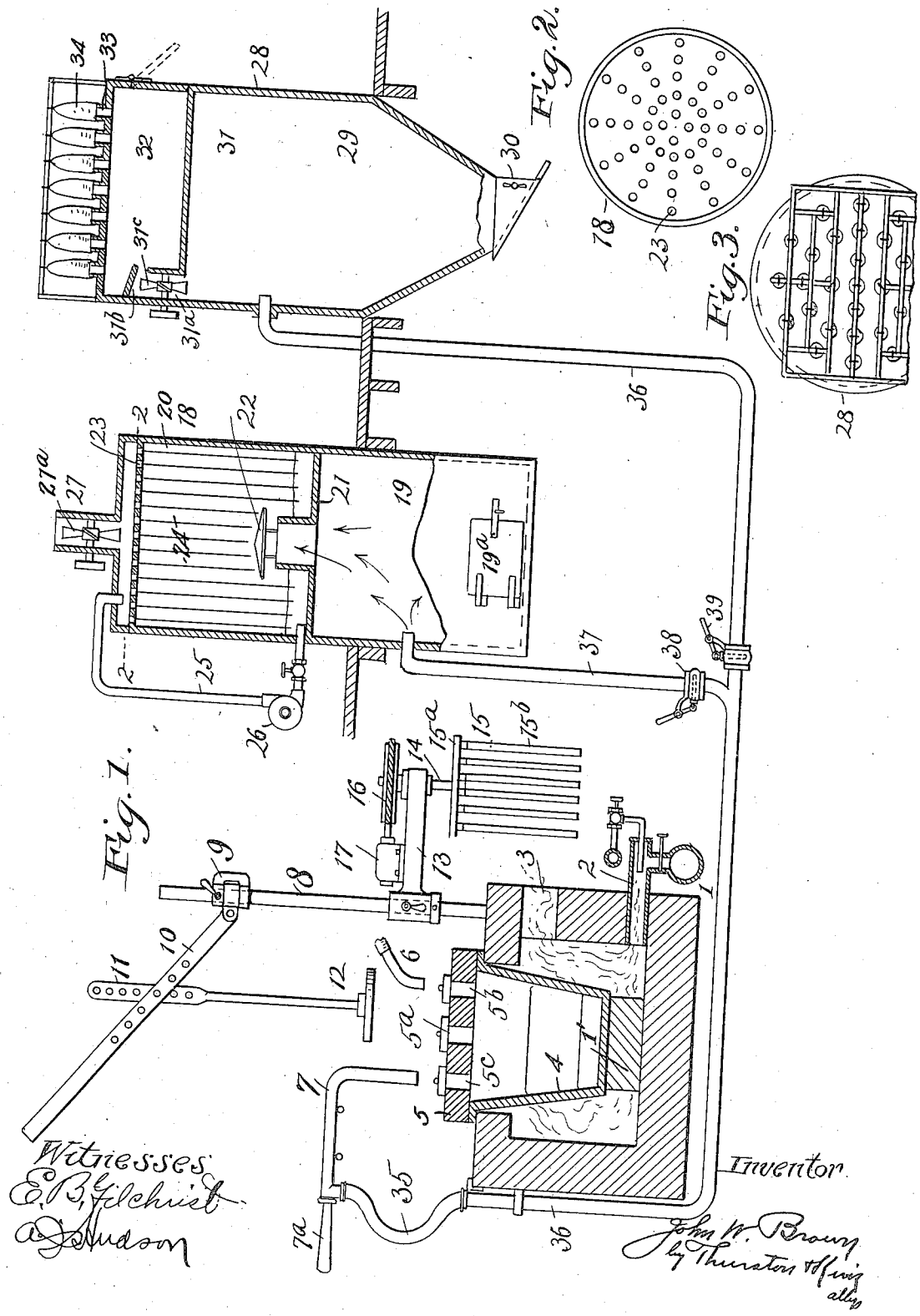
J. W. BROWN.

APPARATUS FOR RECOVERING METAL FROM SCRAP MATERIAL.

APPLICATION FILED JULY 15, 1914.

1,301,374.

Patented Apr. 22, 1919.



UNITED STATES PATENT OFFICE.

JOHN W. BROWN, OF LAKEWOOD, OHIO.

APPARATUS FOR RECOVERING METAL FROM SCRAP MATERIAL.

1,301,374. Specification of Letters Patent. Patented Apr. 22, 1919.

Application filed July 15, 1914. Serial No. 851,057.

To all whom it may concern:

Be it known that I, JOHN W. BROWN, a citizen of the United States, residing at Lakewood, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Apparatus for Recovering Metal from Scrap Material, of which the following is a full, clear, and exact description.

This invention relates to apparatus for carrying out a process disclosed in a companion application filed August 5th, 1914, Serial No. 851,058, which process relates to the recovery of metals from scrap material, such as borings, filings, turnings, clippings, punchings, and sawings, of the metal or metals which it is sought to recover.

Generally speaking, the invention comprises the elements and combinations thereof set forth in the accompanying claims.

Reference should be had to the accompanying drawing forming a part of this specification, in which the drawing shows in elevation with parts in section a more or less diagrammatic representation of the apparatus.

At 1 is represented a furnace which may be of any desired construction. As here shown, the walls are made of fireproof refractory material having a flue outlet 3, and a burner 2 projecting into the interior of the furnace. This burner may be of any desired type.

A melting pot or crucible 4 extends within the furnace, being supported at its lower end by a pier 1', and at its upper end the pot is provided with an outwardly extending flange which rests upon the outer upper surface of the furnace.

A cover 5 closes the top of the crucible, this cover being made in two parts, and is provided with an opening 5^a for the reception of the shaft of the stirring apparatus. The cover is split through the opening 5^a.

There is also an opening 5^b, which is adapted to receive the end of a conduit 6, through which an inert or oxidizing reducing gas may be supplied through the opening 5^b to the interior of the melting pot. In other words a gas of any character may be supplied through the opening 5^b of the cover and thereby maintain the atmosphere above the bath in the crucible in any desired condition, and more particularly control the oxidizing power of the atmosphere. There is also an opening 5^c in the cover which is adapted to receive the nozzle 7 of a vacuum conduit which will be later described.

Suitably mounted adjacent the melting pot is an upright post 8, upon which is slidably mounted a yoke 9, this yoke being adapted to be secured to the post 8 in any desired manner. Upon the post 8 and between the ends of the yoke is a collar 9^a, to which is pivotally secured a lever 10. Mounted upon the lever 10 is a depending arm 11 which at its lower end carries a presser head 12. The lever 10 and the arm 11 are each provided with a series of openings, and the arm 11 is carried upon a pin or bolt which extends through a registering opening in the arm 11 and lever 10. By virtue of the openings, relatively adjustability between the arm 11 and lever 10 may be secured.

Upon the upright 8 there is slidably mounted a bracket 13. This bracket may be held in place in adjusted position upon the upright, in any desired manner, as by a suitable clamp. At the upper end the arm 13 has a shaft 14 journaled therein. The end of this shaft, which is above the support 13 carries a worm wheel 16, which coöperates with a suitable worm driven by the motor 17, which motor is mounted upon the bracket 13. The portion of the shaft 14 extending below the bracket 13 carries a stirring device 15, which in the present instance comprises a head 15^a with downwardly extending arms 15^b, which are rigidly secured to the head.

When it is desired to use the stirrer, the cover 5 is removed, the arm 13 raised and swung toward the melting pot, and the stirring device lowered into the melting pot. The cover 5 is then replaced, the opening 5^a accommodating the shaft 14 which is just above the head of the stirring device.

The nozzle 7 is connected by means of a flexible tube 35 with a pipe line 36. This pipe line is provided with a branch 37 and both pipe line and branch are under suction by means of a suitable suction apparatus, indicated in the drawing.

The pipe lines 37 and 36 are provided with valves 38 and 39 respectively, whereby they may be individually opened and closed.

The pipe 37 communicates with the chamber 19 of a fume arresting device 18. There is a partition 21 which extends across substantially the middle of the fume arresting device, providing an upper chamber 20. Through this partition there is a wall open-

ing, and above the opening a spreading device 22. Adjacent the top of the chamber 20 there is a head 23 from which depend fibrous strips 24 which strips extend substantially to the bottom of the chamber 20. There is a pipe connection 25 between the lower and upper parts of the chamber 20. In this pipe connection is a pump 26, by which liquid material may be pumped from the lower part of the chamber to the upper part. The head 23 is provided with openings so that the liquid material discharged onto the head will find access to the strips of fibrous material. These strips of fibrous material at their lower ends will normally extend into the body of liquid in the lower part of the chamber. The purpose of the construction described as being within chamber 20 is to provide a large surface of contact between the fumes and condensing liquid.

At the lower part of the chamber 19 there is a door 19ª by which material that may collect within the chamber 19 may be removed.

At the upper part of the fume arresting device there is an outlet 27. The outlet 27 may have a fan 27ª of suitable type associated therewith, for the purpose of producing a suction through the chamber 20 and the parts connected therewith.

The pipe 36 is connected with a separating device generally represented at 28. This device is provided with a partition which extends nearly from wall to wall. There is however, an opening represented at 31ª and above this opening is a baffle plate 31ᵇ. The partition 31 divides the separating device into two chambers 29 and 32. The lower walls of the chamber 29 slant toward a gated opening represented at 30. Through this opening material collecting within the chamber 29 may be removed. In the opening 31ª there is a fan 31ᶜ. The fan shown is simply indicative of any suitable suction device which will place the chamber 29 under suction and expel the air through the openings 33.

The top of the chamber 32 is provided with a series of openings generally represented at 33, and over each opening 33 is a bag 34 through which the air escaping from the chamber 32 must pass, the bags acting as a sieve to remove fine particles. The bags may be supported in any desired manner.

The process which is carried out by the apparatus herein described is as follows: Material in the form of borings, filings, clippings, punchings, sawings, etc., of the metal or an alloy of the metal which is desired to recover or certain condensation products of some metals such as blue powder or similar substances, are placed within the melting pot 4, the cover is placed thereon, and the contents of the melting pot heated. As soon as the material in the lower portion of the melting pot has been sufficiently hot so as to be in a plastic condition, the cover is removed and the presser head 12 introduced into the melting pot, and the surface of the material therein is subjected to pressure. The presser head is then removed and the cover replaced. The material in the melting pot is further heated, and when the whole mass has reached a plastic condition, the cover is again removed and the presser head brought into contact with the surface of the metal, and pressure applied. This results in squeezing the metal from the dross and pushing the dross to the bottom of the melting pot. And further the pressure thus applied, forces the smaller particles of metal to unite with each other.

At this stage, the metal in the melting pot is removed, leaving the dross behind. The dross is then broken up and a flux mixed with it. Heat is then applied, if necessary, the stirring apparatus brought into operation, and the suction nozzle 7 is introduced through the opening 5ᵉ in the cover, to the upper part of the crucible. The fumes which may be formed due to the heating and stirring of the flux with the dross, are drawn from the melting pot and carried over to the chamber 19 of the fume arrester, the valve 38 being opened and the valve 39 closed.

The heavier particles of the fumes carried into the chamber 19, will by gravity, fall to the bottom of the chamber, and may be removed by way of the door 19ª. Such particles as do not settle, will be carried into the chamber 20, and there be removed by contact with the moistened strips of fibrous material 24.

When the fumes have thus been removed, the suction nozzle 7 is introduced deeper into the melting pot until it comes in contact with the dross, and then the dross is carried over into the chamber 29 of the separator 28, the valve 38 being closed, and the valve 39 open. In this separator, the heavier particles, usually of metal, fall to the bottom of the chamber 29, and may be removed through the gate opening 30. The air under suction passes into the chamber 32, and out through the ports 33, being strained through the bags 34 in its passage.

It will thus be apparent that not only is the metal separated in the crucible recovered, but also such metal as may be included in the dross. Furthermore, the material forming the flux which may vaporize and form fumes, is recovered in the fume arrester.

Under the term scrap metal, as used herein, I include borings, sawings, filings, clippings, guidings and all similar material and also such by-products produced by condensation such as blue powder.

Having thus described my invention, I claim:

1. Apparatus for the recovery of metal from scrap metal material, comprising a

melting pot, means for applying heat to such pot, and means for forcefully applying pressure to the material within said pot for the purpose of disrupting any globules in said material.

2. Apparatus for the recovery of a metal from scrap metal, comprising a melting pot, means for applying heat to said pot, a presser head, means for operating the same to apply pressure to the material within said pot.

3. Apparatus for the recovery of a metal from scrap metal, comprising a melting pot, means for applying heat to said pot, a support adjacent the said melting pot, a lever pivoted upon said support, and a presser head pivotally carried by the lever.

4. Apparatus for the recovery of metal from scrap metal, comprising a melting pot, means for applying heat to said pot, a supporting device adjacent the melting pot, a presser head, lever mechanism for supporting the said presser head, and operating the same, a stirring device, and means for operating the same carried upon the said supporting device.

5. Apparatus for the recovery of a metal from scrap metal comprising a melting pot, means for applying heat to the melting pot, a supporting device adjacent the melting pot, a presser head, adjustable lever mechanism for supporting and operating the presser head, an arm carried by the said support, a stirring mechanism supported from the arm, and operative mechanism for the stirring mechanism also supported by the arm.

6. An apparatus for recovery of metal from scrap metal material comprising a melting pot, means for heating said pot, a stirring device associated with the pot, a conduit adapted to be maintained under suction, and a fume arrester and flux recoverer connected with said conduit.

7. An apparatus for recovery of metal from scrap metal material comprising a melting pot, means for heating said pot, a stirring device associated with the pot, a conduit adapted to be maintained under suction, and a fume arrester comprising two chambers divided by a partition but communicating through an opening therein, one of said chambers receiving heavier particles, and means in the other chamber affording a large surface of contact between fumes and a condensing liquid.

8. Apparatus for the recovery of a metal from scrap metal comprising a melting pot, means for heating the said pot, a suction conduit, means for connecting the suction conduit with the interior of a melting pot, a fume arrester, and a separator connected with said suction conduit, and valves controlling the connection of the suction conduit with the said fume arrester and separator.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

JOHN W. BROWN.

Witnesses:
A. J. HUDSON,
L. I. PORTER.