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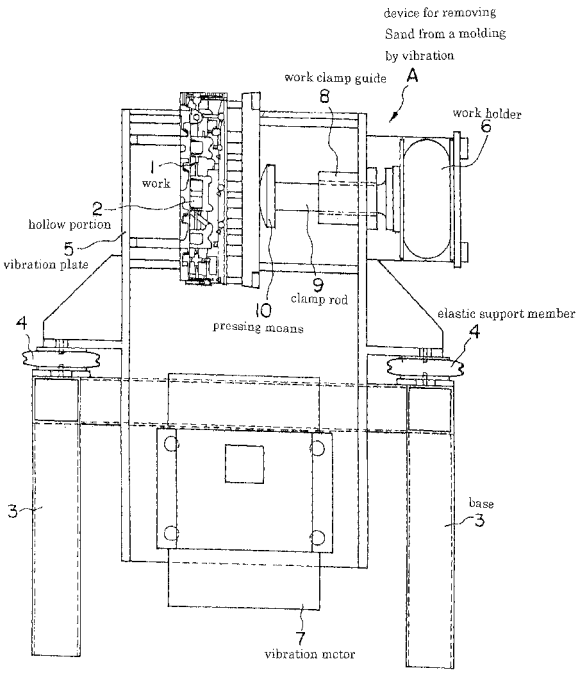
(54) SAND SHAKE-OUT DEVICE USING VIBRATION

(57) A device for removing sand from a workpiece by vibration which is adapted to vibrate a molding (workpiece) molded by casting such as an automobile part to thereby remove core sand remaining in a hollow portion of the workpiece and in which the workpiece is held against a vibration plate and the vibration plate is vibrated with a single vibration motor to remove the sand.

The device for removing sand from a workpiece (1) by vibration which removes sand remaining on the workpiece (1) by vibration, the device comprising a base (3), a vibration plate (5) mounted on the base (3) via elastic support members (4), a workpiece holder (6) provided on the vibration plate (5), and a vibration motor (7) connected to the vibration plate (5); wherein the workpiece is held with the holder (6), and the vibration motor (7) is subsequently actuated to vibrate the vibration plate (.5), thereby applying vibration to the workpiece (1) held with the holder (6) to remove the sand from the workpiece (1).

Fig.1



EP 1 997 573 A1

Description

Technical Field

[0001] The present invention relates to a device for removing sand from a molding (workpiece) by vibration which vibrates a molding (workpiece) molded by casting such as an auto part to thereby remove sand remaining on the workpiece, in particular, core sand remaining in a hollow portion of the workpiece. More particularly, it relates to a device for removing sand from a workpiece by vibration which holds a workpiece that is to have sand removed against a vibration plate, and vibrates the vibration plate by means of a single vibration motor, thereby removing sand remaining on the workpiece.

Background Art

[0002] Many of various machine parts such as automobile parts are molded by casting. On moldings (workpieces) produced by casting, a large amount of sand remains. Accordingly, an operation for removal of the remaining sand is required.

[0003] As methods for removing sand from a workpiece, techniques have heretofore been known which comprise striking a workpiece with sand remaining thereon by means of a hammer in order to vibrate the workpiece, thereby removing the sand. For example, there have been known a device for removal of sand from a workpiece by holding a workpiece in a sealed box and striking the workpiece with a hammer (Japanese Utility Model Registration No. 307 7681); a device for a reversion mode removal of sand from a workpiece by reversing a workpiece holding table to turn a feeder head portion of a workpiece down and striking the workpiece with a hammer (Japanese Laid-Open Patent Publication No. 2003-305 559); and a hammering device provided with a workpiece-side soundproofing box and a hammer-side soundproofing box to define a sealed room in which a workpiece is struck with a hammer (Japanese Patent No. 3 205 897).

[0004] However, each of these conventional devices is of a type which removes sand remaining on a workpiece by striking the workpiece with a hammer, and accordingly, has not only a problem that its size is large but also creates environmental pollution problems of noise and scattering of sand which are caused by the hammering.

[0005] Further, there has been disclosed in a patent application filed by the present inventor a device which vibrates a workpiece by means of a pair of vibration motors to remove sand, in particular, core sand in a hollow portion of the workpiece by the vibration force (Japanese Patent Application No. 2004-243 118).

[0006] Since the device uses two vibration motors, it is excellent in its sand removing effect by vibration. However, it has a drawback that it is large-sized and economically disadvantageous because of the use of the two vibration motors. Further, when two motors are used, the two motors should rotate synchronously. Accordingly, it is necessary to precisely set proportions of weights of the two motors and positions of elastic support members.

Patent Document 1:	Japanese Utility Model Registration No. 307 7681
Patent Document 2:	Japanese Laid-Open Patent Publication No. 2003-305 559
Patent Document 3:	Japanese Patent No. 3 205 897
Patent Document 4:	Japanese Patent Application No. 2004-243 118

Disclosure of Invention

Problem to be Solved by the Invention

[0007] The problem to be solved by the present invention is to provide a device for removing sand by vibration which effects removal of sand from a workpiece by vibrating the workpiece characteristically using a single vibration motor instead of a conventional technique for removing sand by striking a workpiece with a hammer, thereby realizing, as a matter of course, size reduction, and being capable of eliminating noise caused by hammering and of preventing environmental pollution due to scattering sand caused by the hammering and further capable of solving the problems inherent in cases where two motors are used, and accordingly, which is so improved as to be capable of solving the drawbacks inherent in the conventional techniques.

Means to Solve the Problem

[0008] To solve the above-described problem, according to the present invention, there is provided a device for removing sand from a molding by vibration, which device is adapted to remove sand remaining on the molding by vibration, the device for removing sand by vibration comprising:

- a base;
- a vibration plate mounted on the base via elastic support members;
- a molding holder provided on the vibration plate; and
- a single vibration motor connected to the vibration plate;

wherein the molding from which sand is to be removed is held with the holder, and the vibration motor is subsequently actuated to vibrate the vibration plate, thereby applying vibration to the molding held with the holder to remove the sand from the molding.

Effect of the Invention

[0009] The above-described present invention is so constructed that a workpiece from which sand is to be removed is held against a vibration plate, and the vibration plate is vibrated by means of a single vibration motor to thereby remove sand remaining on the workpiece, in particular, core sand in a hollow portion. Accordingly, the device of the present invention requires no large constituent such as a hammering chamber as in a conventional technique and thus enables size reduction to be realized, and is free from noise caused by hammering, and causes no environmental pollution due to scattering of sand.

[0010] Further, since the device of the present invention is provided with only one vibration motor, it enables size reduction to be realized and is economically advantageous. In a case where a sand removing device uses two motors, the two motors are required to rotate synchronously, and accordingly, it is necessary to precisely set proportions of weights of the two motors and positions of elastic support members. However, the device provided with the single motor is free from such a restriction.

Best Mode for Carrying Out the Invention

[0011] In the following, the present invention will be described with reference to the accompanying drawings. Fig. 1 is a plan view of an embodiment of the device for removing sand by vibration according to the present invention. Fig. 2 is a side view of the embodiment of the device. Fig. 3 is a perspective view of the embodiment of the device.

[0012] As shown in Figs. 1, 2 and 3, the present invention discloses a device A for removing sand from a molding (workpiece) 1 by vibration which removes core sand from a hollow portion 2 of the molding (workpiece) 1 by vibration, and which comprises a base 3 and a vibration plate 5 mounted thereon via elastic support members 4. On the vibration plate 5, a workpiece holder 6 for holding the molding 1 therebetween is provided. Further, the vibration plate 5 is connected to a single vibration motor 7. As examples of the elastic support members 4, which isolate vibration toward a floor and prevent hindrance of vibration transmission to the vibration plate 5, there may be mentioned rubber supports, metal springs, pneumatic springs and the like.

[0013] In the device A for removing sand by vibration according to the present invention which is constructed as described above, when sand is removed, first, air is discharged from the workpiece holder 6 which inflates with air to deflate the workpiece holder 6. A clamp rod 9 is thereby retracted through a workpiece clamp guide 8 to provide a space for inserting the workpiece 1, as shown in Fig. 4.

[0014] Subsequently, the workpiece 1 is placed in the space formed by the discharge of air, and then air is introduced into the workpiece holder 6 to inflate the workpiece holder 6, thereby pressing the workpiece 1 with pressing means 10 provided at the tip of the clamp rod 9 to hold the workpiece 1 with the workpiece holder 6, as shown in Fig. 5.

[0015] When the workpiece 1 is held with the workpiece holder 6 in this manner, the single vibration motor 7 connected to the vibration plate 5 is actuated to vibrate the vibration plate 5, thereby applying vibration to the workpiece 1 to remove sand remaining on the workpiece 1, in particular, core sand in the hollow portion 2. In this connection, in a case where core sand is shaken out of the hollow portion 2, if solid grains are placed in the hollow portion 2 of the workpiece 1, the removal can be effected efficiently.

Industrial Applicability

[0016] The above-described present invention is so constructed that a workpiece 1 from which sand is to be removed is held against a vibration plate 5, and the vibration plate 5 is vibrated by means of a single vibration motor 7 to thereby remove sand remaining on the workpiece 1, in particular, core sand in a hollow portion 2. Accordingly, the device of the present invention requires no large constituent as in a conventional technique such as a hammering chamber and thus enables size reduction to be realized, and is free from noise caused by hammering, and causes no environmental pollution problem due to scattering of sand.

[0017] Further, since the device of the present invention is provided with only one vibration motor for vibrating the vibration plate, it is economically advantageous and has a simplified structure and enables size reduction to be realized.

In other words, the device of the present invention is provided with only one motor. On the other hand, in a case where a sand removing device is provided with two motors, the two motors are required to rotate synchronously, and accordingly, it is necessary to precisely set proportions of weights of the two motors and positions of elastic support members. However, the device provided with the single motor is free from such a restriction. Accordingly, the device for removing sand by vibration according to the present invention has high potential that it will be used widely in the field of casting technique.

Brief Description of the Drawings

[0018]

Fig. 1 is a plan view of an embodiment of the device for removing sand by vibration according to the present invention.
Fig. 2 is a side view of the device shown in Fig. 1.
Fig. 3 is a perspective view of the device shown in Fig. 1.
Fig. 4 is an illustrative view showing a state before a workpiece is clamped.
Fig. 5 is an illustrative view showing a state after the workpiece is clamped.

Note on Reference Numbers

[0019]

A device for removing sand from a molding by vibration
1 workpiece
2 hollow portion
3 base
4 elastic support member
5 vibration plate
6 workpiece holder
7 vibration motor
8 workpiece clamp guide
9 clamp rod
10 pressing means

Claims

1. A device for removing sand or core sand from a molding or from a hollow portion of the moldings by vibration, which device is adapted to remove sand remaining on the molding by vibration, the device for removing sand by vibration comprising:

- a base;
- a vibration plate mounted on the base via elastic support members;
- a molding holder provided on the vibration plate; and
- a single vibration motor directly connected to the vibration plate;

wherein the molding from which sand is to be removed is held with the holder, and the vibration motor is subsequently actuated to vibrate the vibration plate, thereby applying vibration to the molding held with the holder to remove the sand from the molding.

2. The device for removing sand by vibration according to claim 1,
wherein the core sand in the hollow portion of the molding is caused to drop out by means of vibration.

3. The device for removing sand by vibration according to claim 2,
wherein solid grains are placed in the hollow portion of the molding to facilitate the removal of the core sand in the hollow portion.

Fig.1

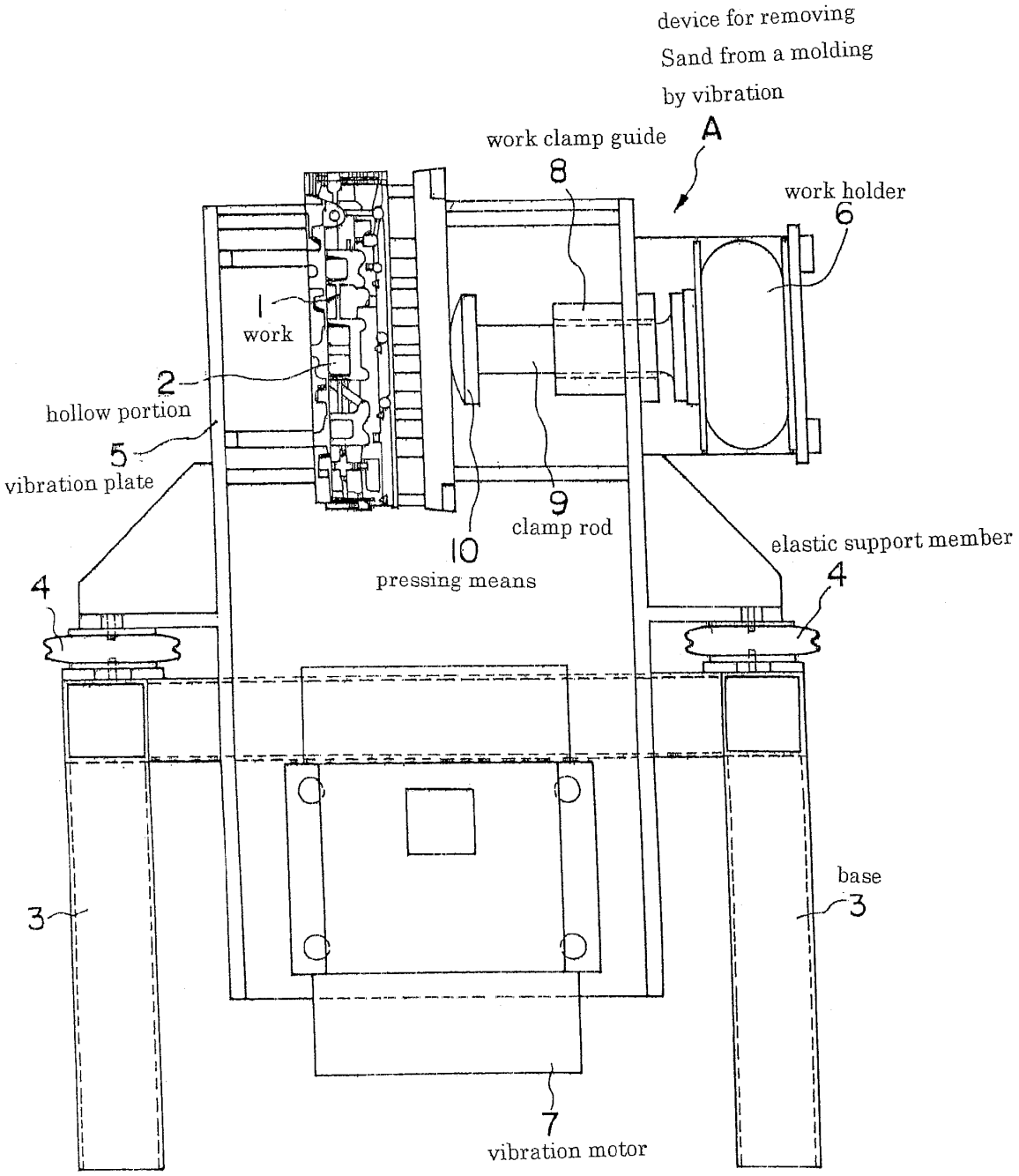
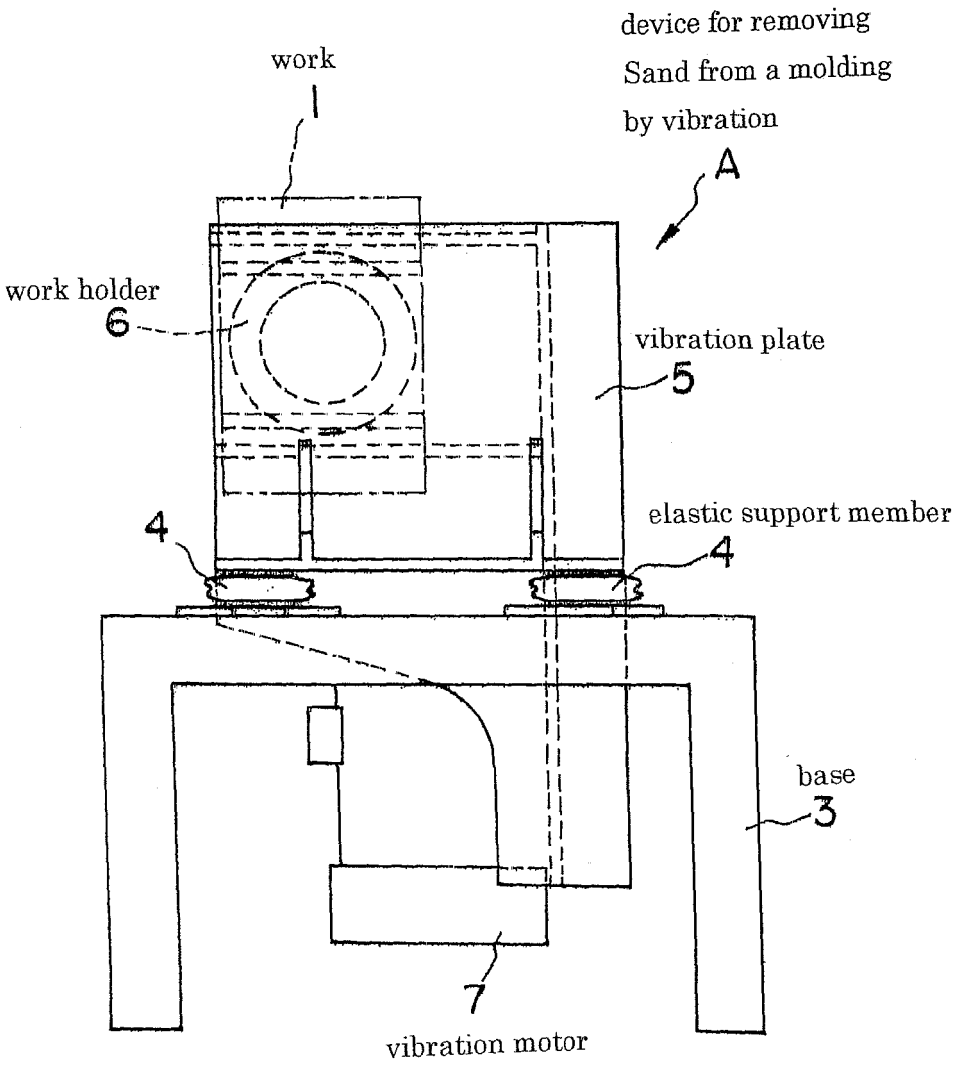

device for removing
Sand from a molding
by vibration
A
work clamp guide
8
work holder
6
1
work
2
hollow portion
5
vibration plate
9
clamp rod
10
pressing means
elastic support member
4
4
base
3
3
7
vibration motor

Fig.2


device for removing
Sand from a molding
by vibration
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work
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vibration plate
5
elastic support member
4
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base
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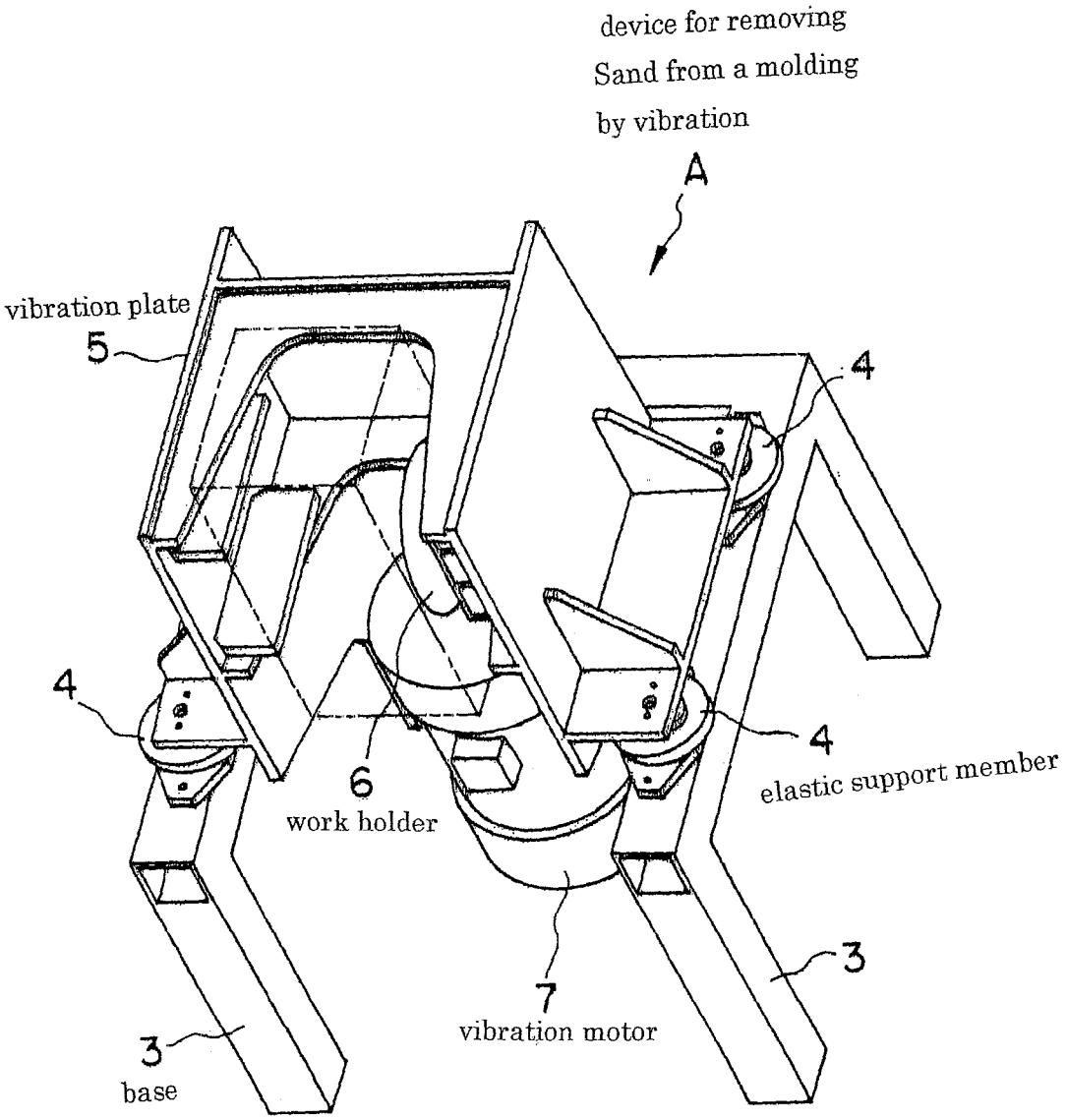
7
vibration motor

Fig.3


device for removing
Sand from a molding
by vibration
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vibration plate
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work holder
elastic support member
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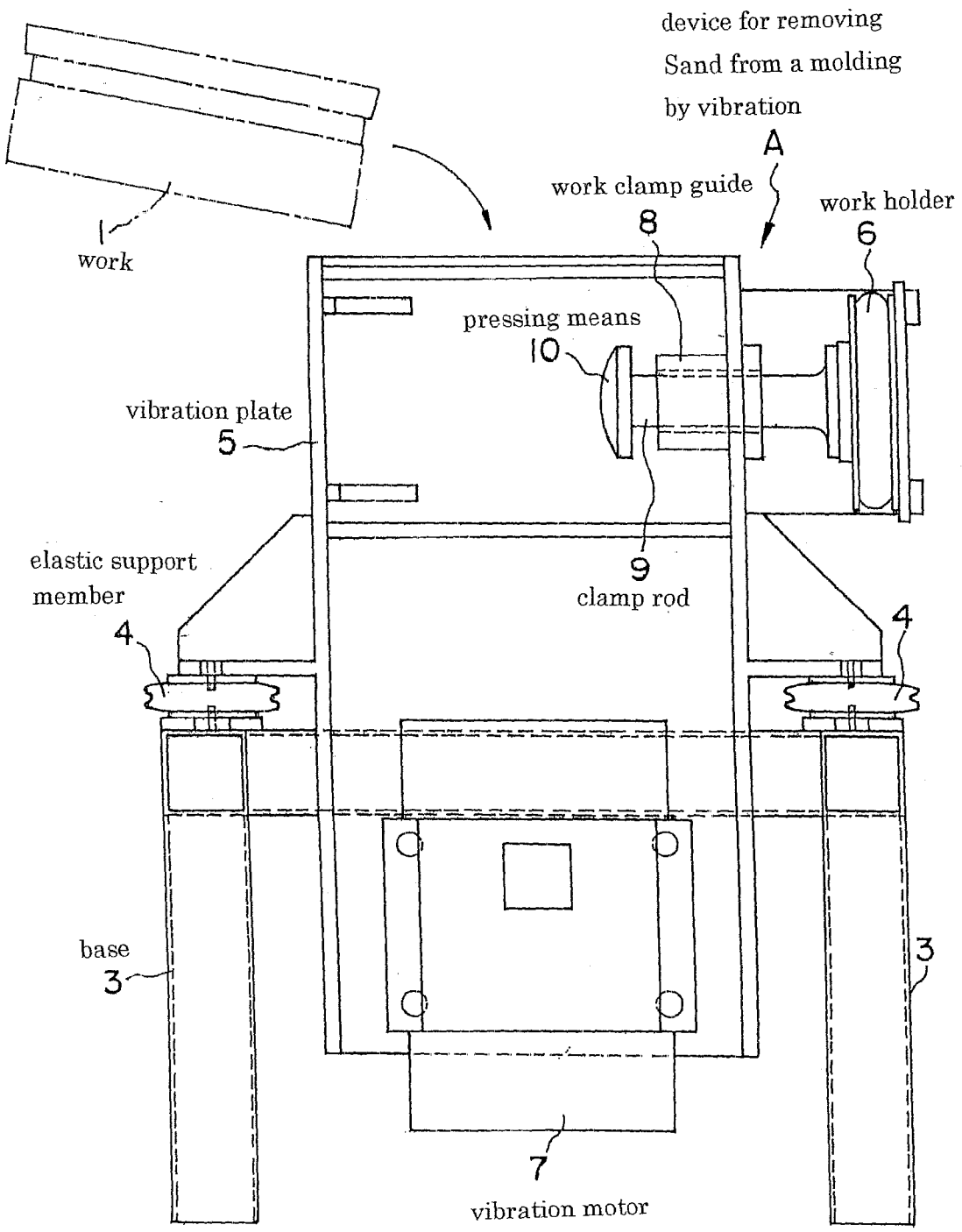
7
vibration motor
3
base

Fig.4


device for removing
Sand from a molding
by vibration
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clamp rod
elastic support
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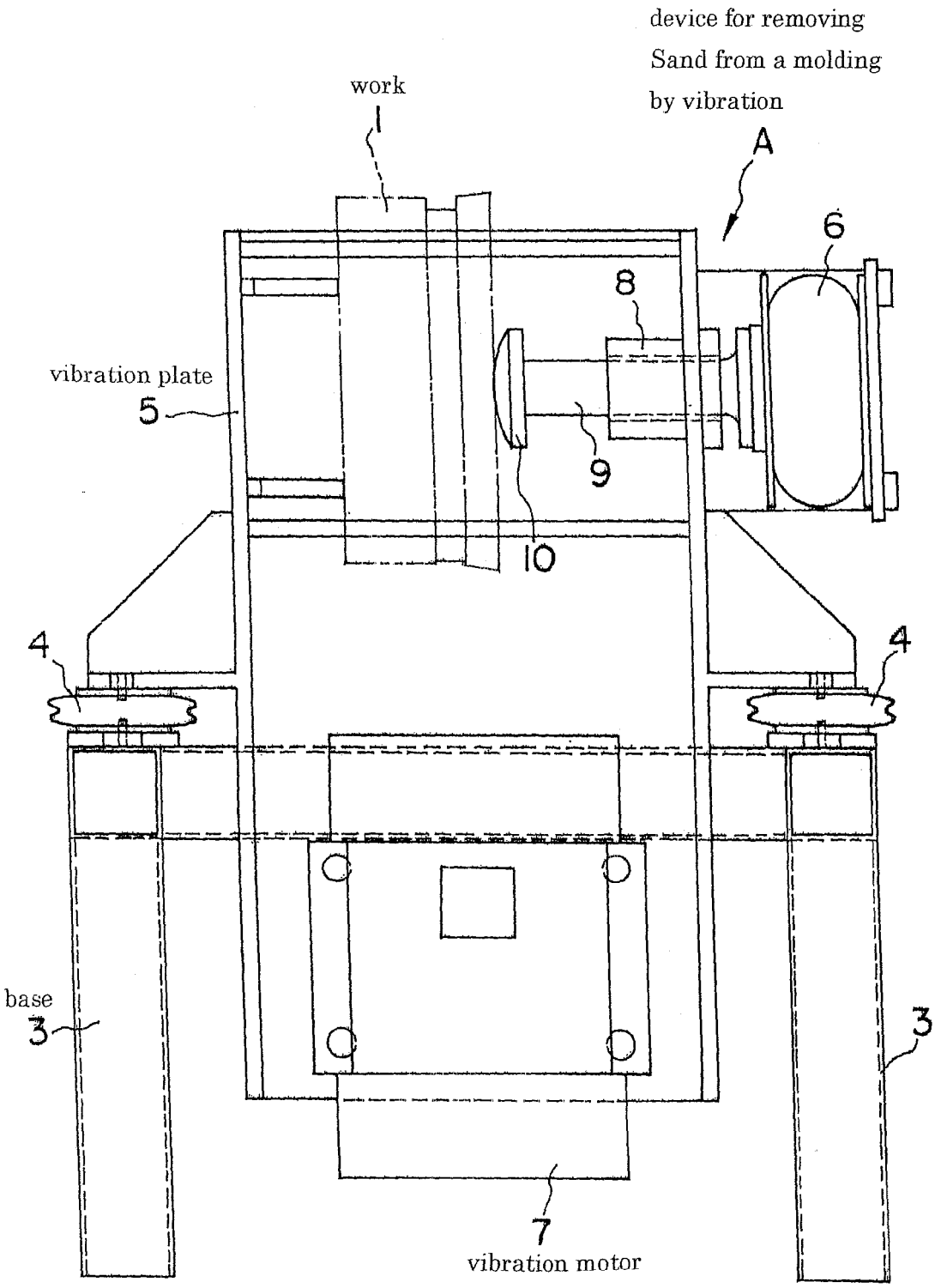
vibration motor

Fig.5


device for removing
Sand from a molding
by vibration
work
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vibration plate
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base
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7
vibration motor

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2007/056760

A. CLASSIFICATION OF SUBJECT MATTER
B22D29/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B22D29/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2007
Kokai Jitsuyo Shinan Koho 1971-2007 Toroku Jitsuyo Shinan Koho 1994-2007

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2000-197962 A (Yoshitaka AOYAMA), 18 July, 2000 (18.07.00), Claims; Par. Nos. [0007] to [0010], [0018]; Fig. 1 (Family: none)	1-3

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 June, 2007 (26.06.07)	03 July, 2007 (03.07.07)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (April 2005)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 3077681 B **[0003] [0006]**
- JP 2003305559 A **[0003] [0006]**
- JP 3205897 B **[0003] [0006]**
- JP 2004243118 A **[0005] [0006]**