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(54) **PROCESSING UNIT HAVING CONDENSER, AND FULLY AUTOMATIC GRAVURE PLATE MAKING
PROCESSING SYSTEM USING SAME**

VERARBEITUNGSEINHEIT MIT KONDENSATOR UND VOLLAUTOMATISCHES
VERARBEITUNGSSYSTEM ZUR TIEFDRUCKPLATTENHERSTELLUNG DAMIT

UNITÉ DE TRAITEMENT COMPRENANT UN CONDENSEUR, ET SYSTÈME DE TRAITEMENT DE
FABRICATION DE CLICHÉS PAR GRAVURE ENTIÈREMENT AUTOMATIQUE UTILISANT
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Description

Technical Field

[0001] The present invention relates to a processing unit including a condenser, which is to be used for a fully automatic gravure plate-making processing system for manufacturing a plate-making roll by performing a series of processes on a plate-making roll to be processed (hereinafter referred to as "unprocessed plate-making roll"), and to a fully automatic gravure plate-making processing system using the processing unit including a condenser.

Background Art

[0002] Conventionally, fully automatic gravure plate-making processing systems disclosed in, for example, Patent Documents 1 to 3 have been known.

[0003] US4519887 discloses an apparatus for automatically attaching and detaching cassette-type rolls, which is suited for plating peripheral surfaces of a roll having a shaft, and particularly for plating peripheral surfaces of a photogravure roll, with copper or chromium. Current-carrying supporters are exchanged depending upon the type of the roll to be treated, and leak-proof caps are provided, made up of moving caps that slide on the outer side of the spindles and exchange caps that are located between end surfaces of the roll and the moving caps. By suitably selecting and exchanging the current-carrying supporters and exchange caps, the apparatus can be adapted to different types of rolls having a shaft.

[0004] Further, the applicant of this application has proposed a fully automatic gravure plate-making processing system having high degrees of freedom, which is capable of manufacturing a gravure plate-making roll more quickly as compared to a conventional system, achieving space saving, performing an unattended operation even in the nighttime, flexibly customizing a manufacturing line, and satisfying various customer needs (Patent Document 4).

[0005] The above-mentioned fully automatic gravure plate-making processing system is configured to manufacture a plate-making roll by performing a series of processes on an unprocessed plate-making roll, and the processes are performed by respective processing units.

[0006] A copper plating apparatus described in, for example, Patent Document 5 is known as a further specific example of the conventional processing unit.

[0007] In the copper plating apparatus described above, a processing solution vaporized into the form of mist during a plating process is exhausted as it is and filtrated with a filter or the like, and then the resultant is exhausted to the outside. Also in a case of a chromium plating apparatus and an etching apparatus, the processing solution vaporized into the form of mist during the process is exhausted as it is and filtrated with a filter or

the like, and then the resultant is exhausted to the outside. Therefore, every time the plate-making process is performed by each processing unit, the amount of the processing solution is reduced, and as a measure against the reduction in amount of the processing solution, for example, the processing solution is added after the plate-making process by an amount corresponding to the vaporization amount.

[0008] Further, in the case of the copper sulfate plating apparatus described in Patent Document 5 and the like, the vapor is particularly liable to be generated, and hence there is a problem in that the vapor is jammed in the middle of the passage even when an exhaust gas cleaning apparatus such as a mist scrubber is mounted.

Prior Art Documents

Patent Documents

[0009]

Patent Document 1: JP Hei 10-193551 A
Patent Document 2: WO 2007/135898
Patent Document 3: WO 2007/135899
Patent Document 4: WO 2011/125926
Patent Literature 5: JP 2005-29876 A

Summary of the Invention

Problems to be solved by the invention

[0010] The present invention has been made in view of the above-mentioned problems inherent in the conventional technologies, and it is therefore an object thereof to provide a processing unit including a condenser, which is capable of condensing, during a plate-making process to be performed by the processing unit in a fully automatic gravure plate-making processing system, a processing solution vaporized into the form of mist so as to reuse the resultant as the processing solution, and to provide a fully automatic gravure plate-making processing system using the processing unit including a condenser.

Means for Solving Problems

[0011] In order to solve the above-mentioned problems, according to one embodiment of the present invention, there is provided a processing unit including a condenser, which is to be used for a fully automatic gravure plate-making processing system for manufacturing a plate-making roll by performing a series of processes on an unprocessed plate-making roll, the processing unit including: a processing bath; chuck means for holding a gravure cylinder inside the processing bath; an intake port for taking in air, which is provided in a part of the processing bath; an exhaust port for exhausting gas, which is provided in another part of the processing bath,

said exhaust port being provided on another side of said processing bath, said intake port facing in a direction of said exhaust port, said intake port, said exhaust port and said processing bath defining a fluid flow path, wherein fluid moves along said fluid flow path from said part of said processing bath to said another part of said processing bath; a condenser provided between the processing bath and the exhaust port; and a processing solution return pipe for returning, to the processing bath, a processing solution obtained by the condenser that liquefies a part of the gas to be exhausted, said condenser being arranged adjacent to said processing solution return pipe, said processing bath and said exhaust port.

[0012] Further, it is preferred that the condenser be an air-cooled condenser. This is because space saving can be achieved. As the air-cooled condenser, a mist collector that is a plate having a large number of baffles arranged thereon is taken as an example. This is because, through use of this mist collector, the processing solution vaporized into the form of mist can be collected and liquefied efficiently.

[0013] As the processing unit including a condenser, the present invention is applicable to any processing unit of the type in which the processing solution is used during the plate-making process, and the processing solution is vaporized into the form of mist and then exhausted. In particular, it is suitable that the processing unit including a condenser be at least one processing apparatus selected from among a copper plating apparatus, a chromium plating apparatus, or an etching apparatus.

[0014] The fully automatic gravure plate-making processing system according to the present invention is constructed by assembling the above-mentioned processing unit including a condenser according to the present invention.

Advantageous Effects of the Invention

[0015] The present invention has a remarkable effect of providing the processing unit including a condenser, which is capable of condensing, during the plate-making process to be performed by the processing unit in the fully automatic gravure plate-making processing system, the processing solution vaporized into the form of mist so as to reuse the resultant as the processing solution, and providing the fully automatic gravure plate-making processing system using the processing unit including a condenser.

[0016] As described above, through use of the processing unit including a condenser according to the present invention, during the plate-making process to be performed by the processing unit in the fully automatic gravure plate-making processing system, the processing solution vaporized into the form of mist is condensed so that the resultant can be reused as the processing solution. Thus, the reduction in amount of the processing solution is suppressed, and hence the cost for the plate-making process is reduced. Moreover, the total amount

of gas to be exhausted is reduced, and hence there is an advantage in that the load on the exhaust gas cleaning apparatus such as a filter is reduced and the improvement is satisfactorily achieved in the environmental issues around the system.

Brief Description of Drawings

[0017]

FIG. 1 is a plan view illustrating a processing unit including a condenser according to one embodiment of the present invention as seen from the top.

FIG. 2 is a left-hand side view of the processing unit including a condenser in FIG. 1.

Modes for Carrying out the Invention

[0018] Embodiments of the present invention are described below, but those embodiments are described as examples, and hence it is understood that various modifications may be made thereto without departing from the scope of the invention, as defined by the appended claims. In addition, the same members are represented by the same reference symbols.

[0019] In the drawings, reference symbol 10 represents a processing unit including a condenser of the present invention.

[0020] The processing unit 10 including a condenser is a processing unit including a condenser, which is to be used for a fully automatic gravure plate-making processing system for manufacturing a plate-making roll by performing a series of processes on an unprocessed plate-making roll. The processing unit 10 includes a processing bath 12, chuck means 16a and 16b for holding a gravure cylinder 14 inside the processing bath 12, an intake port 18 for taking in air, which is provided in a part of the processing bath 12, an exhaust port 20 for exhausting gas, which is provided in another part of the processing bath 12, a condenser 22 provided between the processing bath 12 and the exhaust port 20, and a processing solution return pipe 24 for returning, to the processing bath 12, a processing solution obtained by the condenser 22 that liquefies a part of the gas to be exhausted.

[0021] Further, the condenser 22 illustrated in the figures is an air-cooled condenser. As the air-cooled condenser, there is described an example in which a mist collector that is a plate (made of hard vinyl chloride) having a large number of baffles 26 arranged thereon is used as the condenser 22. That is, when the processing unit 10 performs a plate-making process (in a case of a copper plating apparatus, a copper plating process) on the gravure cylinder 14, a processing solution vaporized into the form of mist impinges and adheres onto the baffles 26 while passing through the condenser 22. Thus, the mist of the processing solution is collected and condensed into liquid again.

[0022] The processing solution thus liquefied is returned again to the processing bath 12 through the processing solution return pipe 24, and the returned processing solution is reused. Further, a part of the exhaust gas that is not condensed into liquid again is exhausted through the exhaust port 20.

[0023] In the processing unit 10 including a condenser in the figures, there is described an example in which "SUNLOID" Eliminator manufactured by Sumitomo Bakelite Co., Ltd. is used as the mist collector serving as the condenser 22. Through use of this mist collector, the processing solution vaporized into the form of mist can be collected and liquefied efficiently.

[0024] In the example of the figures, there is described an example in which a copper plating apparatus is used as the processing unit 10 including a condenser. In addition to the example of the figures, the present invention is applicable to any processing unit of the type in which the processing solution is used during the plate-making process, and the processing solution is vaporized into the form of mist and then exhausted. In particular, the processing unit including a condenser according to the present invention is suitably used as a copper plating apparatus, a chromium plating apparatus, an etching apparatus, or the like.

[0025] Further, in the figures, reference symbol 28 represents a frame member for supporting components of the processing unit 10, such as an electrode, and reference symbol 30 represents a casing of the processing unit 10. As the basic structure of the processing unit 10 other than the condenser 22, for example, the structure similar to that of the processing unit described in Patent Document 4 and the like may be employed.

[0026] Further, the fully automatic gravure plate-making processing system according to the present invention is constructed by assembling the processing unit 10 including a condenser according to the present invention into the fully automatic gravure plate-making processing system described in, for example, Patent Documents 1 to 4. Among others, it is suitable to assemble the processing unit including a condenser according to the present invention into the fully automatic gravure plate-making processing system disclosed in Patent Document 4. This is because the fully automatic gravure plate-making processing system described in Patent Document 4 is a fully automatic gravure plate-making processing system having high degrees of freedom, which is capable of manufacturing a gravure plate-making roll more quickly as compared to a conventional system, achieving space saving, performing an unattended operation even in the nighttime, flexibly customizing a manufacturing line, and satisfying various customer needs.

[0027] As described above, through use of the processing unit including a condenser according to the present invention, during the plate-making process to be performed by the processing unit in the fully automatic gravure plate-making processing system, the processing solution vaporized into the form of mist is condensed so

that the resultant can be reused as the processing solution. Thus, the reduction in amount of the processing solution is suppressed, and hence the cost for the plate-making process is reduced. Moreover, the total amount of gas to be exhausted is reduced, and hence there is an advantage in that the load on the exhaust gas cleaning apparatus is reduced and the improvement is satisfactorily achieved in the environmental issues around the system.

Reference Signs List

[0028]

10: processing unit including condenser, 12: processing bath, 14: gravure cylinder, 16a, 16b: chuck means, 18: intake port, 20: exhaust port, 22: condenser, 24: solution return pipe, 26: baffle, 28: frame member, 30: casing.

Claims

1. A processing unit (10) including a condenser (22) which is to be used for a fully automatic gravure plate-making processing system for manufacturing a plate-making roll by performing a series of processes on an unprocessed plate-making roll, the processing unit (10) comprising:

a processing bath (12); chuck means (16a, 16b) for holding a gravure cylinder (14) inside the processing bath (12) an intake port (18) for taking in air, which is provided in a part of the processing bath (12); an exhaust port (20) for exhausting gas, which is provided in another part of the processing bath (12), said intake port (18) facing in a direction of said exhaust port (20), said intake port (18), said exhaust port (20) and said processing bath (12) defining a fluid flow path, wherein fluid moves along said fluid flow path from said part of said processing bath (12) to said another part of said processing bath (12); a condenser (22) provided between the processing bath (12) and the exhaust port (20); and

a processing solution return pipe (24) for returning, to the processing bath (12), a processing solution obtained by the condenser (22) that liquefies a part of the gas to be exhausted, said condenser (22) being arranged adjacent to said processing solution return pipe (24), said processing bath (12) and said exhaust port (20).

2. A processing unit (10) including a condenser (22) according to claim 1, wherein the condenser comprises an air-cooled condenser.

3. A processing unit (10) including a condenser (22) according to claim 1 or 2, wherein the processing unit (10) including a condenser (22) comprises at least one processing apparatus selected from among a copper plating apparatus, a chromium plating apparatus, or an etching apparatus. 5
4. A fully automatic gravure plate-making processing system, which is constructed by assembling the processing unit (10) including a condenser (22) according to any one of claims 1 to 3. 10

Patentansprüche

1. Bearbeitungseinheit (10), die einen Verdichter (22) umfasst und für ein vollständig automatisiertes Gravur-Plattenherstellungs-Verarbeitungssystem verwendet werden soll, das zur Herstellung einer Plattenherstellungs-Walze durch die Durchführung einer Reihe von Verarbeitungsschritten an einer unbearbeiteten Plattenherstellungs-Walze dient, wobei die Bearbeitungseinheit (10) Folgendes umfasst: 20
 - ein Bearbeitungsbad (12), 25
 - ein Spannfutter (16a, 16b) zum Halten eines Gravurzylinders (14) innerhalb des Bearbeitungsbades (12),
 - einen Eingangsanschluss (18) zum Einführen von Luft, der in einem Teil des Bearbeitungsba- 30 des (12) vorgesehen ist,
 - einen Entlüftungsanschluss (20) zum Abführen von Gas, der in einem anderen Teil des Bearbeitungsba- 35 des (12) vorgesehen ist,
 - wobei der Eingangsanschluss (18) in Richtung des Entlüftungsanschlusses (20) weist und der Eingangsanschluss (18), der Entlüftungs- 40 anschluss (20) und das Bearbeitungsbad (12) einen Fluid-Strömungsweg definieren und sich das Fluid längs des Fluid-Strömungsweges von dem erstgenannten Teil des Bearbeitungsba- 45 des (12) zu dem besagten anderen Teil des Bearbeitungsba- des (12) bewegt,
 - einen Verdichter (22), der zwischen dem Bearbeitungsbad (12) und dem Entlüftungs- 50 anschluss (20) vorgesehen ist, und
 - ein Bearbeitungslösung-Rückführungsrohr (24), das dazu dient, in das Bearbeitungsbad eine Bearbeitungslösung zurückzuführen, die mithilfe des Verdichters (22) erhalten wird, der 55 einen Teil des abzuführenden Gases verflüssigt,
 - wobei der Verdichter (22) in der Nachbarschaft des Bearbeitungslösung-Rückführungsrohrs (24), des Bearbeitungsbades (12) und des Ent- 60 lüftungsanschlusses (20) angeordnet ist.

2. Bearbeitungseinheit (10), die einen Verdichter (22)

umfasst, gemäß Anspruch 1, wobei der Verdichter einen luftgekühlten Verdichter umfasst.

3. Bearbeitungseinheit (10), die einen Verdichter (22) umfasst, gemäß Anspruch 1 oder 2, wobei die Bearbeitungseinheit (10), die einen Verdichter (22) umfasst, wenigstens eine Bearbeitungsvorrichtung umfasst, bei der es sich um eine Kupfer-Beschichtungsvorrichtung oder eine Chrom-Beschichtungsvorrichtung und/oder eine Ätzeinrichtung handelt.
4. Vollständig automatisiertes Gravurplatten-Herstellungs-Verarbeitungssystem, das durch das Zusammenbauen der Bearbeitungseinheit (10) hergestellt ist, die einen Verdichter (22) gemäß einem der Ansprüche 1 bis 3 umfasst. 15

Revendications

1. Unité de traitement (10) comprenant un condenseur (22) qui doit être utilisé pour un système de traitement de plaque de gravure entièrement automatique pour fabriquer un rouleau de fabrication de plaques en effectuant une série de processus sur un rouleau de fabrication de plaque non traité, l'unité de traitement (10) comprenant: 20
 - un bain de traitement (12); 25
 - des moyens de serrage (16a, 16b) pour maintenir un cylindre de gravure (14) à l'intérieur du bain de traitement (12);
 - une porte d'admission (18) pour aspirer de l'air, qui est prévu dans une partie du bain de traitement (12);
 - une porte d'échappement (20) pour évacuer le gaz, qui est prévu dans une autre partie du bain de traitement (12), ladite porte d'admission (18) faisant face à ladite porte d'échappement (20), ladite porte d'admission (18), ladite porte d'échappement (20) et ledit bain de traitement (12) définissant un trajet d'écoulement de fluide, le fluide se déplaçant le long dudit trajet d'écoulement de fluide depuis ladite partie dudit bain de traitement (12) jusqu'à ladite autre partie dudit bain de traitement (12);
 - un condenseur (22) placé entre le bain de traitement (12) et la porte d'échappement (20); et
 - une conduite de retour de la solution de traitement (24) pour renvoyer dans le bain de traitement (12) une solution de traitement obtenue par le condenseur (22) qui liquéfie une partie du gaz à évacuer, ledit condenseur (22) étant adjacent à ladite conduite de retour de solution de traitement (24), ledit bain de traitement (12) et ladite porte d'échappement (20).

2. Unité de traitement (10) comprenant un condenseur

(22) selon la revendication 1, dans laquelle le condenseur comprend un condenseur refroidi à l'air.

3. Unité de traitement (10) comprenant un condenseur (22) selon la revendication 1 ou 2, dans laquelle l'unité de traitement (10) comprenant un condenseur (22) comprend au moins un appareil de traitement choisi parmi un appareil de plaquage de cuivre, un appareil de placage, ou un appareil de gravure.
4. Système de traitement de plaque de gravure entièrement automatique, qui est construit en assemblant l'unité de traitement (10) comprenant un condenseur (22) selon l'une quelconque des revendications 1 à 3.

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FIG.1

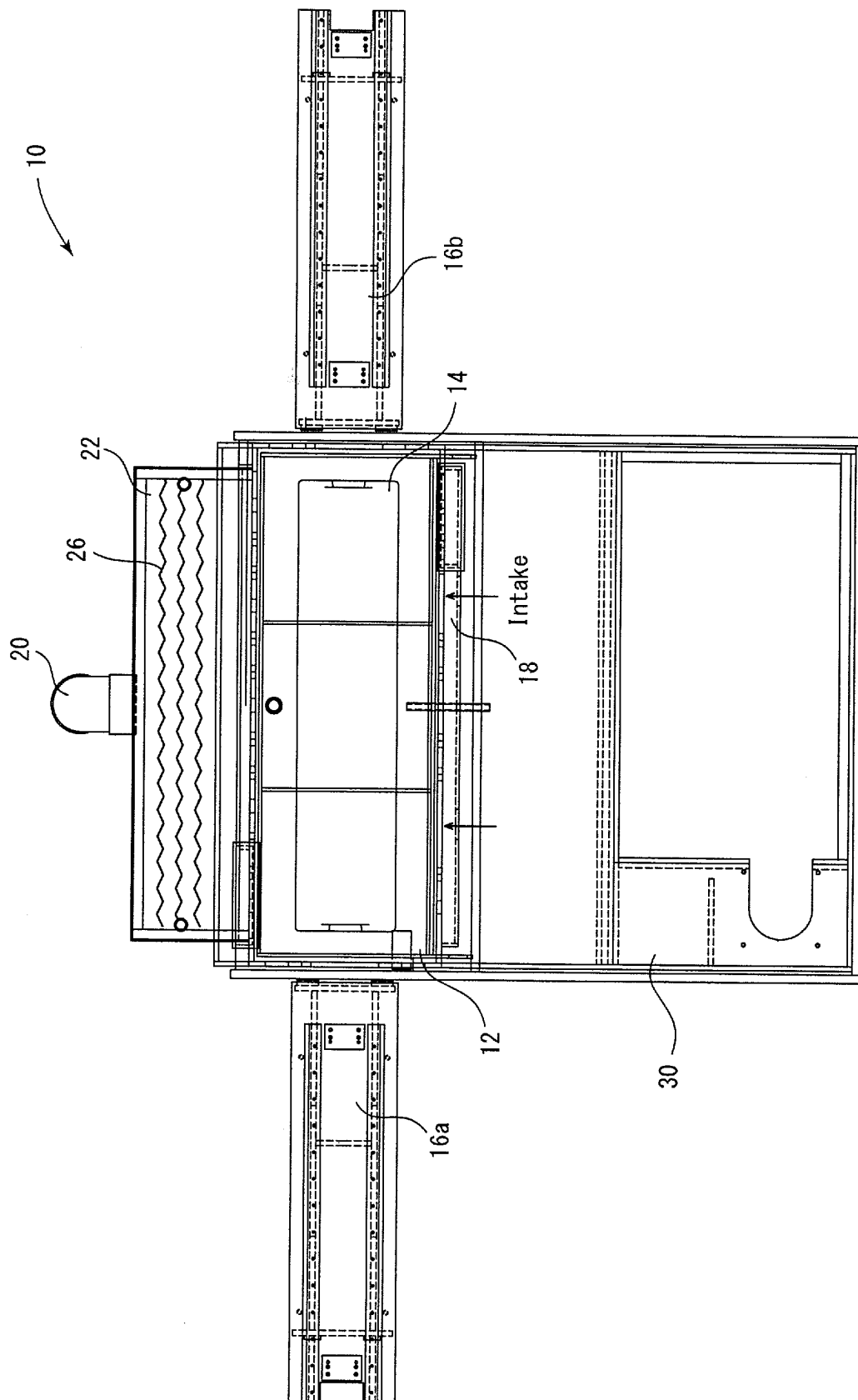
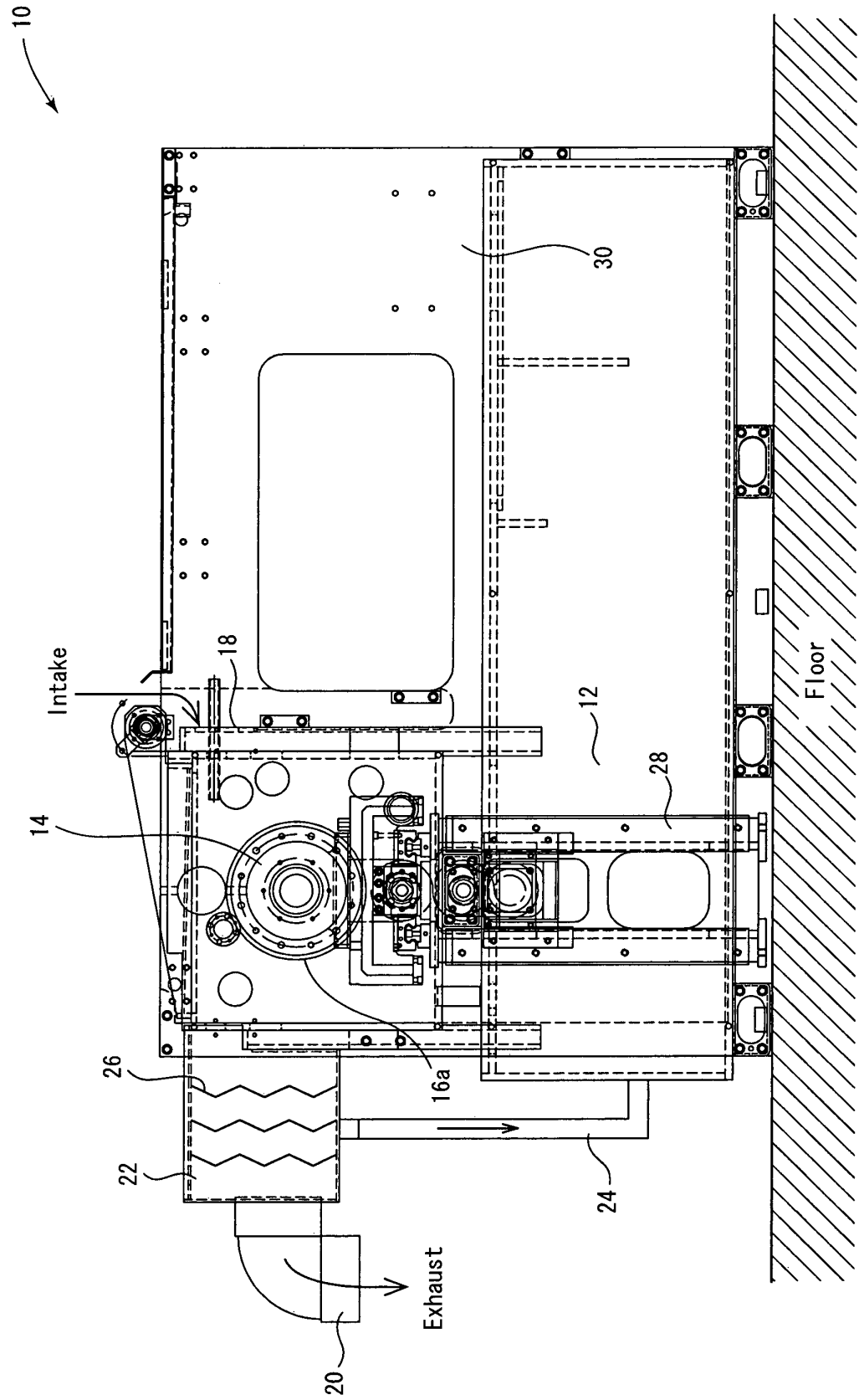


FIG.2



REFERENCES CITED IN THE DESCRIPTION

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