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(54) **Flexible air extraction system**

Flexibles Luftabsugsystem

Système flexible d'extraction d'air

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Description

[0001] The invention relates to an air extraction and filtering system according to the preamble of claim 1.

[0002] At the actual state of art, there are, in certain and particular production fields, where some structures are constructed with materials containing resins or these are varnished, a substantially unresolved problem, with the consequence of considerable exposure of workers to substances released by the production processes inside the working area.

[0003] In particular, the problem arises when the above described processes are to be done on vertical and/or horizontal surfaces of medium and big dimensions, on objects that are often of different form or dimension between one production cycle and the succeeding one. As example, without considering it as a limitation to the application of the invention, the case of a shipyard and, in particular, the construction of hulls in resin and their varnishing, in other words, a working process which development varies from time to time in function of the dimensions of the hulls to varnish that necessarily have to be worked in the same space where a totally different processing has been done on other hulls. At the moment, the shipyards use a system of scaffolds to wrap up the hull, in accordance with the specific case, either the whole hull or one of its sides, and eventually also the upper surface of the hull or a part of it, with plastic material, generally transparent, in order to create a tunnel like space that provides isolation between the working area where the varnishing process is being done and the surroundings. See fig. 1. In this scheme the pavement where the hull is being placed is indicated as nr. (1), as nr. (2) the hull, the transparent wrapping of the upper part of the hull as nr. (3) and as nr. (4) the farthest part of the lateral transparent wrapping realized on a scaffold construction. Both wrappings are an example of a tunnel like space in the shipbuilding industry.

[0004] In consideration of this procedure, it results obvious that such division of space leads to a high concentration of toxic agents inside the tunnel, deriving from resin and varnishing processes. On this purpose, because of no solutions available resolving this problem efficiently, generally, one or more air filtration systems are being installed on one side of the tunnel in order to create air circulation.

[0005] All of the known solutions are characterized by leaving unresolved some problems arising during the resin and varnishing problems, such as:

- Air speed created inside of the tunnel is too low and thus the varnish dispersed in the air tends to set down on surfaces, particularly on the horizontal ones;
- The average distance that the air has to cross to get to the aspiration unit is long and therefore a huge quantity of varnish or vapors produced by resin remain hanging in the air, with consequent high exposure of workers to toxic agents, and, in case of var-

nishing, a deterioration of already varnished surfaces.

[0006] A known system such as the one disclosed in US6395047, having the features of the preamble of the annexed independent claim, comprises a plurality of hose lines with end aspiration nozzles which can be put in different points of the working area. However, the adaptability of this system to the conformation of the working area is limited.

[0007] Accordingly, the object of the present invention is to provide an air extraction and filtering system for extraction and filtration of toxic agents which makes possible the dislocation of the air intake units, that is the vapors and solvents intake units, in several points along the inside area of the tunnel and to put in activity one or more of these by simple operations also during the working process. This enables to shorten considerably the distance the air has to cross from the point where the vapors are generated to the point of air intake and to increase in considerable way the air speed inside the hoses in order to avoid this way, or at least to limit, the depositing of condensed vapors or powder.

[0008] The above object is achieved according to the invention by the air extraction and filtering system as defined in claim 1. Particular embodiments of the invention are the subject of the dependent claims.

[0009] Substantially, we are going to set up a movable and modular air filtering system, a detailed description will follow, suitable for aspiration of vapors or solvents, both from resin and varnishing processes. It consist of air intake nozzles, also these to be described into detail subsequently, equipped with specific openings for choking the air flow, using special hoses, generally flexible or however adaptable to the area to enable the dislocation of the nozzles on a certain distance one from the other either along the whole internal side of the tunnel or a part of it.

[0010] The invention consists of a component constituted by an aspiration nozzle, fitted in a way to have two ends, generally opposite, two flanges that enable a quick connection to hose elements that form a hose line for airflow, or in case of an eventual terminal nozzle, a final plug. The nozzle furthermore, is equipped with one or more closable openings, in general to be opened separately, that enable to conform the nozzle either as a flow through or as an air aspiration unit and in case of more openings present, to vary the air intake capacity of the nozzle.

[0011] Therefore, it is possible to set up a modular installation with several possible compositions of nozzles and hoses. This way it is possible to adapt the hose line to any kind of tunnel conformation, enabling the use of an air filtering unit on one end of the hose line or alternatively, of two air filters, placed on both extremities of the tunnel.

[0012] The nozzles may be equipped with more than one opening, as already mentioned, eventually to be

closed separately, in order to choke the air flow of one specific nozzle part of the installation and enable, for example, the use of two neighboring nozzles choking the air flow of the nozzle closest to the aspiration point, avoiding in this way the air flow entering to concentrate exclusively on one nozzle and, more in general, to utilize optimally the potential of the aspirator, or of the aspirators, in function of the air intake units necessary .

[0013] The nozzles might be realized in metal or plastic material of a prism similar form on hexagonal basis see fig. 2, the variation of form and constructive solution without going out of the invention.

[0014] The nozzles might have, without going out of the invention, all the combinations in number of closable flaps.

[0015] The flaps might be hinged up on one side to be opened and closed easily, remaining the possibility to use any solution, comprising rotation on an axis that enables a total or partial opening of a slit of semi circular form or a different one, or a system that enables the total removal of the flap, as stopper.

[0016] In particular, in fig. 2, indicated as nr. (5) there is the body of the aspiration nozzle, as nr. (6) the flanges for hose connection, as nr. (7) the flap for covering the opening in closure position, as nr. (8) the flap in open position and as nr. (9) the opening for air intake.

[0017] The extremities of the nozzle might be usefully conformed by means of a connector in iron, in plastic material or any combination of materials and construction technique that makes possible the connection between the body of the nozzle and the hose conducting the air flow aspirated. On fig. 3, for example, neither exclusive nor limiting, there is a possible solution of a connection between the nozzle, as illustrated, and a conduct of circular section. In particular, indicated as nr. (10) there is the flange attached to the hose that matches the flange on the aspiration nozzle and as nr. (11) the junction for the circular section hose. Indicated as nr. (12) there is the hose, in this specific case, flexible.

[0018] The unit composed of the body of the nozzle, the flap/s and the flanges is named "aspiration nozzle".

[0019] Two or more nozzles connected together, attached to one or more aspirators by means of a hose line carrying air and varnish vapors conform the so called "modular air extraction and filtration system".

[0020] The connection between aspiration nozzles and the aspirator, or aspirators, might be done, as pictured, by means of flexible hoses of circle section, without these being considered a limitation to the protection of this invention, making possible the use of other sections for the conduct and/or every combination of rigid, semi rigid or flexible material permitting the aspiration inside the tunnel or, however, in a narrow and long workspace.

[0021] As example without exclusivity or limitation, on fig. 4, a solution that makes possible the setting up of the installation according to the above described characteristics. In fig. 4, indicated as nr. 13 there are the nozzles, as nr. 14 the hoses and as nr. 15 the aspirator placed on

one extremity of the installation.

Claims

1. An air extraction and filtering system for extraction and filtration of toxic agents such as solvents, resins or varnishing vapors deriving from varnishing or resin application processes carried out in a working area, the system comprising aspirator means (15), a plurality of nozzles (13) with one or more closable openings, and fitted hoses (14) for connecting together said nozzles (13), **characterized in that** said nozzles and hoses are defined by respective modular elements with flanges (6;10) enabling a quick connection for composing at least one hose line, whereby the development of said line or lines and the number and position of the nozzles (13) is adaptable to the conformation of said working area and to the points where said toxic agents are generated.
2. The system according to claim 1, wherein each of said nozzles (13) comprises two or more openings (9) to be closed separately.
3. The system according to claim 1 or 2, wherein each of said nozzle comprises two or more flaps (7,8) for closure of said air-intake opening (9).
4. The system according to any of the previous claims, wherein each of said nozzles composes a body (5) with two axial ends, generally opposite, two flanges (6) at respective ends of said body (5), for connection with respective of said hoses (14) or to a final plug, an air-intake opening (9) formed in said body (5), and two flaps (7, 8) hinged to said body (5) for closing said air-intake opening (9), to be opened separately for permitting to vary the air intake capacity of the nozzle (13).
5. The system according to claim 4, wherein said body (5) has a prismatic shape, said opening (9) being formed in a flat face of the body (5).
6. The system according to claim 4 or 5, wherein each of said hose (14) comprises, at respective axial ends, flanges (10) for quick connection with said flanges (6) of said nozzle (13).
7. The system according to any of the previous claims, wherein at least one of said nozzles (13) comprises at least one device for choking the airflow.
8. The system according to any of the previous claims, wherein said hoses (14) are flexible.
9. The system according to any of the previous claims, in which said working area is defined by a wrapping

tunnel, scaffolds or another kind of segregation system.

dest eine Vorrichtung zum Drosseln des Luftstroms enthält.

Patentansprüche

1. Luftabsaug- und -filtersystem zur Absaugung und Filtration von toxischen Stoffen, wie Lösungsmittel-, Harz- oder Lackdämpfen, die beim Lackieren oder bei Harzanwendungsprozessen erhalten werden, die in einem Arbeitsbereich ausgeführt werden, welches System Absaugeinrichtungen (15), eine Mehrzahl von Düsen (13) mit einer oder mehreren verschließbaren Öffnung(en) und eingepasste Schläuche (14) enthält, um die Düsen (13) miteinander zu verbinden, **dadurch gekennzeichnet, dass** die Düsen und Schläuche durch entsprechende modulare Elemente mit Flanschen (6; 10) definiert sind, die eine schnelle Verbindung zum Zusammensetzen wenigstens einer Schlauchleitung ermöglichen, wodurch der Aufbau der Leitung oder Leitungen und die Anzahl und Position der Düsen (13) an die Gestalt des Arbeitsbereichs und an die Punkte anpassbar sind, wo die toxischen Stoffe erzeugt werden.
2. System nach Anspruch 1, wobei jede der Düsen (13) zwei oder mehr Öffnungen (9) enthält, die separat zu schließen sind.
3. System nach Anspruch 1 oder 2, wobei jede besagte Düse zwei oder mehr Klappen (7, 8) zum Verschluss der Luftansaugöffnung (9) enthält.
4. System nach einem der vorhergehenden Ansprüche, wobei jede der Düsen enthält einen Körper (5) mit zwei axialen Enden, die allgemein entgegengesetzt sind, zwei Flanschen (6) an den jeweiligen Enden des Körpers (5) zur Verbindung mit entsprechenden Schläuchen (14) oder mit einem Abschlussstopfen, eine Luftansaugöffnung (9), die in dem Körper (5) ausgebildet ist, und zwei Klappen (7, 8), die an dem Körper (5) angelenkt sind, zum Verschließen der Luftansaugöffnung (9), um separat geöffnet zu werden, um es zu gestatten, die Luftansaugkapazität der Düse (13) zu variieren.
5. System nach Anspruch 4, wobei der Körper (5) eine prismatische Form hat, wobei die Öffnung (9) in einer flachen Seite des Körpers (5) ausgebildet ist.
6. System nach Anspruch 4 oder 5, wobei jeder Schlauch (14) an entsprechenden axialen Enden Flansche (10) zur schnellen Verbindung mit den Flanschen (6) der Düse (13) enthält.
7. System nach einem der vorhergehenden Ansprüche, wobei wenigstens eine der Düsen (13) zumin-

8. System nach einem der vorhergehenden Ansprüche, wobei die Schläuche (14) flexibel sind.
9. System nach einem der vorhergehenden Ansprüche, wobei der Arbeitsbereich durch einen Umhüllungstunnel, Gerüste oder eine andere Art eines Segregationssystems definiert ist.

Revendications

1. Un système d'extraction d'air et de filtration pour l'extraction et la filtration d'agents toxiques tels que des solvants, résines ou vapeurs de vernis dégagés par les procédés d'application de vernis ou de résines mis en oeuvre dans une zone de travail, le système comprenant des moyens d'aspiration (15), une pluralité de buses (13) avec une ou plusieurs ouvertures de prise d'air aptes à être obturées, et des conduits adaptés (14) pour relier ensemble lesdites buses (13), **caractérisé en ce que** lesdites buses et lesdits conduits sont définis respectivement par des éléments modulaires avec des brides (6, 10) permettant un raccordement rapide pour réaliser au moins une ligne de conduite, où la formation de ladite ligne ou lesdites lignes et le nombre et la position des buses (13) peuvent être adaptés à la configuration de ladite zone de travail et aux endroits où sont produits lesdits agents toxiques.
2. Le système selon la revendication 1, où chacune des dites buses (13) comporte deux ouvertures (9) de prise d'air ou plus aptes à être obturées séparément.
3. Le système selon l'une des revendications 1 et 2, où chacun des dites buses comporte deux volets (7, 8) ou plus pour la fermeture des dites ouvertures (9) de prise d'air.
4. Le système selon l'une quelconque des revendications précédentes, où chacune des dites buses comporte un corps (5) avec deux extrémités axiales, généralement opposées, deux brides (6) aux extrémités respectives du dit corps (5), pour son raccordement respectivement avec lesdits conduits (14) ou à une prise finale, une ouverture de prise d'air (9) formée dans ledit corps, et deux volets (7, 8) articulés sur ledit corps (5) pour fermer ladite ouverture de prise d'air (9), pour être ouverts séparément et permettre de faire varier la capacité d'entrée d'air de la buse (13).
5. Le système selon la revendication 4, où ledit corps (5) a une forme prismatique, ladite ouverture (9)

étant réalisée dans une face plane du corps (5).

6. Le système selon l'une des revendications 4 et 5, où chacun des dits conduits (14) comprend, à ses extrémités axiales respectives, des brides (10) pour un raccordement rapide avec lesdites brides (6) de ladite buse (13). 5
7. Le système selon l'une quelconque des revendications précédentes, où au moins l'une des dites buses (13) comprend au moins un dispositif pour obstruer le flux d'air. 10
8. Le système selon l'une quelconque des revendications précédentes, où lesdits conduits (14) sont flexibles. 15
9. Le système selon l'une quelconque des revendications précédentes, où ladite zone de travail est définie par un tunnel d'emballage, des échafaudages ou une autre sorte de système de séparation. 20

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Fig. 1

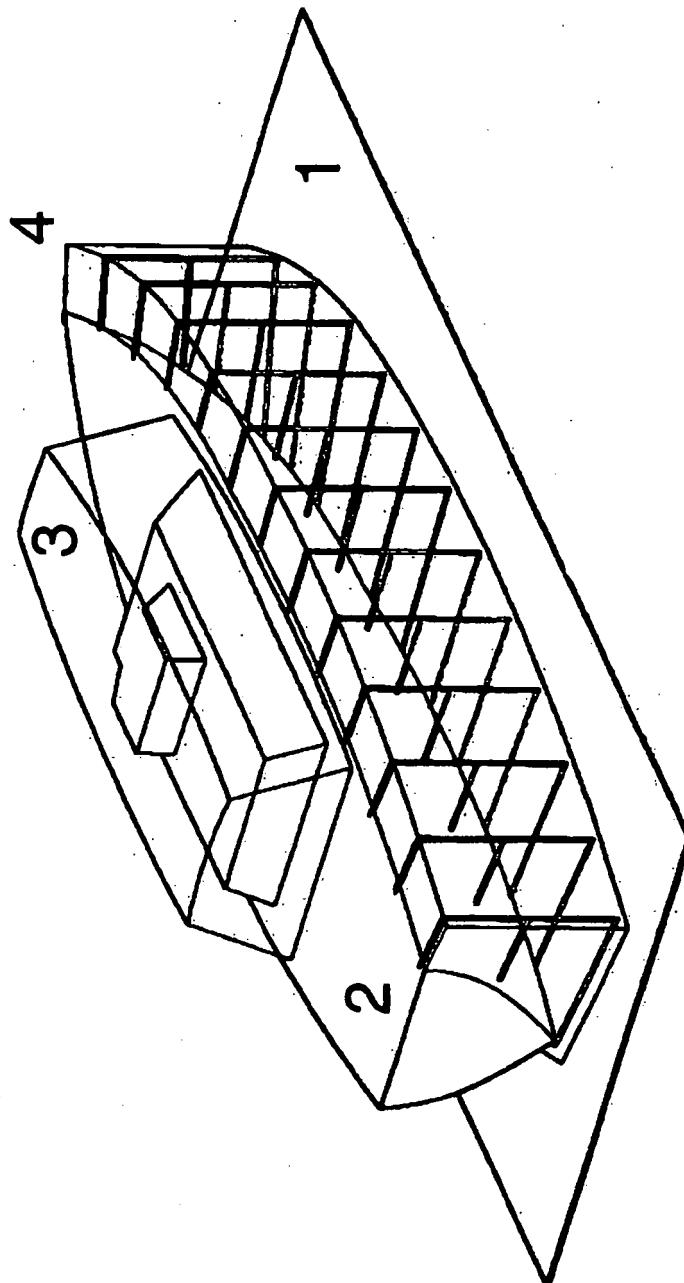


Fig. 2

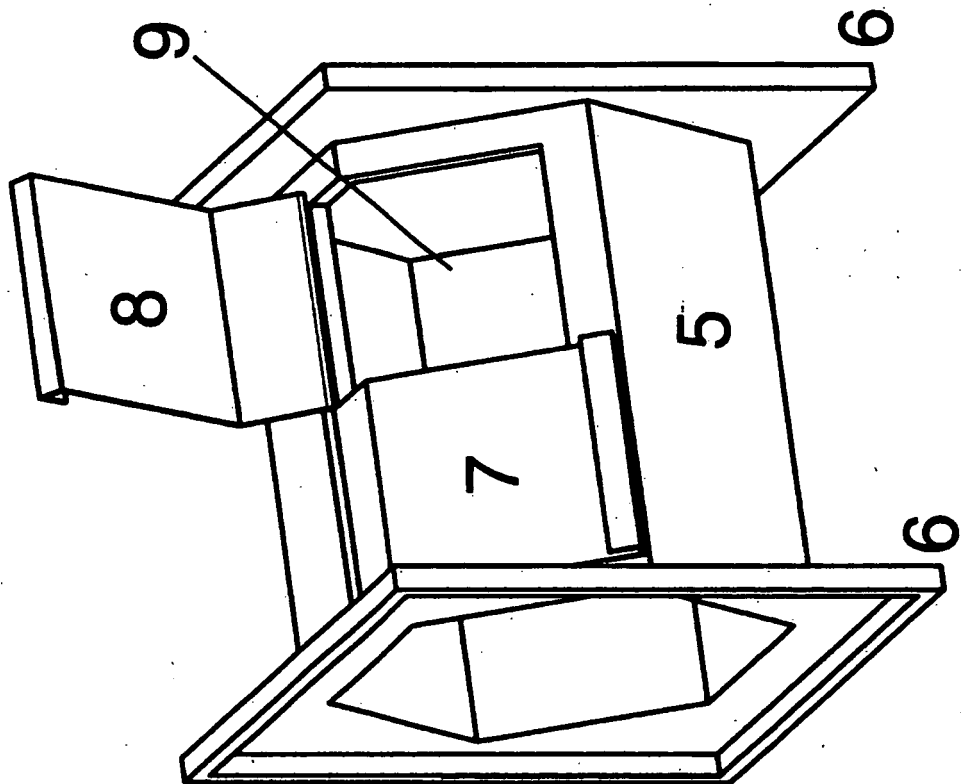


Fig. 3

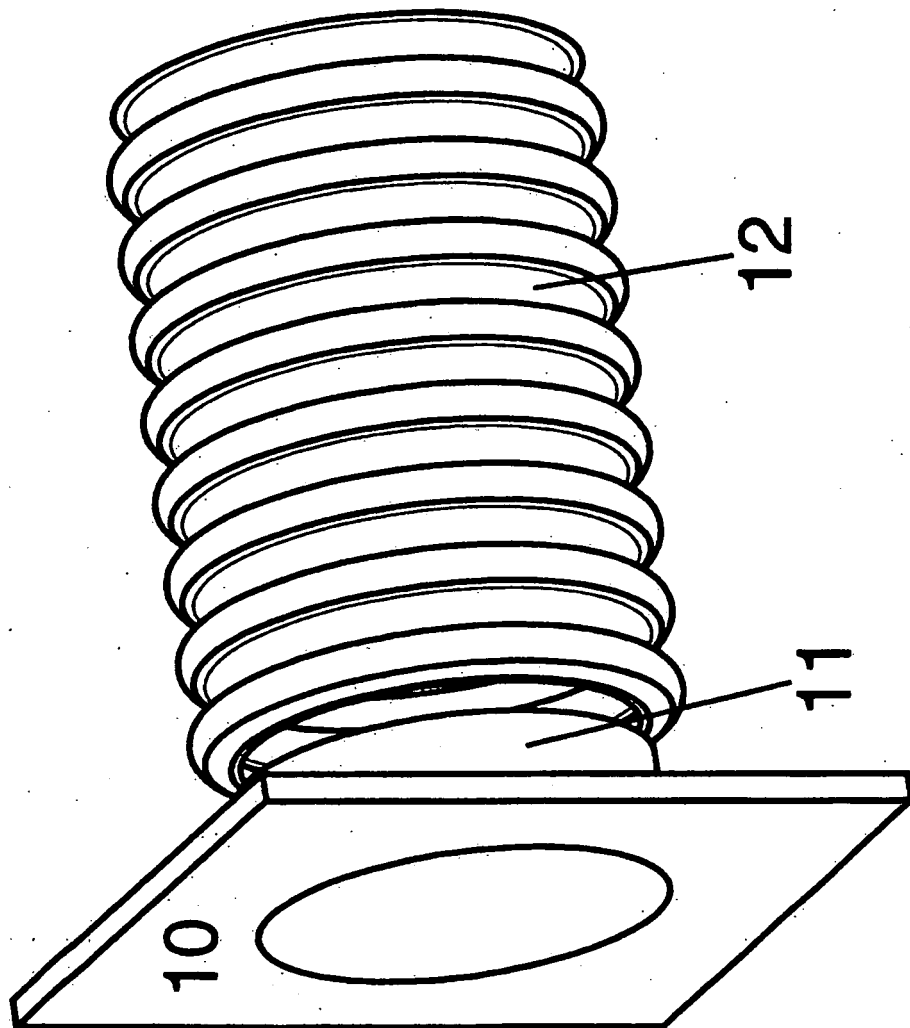
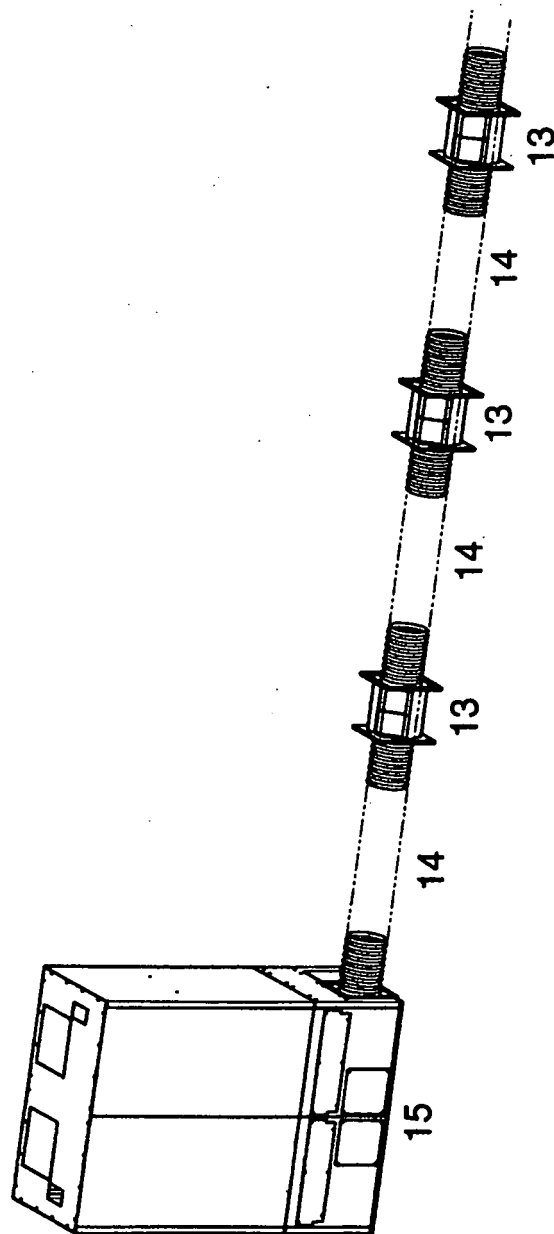


Fig. 4



REFERENCES CITED IN THE DESCRIPTION

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