



(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication of patent specification :
13.01.93 Bulletin 93/02

(51) Int. Cl.⁵ : **B01F 3/12, B01F 3/18**

(21) Application number : **88906846.6**

(22) Date of filing : **29.07.88**

(86) International application number :
PCT/SE88/00389

(87) International publication number :
WO 89/00884 09.02.89 Gazette 89/04

(54) **Mixing method.**

(30) Priority : **30.07.87 SE 8703001**

(43) Date of publication of application :
23.05.90 Bulletin 90/21

(45) Publication of the grant of the patent :
13.01.93 Bulletin 93/02

(84) Designated Contracting States :
BE DE FR GB NL

(56) References cited :
US-A- 3 860 219

(73) Proprietor : **ERIKSSON, Kurt Aron**
Valleberga 1
S-260 51 Ekeby (SE)

(72) Inventor : **ERIKSSON, Kurt Aron**
Valleberga 1
S-260 51 Ekeby (SE)

(74) Representative : **Berglund, Gustav Arthur et al**
AWAPATENT AB Box 5117
S-200 71 Malmö (SE)

EP 0 368 917 B1

Note : Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid (Art. 99(1) European patent convention).

Description

The present invention relates to a method for mixing granular and/or pulverulent materials with each other and/or a liquid.

When mixing e.g. concrete in small batches, as in small repair jobs or the like, the components are usually placed on a board or in a receptacle and manually mixed with each other by means of a shovel or other tool. This is a heavy and time-consuming toil. The necessary cleaning of the board or the receptacle after completed use also is a laborious task. Although there are mechanical mixers with mixing means rotating relative to a mixing receptacle, these mixers do not always provide a satisfactory mixing effect and also are relatively expensive.

A first object of the invention therefore is to provide a method of the type stated by way of introduction, which ensures efficient mixing with small efforts and at a low cost.

When mixing pulverulent materials, there usually is a substantial formation of dust which may be environmentally unacceptable. The problems of dust formation may be encountered in both manual and mechanical mixing. Another object of the invention is to entirely eliminate the emission of dust to the environment.

These two objects of the invention are achieved by a method of the type stated in the introduction to this specification, which has the features disclosed by appended claim 1.

To make it easier to perform the lifting movements, each end of the tube preferably is provided with a handle. These handles may consist of holes through the tube at the ends thereof.

In order to introduce the batch in the tube, this is suitably open or openable at least at one end thereof. If the other end of the tube is closed, the tube may also serve as a package for the granular and/or pulverulent materials.

To ensure a dust-free supply of the granular and/or pulverulent materials from a standard package, e.g. a bag, the circumference of the tube is made larger than the circumference of the package. In this manner, the open end of the tube can be passed over the package which can thus be emptied of its entire contents or part thereof in a dust-free manner.

Preferably, the tube is made of a transparent material, such that the progress of the mixing operation can be directly observed.

It is evident that the invention ensures efficient mixing with only small manual efforts. Further, the dusting and cleaning problems are reduced to an acceptable level.

The tube also offers the advantage of allowing convenient transport of the mixed material to the place of use. Cleaning of the tube normally consists only in washing the inside of the tube. If some of the

mixed material is left in the tube so as to dry and get stuck to the inner side thereof, it can easily be removed by lightly shaking the tube thanks to the pliability thereof.

It should be emphasised that the invention is not restricted to the mixing of concrete but is also well suited for mixing any granular and/or pulverulent materials with or without the addition of liquid.

The invention will now be described in more detail hereinbelow with reference to the accompanying drawings. Fig. 1 is a top plan view of an embodiment of the device used according to the invention. Fig. 2 shows an alternative embodiment of the device according to Fig. 1. Fig. 3 is a side view of the device according to Fig. 1 containing a batch ready for mixing. Fig. 4 is an example showing how the device can be filled with materials to be mixed. Fig. 5 shows the device in Fig. 3 with a cross for further reducing the mixing efforts.

The device used according to the invention and shown in Figs. 1-3 consists of a tube 1 of a pliable web having ends 2 and 3 reinforced by doubling over the web. Holes 4, 5 are formed in the doubled portions at the ends 2 and 3 and have such a shape that the user's hands can be passed therethrough to obtain a steady grip at each end of the tube.

The doubled end portions of the tube 1 and the holes 4 and 5 thus provide a handle at each end of the tube 1. The ends 2 and 3 can be further reinforced e.g. by means of a strip 6 shown in Fig. 2, which has a hole corresponding to the hole 4.

The use of the device according to the invention is illustrated in Fig. 3, where a batch 7 of granular and/or pulverulent materials and a liquid, e.g. a batch of sand, cement and water, has been placed in the central part of the tube 1. This central part of the tube 1 rests on a stationary supporting surface 8, and the ends 2 and 3 of the tube are held in an upwardly stretched state by the hands of a user (not shown). By alternately lifting and lowering the ends 2 and 3 while maintaining a portion of the central part of the tube in contact with the surface 8, it is possible to achieve a highly efficient mixing of the components in the batch 7. More specifically, the lifting movements are performed to such an extent that the materials in the batch 7 are thoroughly blended. Such blending can be achieved in that the outer portions of the batch 7 as shown in Fig. 3 are alternately lifted and shifted sideways in over the central portion of the batch 7. Thus, the central portion of the batch 7 will successively be superposed by new layers consisting of the material raised from the outer portions of the batch 7. Concurrently with such successive superposition of new layers on the central portion of the batch 7, there is also a motion of material out from the central portion of the batch 7 towards the outer portions thereof, which motion of material occurs alternately as a result of the alternate lifting of the ends 2 and 3 of the tube.

Practical tests have shown that the device now described provides highly efficient mixing in a very short time and with small efforts.

In order to fill the tube 1 with the materials to be mixed, the tube suitably is open at least at one end thereof. Further, the tube 1 has such a circumference that it can be passed over a package 9 with the material to be mixed, as shown in Fig. 4. Before the tube 1 is passed over the bag-like package 9, its upper end has been cut open so that after passing the tube over the package, the entire contents or part of the contents thereof can be emptied into the tube 1 by lifting the lower end of the package 9. In this way, there will be practically no dust formation from the material in the package 9.

The manual efforts required for mixing the batch can be further reduced by using a rocker consisting of a cross 10 as shown in Fig. 5. The cross 10 more specifically has arms on the ends of which the handles of the tube 1 are supported. The vertical part of the cross serves as a supporting leg the lower end of which engages the stationary supporting surface. By rocking the cross back and forth, as indicated by the double arrow, alternate lifting of the ends 2 and 3 of the tube 1 is achieved.

It goes without saying that the lifting movements described above may just as well be executed by mechanical means. They can also be performed with one end of the tube fixed, e.g. hung from a hook, while the other end of the tube is alternately lifted and lowered to a level respectively above and below the fixed end of the tube which, in this case, should however not rest on a supporting surface.

Modifications of the tubular device described above are of course possible within the scope of the invention. Thus, the tube need not be open or openable at any of its ends but may have a suitable opening provided between the ends. The tube may also serve as a package for the granular and/or pulverulent materials.

Claims

1. A method for mixing granular and/or pulverulent materials with each other and/or with a liquid, **characterised** by the steps of placing a batch (7) of the materials to be mixed in a tube (1) formed of a pliable web, and alternatively lifting the ends (2, 3) of the tube relative to said batch.
2. A method as claimed in claim 1, **characterised** in that a part of the tube (1) supporting the batch (7) is placed on a fixed supporting surface before commencing said alternate lifting which is carried out while maintaining part of the tube in contact with said supporting surface.
3. A method as claimed in claim 1 or 2, **characterised** in that the alternate lifting is performed by means of handles (4, 5) provided on each end (2, 3) of the tube (1).
4. Method as claimed in claim 3, **characterised** in that the alternate lifting is performed using holes (4, 5) through doubled portions of the tube (1) at the ends (2, 3) thereof.
5. Method as claimed in claim 3 or 4, **characterised** by the use of a tube (1) the ends (2, 3) of which are provided with stiffening strips (6).
6. A method as claimed in any one of claims 1-5, **characterised** in that the materials to be mixed are introduced through an open or openable end of the tube (1).
7. Method as claimed in claim 6, **characterised** by the use of a tube which is closed at its other end and serves as a package for the granular and/or pulverulent materials.
8. Method as claimed in any one of claims 1-7, **characterised** by the step of supporting the ends (2, 3) of the tube (1) by means of arms of a rocker having a leg supporting said arms, and performing said alternate lifting by tilting the rocker back and forth.
9. Method as claimed in any one of claims 1-8, **characterised** by the use of a tubular web consisting of a transparent material.
10. Method as claimed in claim 1, **characterised** by the use of a tube (1) having an opening provided between its ends (2, 3).

Patentansprüche

1. Verfahren zum Vermischen körniger und/oder feinpulvriger Stoffe miteinander und/oder mit einer Flüssigkeit, **gekennzeichnet** durch die Anbringung eines Satzes (7) der zu vermischenden Stoffe in einem aus einem biegbaren Tuch gebildeten Rohr (1) und durch das wechselseitige Anheben der Rohrenden (2, 3) im Verhältnis zum Satz.
2. Verfahren nach Anspruch 1, dadurch **gekennzeichnet**, dass ein Teil des den Satz (7) tragenden Rohrs (1) auf einer festen Tragfläche angebracht wird, bevor das wechselseitige Anheben eingeleitet wird, das ausgeführt wird, während ein Teil des Rohrs mit der Tragfläche in Berührung bleibt.

3. Verfahren nach Anspruch 1 oder 2, dadurch **gekennzeichnet**, dass das wechselseitige Anheben mit Hilfe von an jedem Ende (2, 3) des Rohrs (1) angeordneten Griffen (4, 5) ausgeführt wird.
4. Verfahren nach Anspruch 3, dadurch **gekennzeichnet**, dass das wechselseitige Anheben mit Hilfe von sich durch gefaltete Abschnitte des Rohrs (1) an dessen Enden (2, 3) erstreckenden Löchern (4, 5) ausgeführt wird.
5. Verfahren nach Anspruch 3 oder 4, **gekennzeichnet** durch die Verwendung eines Rohrs (1), dessen Enden (2, 3) mit versteifenden Leisten (6) versehen sind.
6. Verfahren nach einem der Ansprüche 1-5, dadurch **gekennzeichnet**, dass die zu vermischenen Stoffe durch ein offenes oder zu öffnendes Ende des Rohrs (1) eingebracht werden.
7. Verfahren nach Anspruch 6, **gekennzeichnet** durch die Verwendung eines Rohrs, das am anderen Ende geschlossen ist und als Verpackung für die körnigen und/oder feinpulverigen Stoffe dient.
8. Verfahren nach einem der Ansprüche 1-7, **gekennzeichnet** durch das Abstützen der Enden (2, 3) des Rohrs (1) mittels der Arme einer Wippe, die einen die Arme tragenden Schenkel aufweist, und durch das Ausführen des genannten wechselseitigen Anhebens durch Hin- und Herkippen der Wippe.
9. Verfahren nach einem der Ansprüche 1-8, **gekennzeichnet** durch die Verwendung eines rohrförmigen Tuchs aus einem transparenten Material.
10. Verfahren nach Anspruch 1, **gekennzeichnet** durch die Verwendung eines Rohrs (1) mit einer Öffnung zwischen seinen Enden (2, 3).

Revendications

1. Procédé pour mélanger des matières granulaires et/ou pulvérulentes entre elles et/ou avec un liquide, caractérisé par les phases consistant à placer une charge (7) des matières à mélanger dans un tube (1) formé d'une feuille souple, et à soulever alternativement les extrémités (2, 3) du tube par rapport à ladite charge.
2. Procédé selon la revendication 1, caractérisé en ce qu'on place une partie du tube (1) qui supporte la charge (7) sur une surface d'appui fixe avant

de commencer l'élévation alternée qui est exécutée tout en maintenant une partie du tube en contact avec ladite surface d'appui.

- 5 3. Procédé selon la revendication 1 ou 2, caractérisé en ce que l'élévation alternée est exécutée au moyen de poignées (4, 5) prévues respectivement aux deux extrémités (2, 3) du tube (1).
- 10 4. Procédé selon la revendication 3, caractérisé en ce que l'élévation alternée est exécutée à l'aide de trous (4, 5) percés à travers des portions retournées du tube (1) aux extrémités (2, 3) de ce tube.
- 15 5. Procédé selon la revendication 3 ou 4, caractérisé par l'utilisation d'un tube (1) dont les extrémités (2, 3) sont munies de bandes raidisseuses (6).
- 20 6. Procédé selon une quelconque des revendications 1 à 5, caractérisé en ce que les matières à mélanger sont introduites à travers une extrémité du tube (1) qui est ouverte ou susceptible d'être ouverte.
- 25 7. Procédé selon la revendication 6, caractérisé par l'utilisation d'un tube qui est fermé à son autre extrémité et qui sert d'emballage pour les matières granulaires et/ou pulvérulentes.
- 30 8. Procédé selon une quelconque des revendications 1 à 7, caractérisé par la phase consistant à supporter les extrémités (2, 3) du tube (1) à l'aide des bras d'une bascule possédant une branche qui supporte lesdits bras, et à exécuter l'élévation alternée en inclinant la bascule alternativement dans les deux sens.
- 35 9. Procédé selon une quelconque des revendications 1 à 8, caractérisé par l'utilisation d'une feuille tubulaire composée d'une matière transparente.
- 40 10. Procédé selon la revendication 1, caractérisé par l'utilisation d'un tube (1) présentant une ouverture placée entre ses deux extrémités (2, 3).
- 45

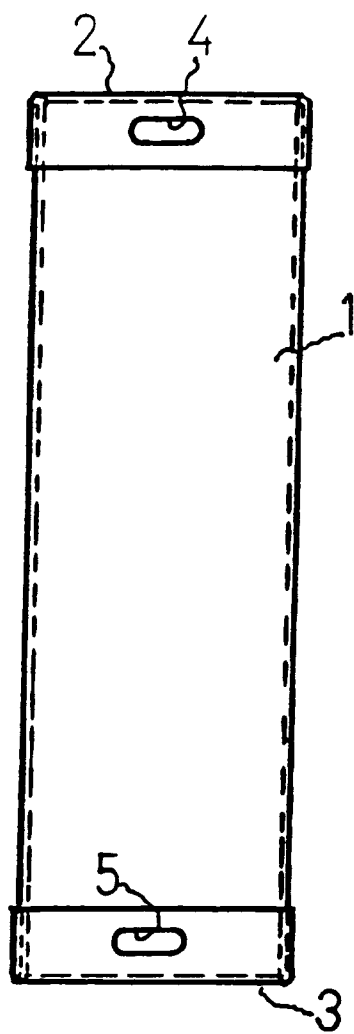


FIG 1

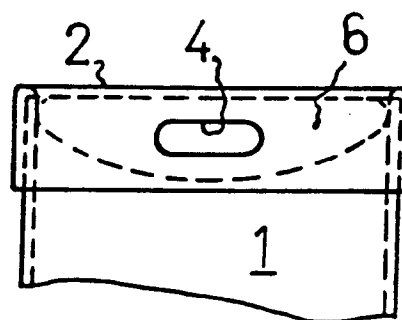


FIG 2

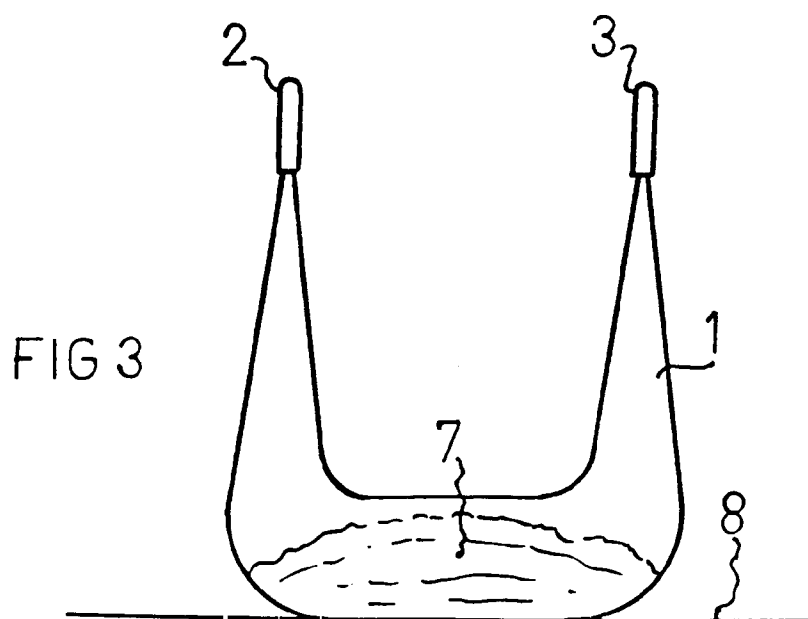


FIG 3

