MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A
COMMONWEALTH OF AUSTRALIA
Patents Act 1952-79

CONVENTION STANDARD
APPLICATION FOR A/PATENT

I, HALVOR GUDMUND FORBERG, of Hagabakken 2,
3250 Larvik, Norway,

hereby apply for the grant of a Patent for an invention entitled:

"Method of Mixing Particulate Components"

which is described in the accompanying complete specification.

This application is made under the provisions of Part XVI of the Patents Act 1952-79 and is based on an application for a patent or similar protection made in Norway on 25th July, 1978 (No. 782550)

My address for service is: F. B. Rice & Co., 101 Mort St., Balmain, NSW 2041

Dated this 1st day of August, 1979.

HALVOR GUDMUND FORBERG

by: ...........................................
Patent Attorney

To: The Commissioner of Patents,
Commonwealth of Australia.

F. B. RICE & CO.,
Patent Attorneys,
Sydney.
DECLARATION IN SUPPORT OF
AN APPLICATION
A CONVENTION APPLICATION FOR A
PATENT OR PATENT OF ADDITION

In support of the ________________________________________________________________________________

Convention Application made by

HALVOR GUDMUND FORBERG

49528/79

for a ________________________________________________________________________________________

patent

for an invention entitled "METHOD OF MIXING PARTICULATE

COMPONENTS"

HALVOR GUDMUND FORBERG of Bagabakken 2, 3250 Larvik,
do solemnly and sincerely declare as follows:

(1) I am/was the applicant for the __________________________________________________________________

patent

(1) I hereby declare

patent

for the ________________________________________________________________________________________

Convention Application

(2) The basic application as defined by Section __________________________________________________________________________

of the Act was

made in ________________________________________________________________________________________

on ________________________________________________________________________________________

by the present applicant

(3) HALVOR GUDMUND FORBERG of Bagabakken 2, 3250 Larvik.

I am the actual inventor of the invention upon which

W

I/are entitled to make the application are as follows:

The basic application referred to in paragraph 2 of this Declaration is/are the first application made in a Convention country in respect of the invention the subject of the application.

Declared at Larvik this 26th day of June 1979

Halvor Gudmund Forberg
1. A method of mixing particulate components, such as, for example, peat, fertilizer and lime, using a mixing machine which comprises a mixing chamber in which two shafts are disposed in the same horizontal plane and are provided with blades arranged at an angle to and parallel with the shafts, the shafts rotating in opposite directions with an upward movement on the side where the shafts turn toward one another, characterized in that the blades are given a peripheral rotational speed of at least 1.2 m/sec, and that the components, in powdered form, are filled into the machine to a filling height of at least up to the level of the shafts.
Complete Specification (Original)

Application Number:
Lodged:
Complete Specification Lodged:
    Accepted:
    Published:
Related Art:

Name of Applicant: HALVOR GUDMUND FORBERG

Address of Applicant: Hagabakken 2,
3250 LARVIK. NORWAY.

Actual Inventor: HALVOR GUDMUND FORBERG

Address for Service: F.B. RICE & CO.,
Patent Attorneys,
The Forth and Clyde,
101 Mort Street,
BALMAIN. 2041.

Complete Specification for the invention entitled:

"Method of Mixing Particulate Components"

The following statement is a full description of this invention including the best method of performing it known to me:
The invention pertains to a method of mixing particulate components such as, for example, peat, fertilizer and lime, utilizing a mixing machine which comprises a mixing chamber in which two shafts are disposed in the same horizontal plane and provided with blades arranged at an angle to and parallel with the shafts, said shafts rotating in opposite directions with an upward movement on the side where the shafts turn toward one another.

Various mixing apparatus are discussed in German Patent Publications 1,112,968, 1,097,411 and 1,116,196, where the purpose is to mix liquid substances that are sticky, and where it is thus desirable that the blades of the apparatus be covered by the materials during the entire rotation. The mixing itself takes place below the center of the shafts, and the particles which are to be mixed into the sticky, liquid substances are given so much energy that they are thrown from the center of the mixer to the outer wall.

The purpose of the present invention is to provide a method of mixing particulate components by which one can obtain a very homogeneous distribution of a small amount of one particulate material in a large quantity of another particulate material.

It is also a purpose of the invention to enable the effective mixture of heavy and lightweight substances, and in particular, dry substances.

Specifically, the purpose of the invention is to enable one to mix dry substances which have highly different densities effectively and in a short time. This is obtained in accordance with the invention by utilizing a mixing machine in which the particulate components are mixed by means of two counter-rotating shafts with blades, where some of the blades have different angles
of incidence and different blade areas in order thereby to obtain a good mixing of the said substances.

The invention thus pertains to a method of mixing particulate components such as, for example, peat, fertilizer and lime, utilizing a mixing machine which comprises a mixing chamber in which two shafts are arranged in the same horizontal plane, the shafts being provided with blades disposed at an angle to and parallel with the shafts, the shafts rotating in opposite directions with upward movements on the side where the shafts turn toward one another, and the method is characterized in that the blades are given a peripheral rotational velocity of at least 1.2 m/sec, and that the components, in powder form, are filled into the machine to a filling height of at least the level of the shafts.

With the use of such a mixing machine, one will obtain a circulating transport movement of the powdered components in the horizontal plane while simultaneously obtaining a lifting of the particulate components in the region between the shafts, thus obtaining a mixing zone in which the particulate components are in a turbulent, floating state, thereby resulting in a very good mixing effect.

One can obtain a mixture of, for example, peat, fertilizer and lime in as short a time as only 4 seconds with a charge of 400 liters, the entire mixing process thus being carried out much more rapidly than previously possible, and in addition comes the advantage that the mixture of the substances in question will be completely homogeneous, thus resulting in an improved product.

The method can of course be utilized for mixing any kind of particulate components whatsoever, where the aim is to obtain a homogeneous mixture.

The method of the invention will be explained in greater detail below in connection with the use of a favorable type of mixing machine.

A suitable mixing machine is shown in the accompanying drawings, where

Figure 1 shows the complete apparatus, seen from the side.
Figure 2 is a front view of the apparatus, and Figure 3 shows the mixing members of the apparatus. Figure 4 shows the zones which arise in the mixing machine when the method of the invention is used.

On all of the drawings, the same reference numerals are used to designate the same parts.

Through a hopper 1, peat, for example, is fed into a silo 2, from which a specified volume of peat passes via two pivotable trap doors 3 into a mixing chamber 4. At the same time, fertilizer, for example, from a hopper 5, and lime, for example, from a hopper 6, are added, by means of contactors, programming machinery and metering vessels which measure out the correct quantities of additive materials and a scoop which guides the materials into the mixing chamber. As soon as the correct quantities of material have been supplied to the chamber, the mixing begins. The mixing is effected by means of two counter-rotating shafts 7 and 8. Mounted on each shaft are two opposing pairs of blades 9 of a certain area, positioned 90° transverse of the centerline for the shafts and with the blade wings disposed at a 45° angle in relation to the shaft centerline. Also disposed on both shafts are two opposing pairs of blades 10, having the same blade area, disposed 90° transverse of the shaft centerline and with the blade wings at a 45° angle, but the supports 11 for the wings are displaced 90° in relation to the supports for the wings 9. At respective opposite ends of each shaft, an opposing pair of blades 12 is disposed, aligned with the pairs of blades 9, having the same blade area and also positioned 90° transverse of the shaft centerline, but with the blade wings twisted 55° instead of 45° in relation to the shaft centerline. At the other respective opposite ends of each shaft, a pair of blades 13 is disposed, positioned 90° transverse of the shaft centerline. The wings of this pair of blades, however, are not twisted relative to the shaft centerline, but are parallel to the centerline and have a smaller blade area than the other blades.

All of the opposing blade wings are disposed on the respective ends of their respective supports 11. After the components introduced into the chamber have been effectively
mixed by four different mixing movements, in that the mixture is
guided down over the blades, pushed to one side or the other
according to the direction of rotation, and thereafter led along
the shafts in both directions, trap doors 14 open and the mixture
falls down into a discharge chute 15.

In accordance with the method of the invention, the blades
are given a peripheral rotational velocity of at least 1.2 m/sec,
and the components, in powdered form, are filled into the machine
to a filling height of at least the level of the shafts. In this
manner, the components are made to undergo a special fluidizing
or floating effect. On Figure 4, two zones I and II are marked,
zone I designating the mixing zone which is obtained with the
method of the invention and zone II indicating the transport zone,
i.e., the transport in the mixing system occurs below the level
of the shafts and of the mixing itself, which takes place with
the components in a fluidized state and occurs in zone I. If the
peripheral rotational velocity of the blades is not held to at
least 1.2 m/sec, and preferably between 1.2 and 1.8 m/sec, the
powdered components will leave zone I and pass into the lateral
zones, where one would obtain an unfortunate centrifugal effect.
In that case, the heavier particles would be thrown to the side
and the lighter particles would fall in between, and the mixer
would then have a separator effect which is absolutely undesired.
In addition, the filling height in the machine must be at least
up to the level of the shafts, and preferably a little above, as
indicated by the dotted line III on Figure 4. If the fill level
is reduced or increased, one obtains a reduced mixing effect even
at the specified peripheral velocity. The reduced mixing zone
would also be supported by the air which is introduced into the
mixing zone at the specified peripheral speed of the blades.

In the preceding discussion, the invention has been
described with reference to a specific mixing machine, but this
should not be construed as limiting the embodiment of the method;
modifications could of course be carried out without exceeding
the scope of the invention as disclosed in the appurtenant patent
claim.
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A method of mixing particulate components, such as, for example, peat, fertilizer and lime, using a mixing machine which comprises a mixing chamber in which two shafts are disposed in the same horizontal plane and are provided with blades arranged at an angle to and parallel with the shafts, the shafts rotating in opposite directions with an upward movement on the side where the shafts turn toward one another, characterized in that the blades are given a peripheral rotational speed of at least 1.2 m/sec, and that the components, in powdered form, are filled into the machine to a filling height of at least up to the level of the shafts.

DATED this 1st day of August, 1979.

HALVOR GUDMUND FORBERG
Patent Attorneys for the Applicant:
F.B. RICE & CO.
Fig. 1.
Fig. 2.