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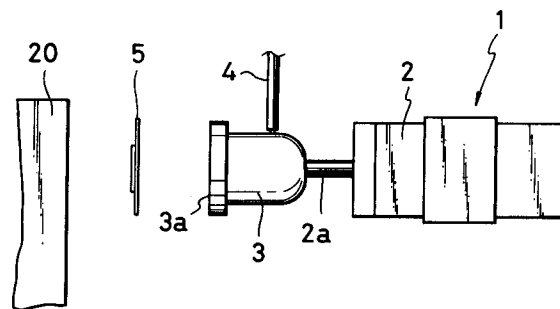
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(54) **Mark printing apparatus.**

(57) It is an object of the present invention to provide an apparatus for printing a desired mark on the surface of a sanitary earthenware product. The apparatus is combined with a working robot so as to automate and ensure the work of printing a mark and to print a mark at a constant position. The apparatus comprises a seal holding portion 3 for holding by suction the rear side of a mount 6 of a printing seal 5 having a mark portion 7 separated by heating and provided on the surface thereof, and a driving portion 2 for forwardly and backwardly moving the seal holding portion 3, the seal holding portion 3 being provided with a heater 8 for heating the mark portion 7 of the printing seal 5 held by suction from the rear side of the mount 6.

FIG. 1



BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an apparatus for printing a desired mark such as a brand mark or the like on the surface of a sanitary earthenware product.

Description of the Related Art

A brand mark or the like is generally printed on the surface of a sanitary earthenware product by the following method:

A seal having a mount with a mark provided on the surface thereof is pasted at a predetermined position of the surface of the product base obtained by molding a raw material before burning (when the product base is glazed, immediately after glazing) and then burnt. As a result, the mount is burnt during burning to obtain a sanitary earthenware product having the mark portion only printed on the surface thereof.

In the above conventional mark printing method, since a printing seal is manually pasted on the surface of a product base, the mark cannot be easily printed at a constant position, and the worker frequently forgets to paste the printing seal. In addition, the manual work fails to progress the production process smoothly and thus is an obstacle to an attempt to speed up the production work.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a mark printing apparatus which is capable of simply and securely printing a mark on a sanitary earthenware product and which can automate the work of printing a mark on a sanitary earthenware product by combination with a working robot or the like, whereby preventing the worker from forgetting to paste the mark and printing a mark at a constant position of a product.

A mark printing apparatus of the present invention is capable of printing a mark on the surface of a sanitary earthenware product using a printing seal having a mark portion provided on the surface of a mount and separated by heating. The apparatus comprises a seal holding portion for holding the rear side of the mount of the printing seal and a driving portion for forwardly and backwardly moving the seal holding portion, wherein the seal holding portion is provided with a heater for heating a mark portion of the printing seal held from the rear side of the mount.

The printing seal is formed by forming a film of an organic material such as paraffin or the like

which melts at about 50 to 100 ° C on the surface of the mount and printing a pattern or character on the film using a pigment. A mark may be printed on the mount using melted paraffin containing a pigment.

In the mark printing apparatus of the present invention configured as described above, the rear side of the mount of the printing seal is held by suction by the seal holding portion, and the seal holding portion is then forwardly moved to the surface of a sanitary earthenware product (unburnt product) by the driving portion. When the printing seal held by suction contacts with the surface of the product, the printing seal is pressed by the seal holding portion from the rear side thereof so that the mark portion is brought into pressure contact with the surface of the product. At the same time, the mark portion is heated by the heater provided in the seal holding portion. As a result, the paraffin is melted, and the mark portion is separated from the mount and printed on the surface of the sanitary earthenware product. The seal holding portion and the mount held thereby are then backwardly moved to leave the mark portion only on the surface of the sanitary earthenware product. When the organic material such as paraffin or the like is solidified by cooling, the mark adheres to the surface of the earthenware product. The product is then burnt to obtain the sanitary earthenware product having a desired mark printed on the surface thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side view showing a mark printing apparatus in accordance with an embodiment of the present invention;

Fig. 2 is a perspective view showing the printing seal used in the present invention;

Fig. 3 is an enlarged side view showing the seal holding portion of a mark printing apparatus according to the present invention; and

Fig. 4 is a drawing showing the state wherein a mark printing apparatus according to the present invention is attached to a working robot.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is described in detail below with reference to the embodiment shown in the drawings.

Fig. 1 shows a mark printing apparatus 1 in accordance with an embodiment of the present invention. The mark printing apparatus 1 comprises a driving portion 2 comprising an air cylinder, and a seal holding portion 3 fixed to the rod portion 2a of the air cylinder and having a printing seal suc-

tion surface 3a provided at the front end thereof.

As shown in Fig. 2, the printing seal 5 employed in the present invention comprises a mount 6 and a mark portion 7 provided on the surface thereof. The mark portion 7 is separated from the mount 6 and printed on another portion by heating at a predetermined temperature (for example, 60°C) or more and pressing at an appropriate pressure (for example, 0.5 kgf/cm²) for a necessary time (for example, 2 to 3 seconds).

As shown in an enlarged view of Fig. 3, the seal holding portion 3 of the mark printing apparatus 1 of the embodiment has a plurality of small holes 9 in the seal suction surface 3a, each of the small holes 9 communicating with a suction pump (not shown) through an internal communicating passage 10 and a draft tube 4. Namely, negative pressure is generated by the suction pump so that the rear side 6a of the mount 6 of the printing seal 5 can be held by suction through the small holes 9.

The seal holding portion 3 is also provided with a heater 8 for heating a required region of the suction surface 3a. The heater 8 is controlled to be electrically charged for a required time so as to heat the suction surface 3a at a required temperature or more only when the mark portion 7 of the printing seal 5 is printed on the surface 20a of a product 20, i.e., only when the printing seal 5 held by suction by the suction surface 3a is pressed at a predetermined position of the product surface 20a.

The whole or at least the suction surface 3a of the seal holding portion 3 is preferably made of a material such as aluminum or the like which has good thermal conductivity so that heating and cooling can be rapidly performed in correspondence with energization and non-energization of the heater 8. Namely, the suction surface 3a is rapidly heated when the mark portion 7 of the printing seal 5 is printed and rapidly radiates heat and is cooled to less than a predetermined temperature when a next printing seal is held by suction after the mark is printed.

As shown in Fig. 4, the work of printing a mark can be automated by attaching the mark printing apparatus 1 of the present invention to the end of an arm 31 of a working robot 30, whose movement can be freely controlled. In this case, it is desirable to prepare an automatic seal feeder 40 which contains many printing seals 5.

The work of printing marks is performed according to the following process. The robot 30 is first controlled so that the mark printing apparatus 1 is moved to a position corresponding to the automatic feeder 40. The suction pump connected to the draft tube 4 is then operated for discharging one printing seal 50 from the automatic feeder 40 by suction by the seal holding portion 3. The mark

printing apparatus 1 is then turned to a different direction, and the arm 31 is moved so that the printing seal 5 held by suction by the seal holding portion 3 is brought close to a predetermined position on the surface 20a of the sanitary earthenware product 20. The driving portion 2 of the mark printing apparatus 1 is then operated for forwardly moving the seal holding portion 3, and the printing seal 5 is pressed on the product surface 20a. At the same time, the printing seal 5 is heated from the rear side thereof by electrically charging the heater 8 provided in the seal holding portion 3. As a result, the mark portion 7 of the printing seal 5 is separated from the mount 6 and is printed on the product surface 20a. After the printing of the mark is completed, the mark printing apparatus 1 is separated from the sanitary earthenware product 20, and the negative pressure acting on the seal holding portion 3 is released. If required, the mount 6 is separated from the suction surface 3a by supplying compressed air, and a next mark printing process is prepared. The sanitary earthenware product 20 having the mark printed thereon is transferred to a burning process to obtain a finished product having a mark printed thereon.

As described above, the mark printing apparatus 1 of the present invention is combined with the working robot 30 so as to automate the work of printing a mark on a sanitary earthenware product, whereby preventing the danger of forgetting to paste a mark. In addition, the mark printing apparatus has the advantage that a mark can be correctly printed on a constant position even if a product has a complicated shape.

Claims

1. An apparatus for printing a mark on the surface of a sanitary earthenware product by using a printing seal having a mark portion provided on the surface of the mount thereof and separated by heating, said apparatus comprising:
 - a seal holding portion for holding the rear side of said mount of said printing seal by suction;
 - a driving portion for forwardly and backwardly moving said seal holding portion; and
 - a heater provided in said seal holding portion so as to heat a mark portion of said printing seal held by suction from said rear side of said mount.
2. An apparatus according to Claim 1, wherein said seal holding portion has an end surface contacting with said mount and small holes formed in said end surface so that said mount is held by said end surface by suction of air in said small holes.

3. An apparatus according to Claim 1, wherein said heater is electrically charged for a very short time only when said mark is transferred to the surface of a sanitary earthenware or the like. 5
4. An apparatus according to Claim 1, wherein many seals are placed upside down one on top of the other and are held by suction one at a time by said holding portion so that a mark is printed on the surface of a sanitary earthenware. 10
5. An apparatus according to Claim 4, being attached at the end of an arm of a working robot so that a mark is automatically printed. 15
6. An apparatus according to Claim 2, wherein a mount is separated from said seal holding portion by discharging air from said small holes after a mark is printed. 20

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FIG.1

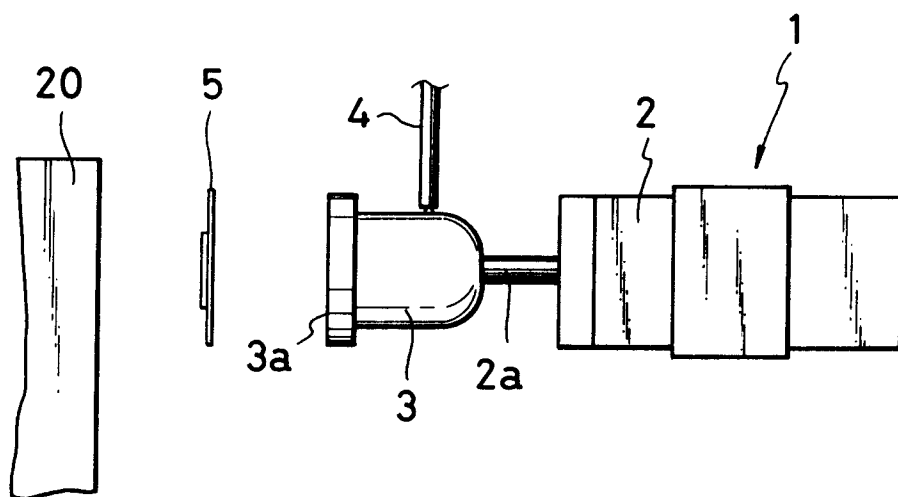


FIG.2

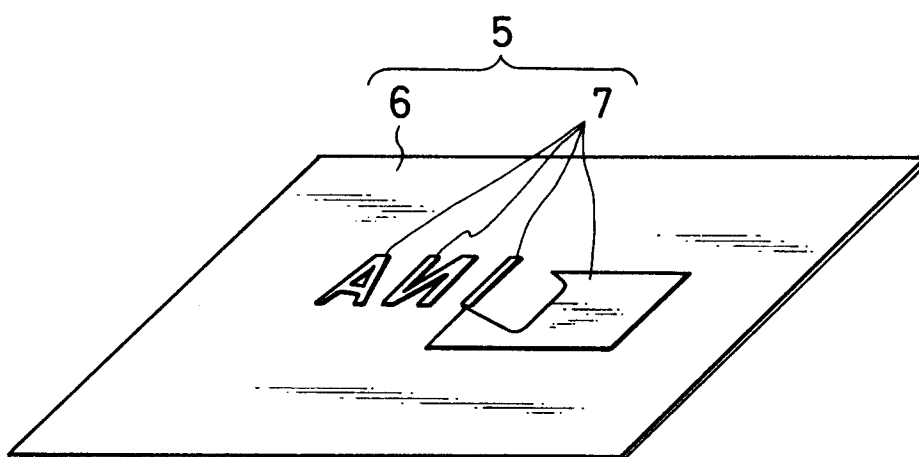


FIG.3

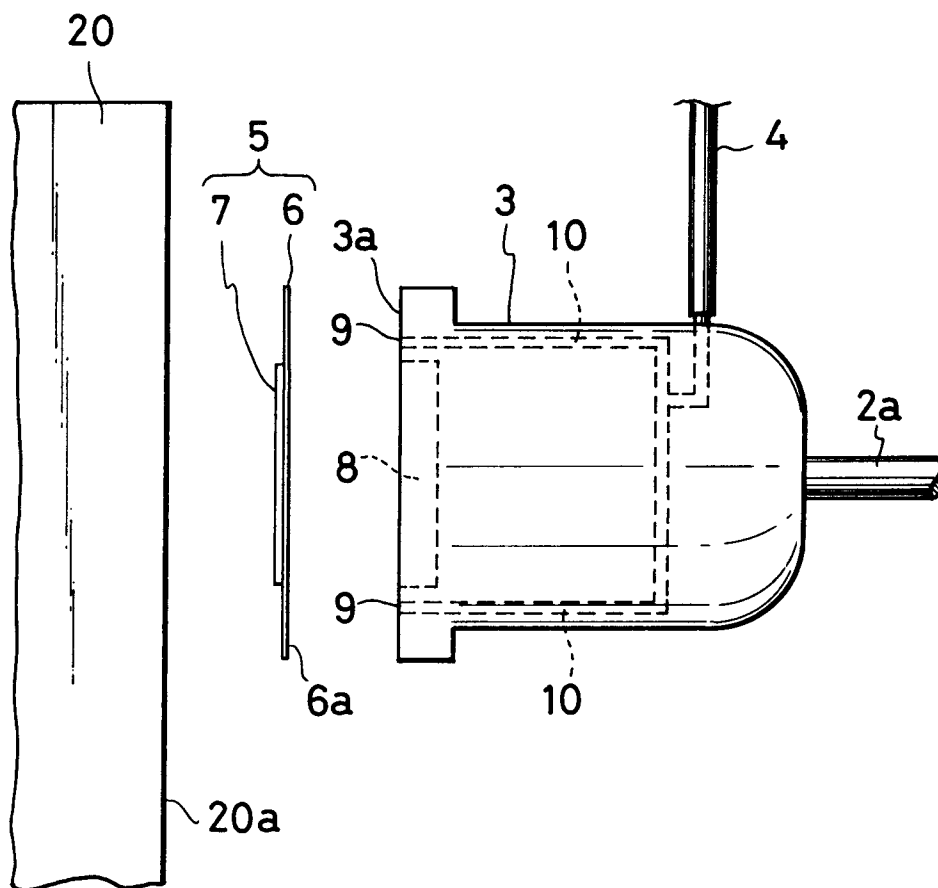


FIG. 4

