 21 which controls a by-pass 22, and the air pump is provided with a weighted valve 23. I prefer that the gas and air should be delivered—the gas at a pressure of $1\frac{1}{2}$ pounds, and the air at a pressure of 1 pound, to the square inch.

The method of operation is as follows: The molten matte 30 having been inserted into the converter 12, the valve 18 in pipe 17 is closed, which shuts off the supply of gas, and valve 20 in pipe 19 opened. This permits air under pressure to be introduced through the twyers 14 into the matte and this air supply is continued until complete oxidation of the iron and sulfur of the matte has been effected and these bodies combined with the lining of the converter to form a slag. At such time the slag can be drawn off. The copper remaining in the converter by such preliminary step of oxidation has become partially oxidized and as in combination with air it has no heat generating properties it tends to cool and choke the twyers. To avoid this condition and to reduce the oxid of copper formed, the valve 18 in the pipe 17 is opened and a mingled stream of gas and air derived from the pumps 10 and 16 delivered into the converter through the twyers 14 and ignited. This mingled stream of gas and air, delivered under the conditions above specified, will generate an extremely high temperature, and, further, owing to the presence of an excess of hydrogen in such gas acts to reduce the remaining oxid in the copper, while maintaining the copper at the required temperature to effect its conversion into a commercial metal.

Having thus described my invention, I claim:

1. The herein described method of treating copper matte when in a converter having a suitable lining, which consists in successively subjecting it to the action first of an oxidizing gas, then of a reducing gas capable when ignited of maintaining the temperature of the copper.

2. The herein described method which consists in subjecting copper matte while in

2
a converter having a suitable lining to the
action of an oxidizing gas under pressure
to oxidize the iron and sulfur and with the
lining form a slag, removing the slag, and
5 then subjecting the remaining body in the
converter to the action of a reducing gas
under pressure and capable of generating a
high temperature when ignited.

10 3. A step in the process of treating copper
matte which consists in introducing into the
metal in the converter after oxidation and
the formation of a slag a reducing gas under
pressure and capable of generating a high
temperature when ignited.

15 4. A method of bessemerizing copper
herein described, which consists in suc-
cessively subjecting it to the action of an

oxidizing gas and a reducing gas, the last
gas employed capable of generating, when
ignited, a high temperature.

20 5. The herein described method of bes-
semerizing copper matte, which consists in
introducing it into a heated converter, then
subjecting it to the action of an air blast,
then to the action of a reducing gas capable, 25
when ignited, of generating an extremely
high temperature.

In testimony whereof, I affix my signa-
ture, in the presence of two witnesses.

GEORGE HILLARD BENJAMIN.

Witnesses:

FREDERICK A. BLOUNT.

FRANK O'CONNOR.