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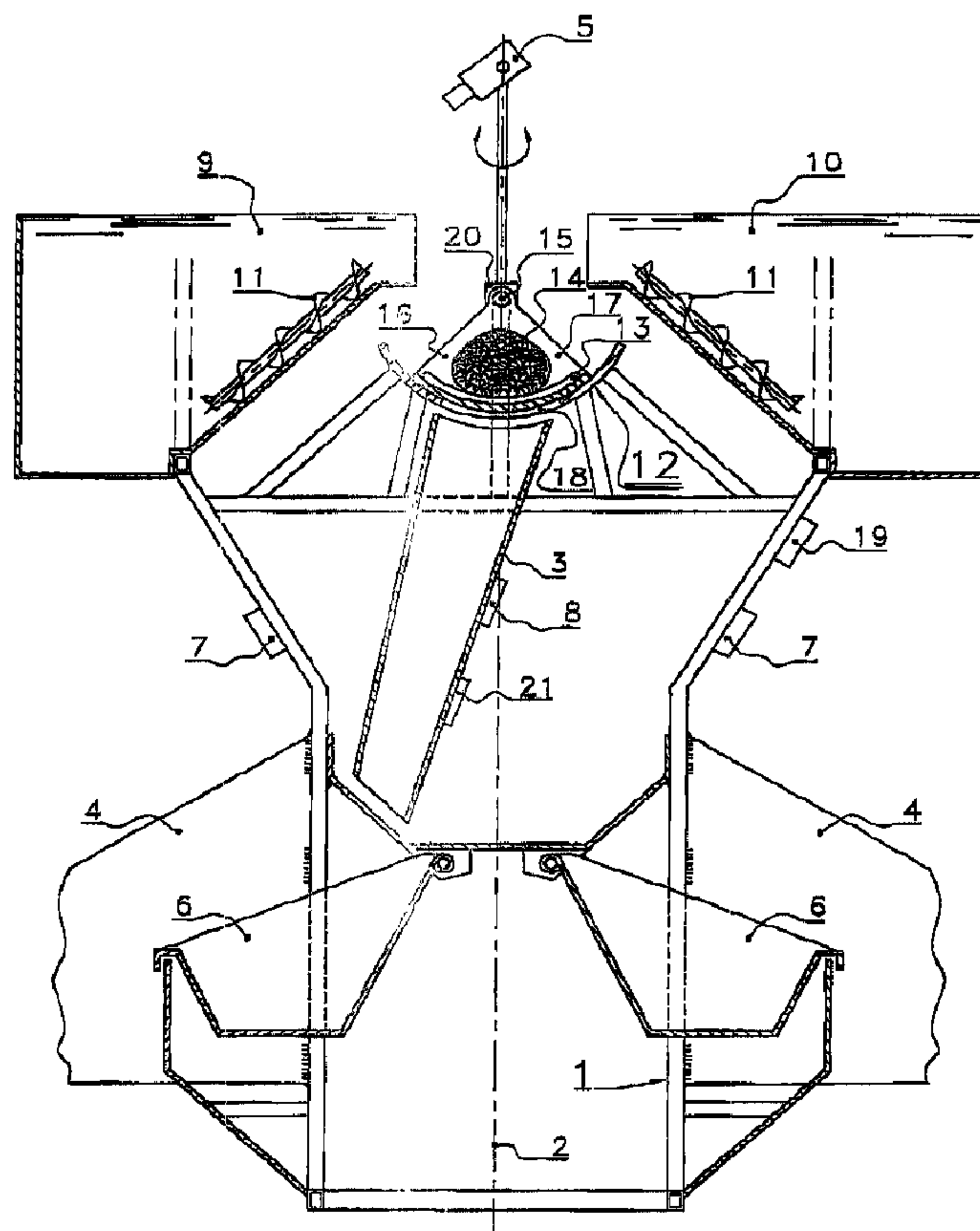
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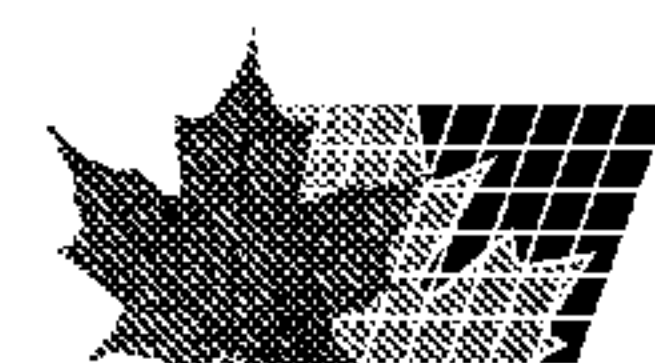
(54) Titre : DISPOSITIF DE DETERMINATION DE L'ADHESIVITE D'UN TYPE PARTICULIER D'ALIMENT

(54) Title: A DEVICE FOR DETERMINING THE ADHESIVENESS FACTOR OF A PARTICULAR SORT OF FEED



(57) Abrégé/Abstract:

A device for determining the adhesiveness factor of a particular sort of feed. The device is provided with a tube-chaped chute respectively a channel-shaped chute having a first end and a second end. The second end is located below the first end. A contact-determining means determines the moment of contact of an amount of the particular sort of feed with a first place of the



(57) **Abrégé(suite)/Abstract(continued):**

tube-shaped chute respectively the channel-shaped chute. A leaving-determining means determines the moment when the amount of the particular sort of feed leaves a second place of the tube-shaped chute respectively the channel-shaped chute, said second place being remote from the first place. A period-of-time-determining means determines the period of time between the moment of contact and the moment of leaving.

ABSTRACT

A DEVICE FOR DETERMINING THE ADHESIVENESS FACTOR OF A PARTICULAR SORT OF FEED

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A device for determining the adhesiveness factor of a particular sort of feed. The device is provided with a tube-shaped chute respectively a channel-shaped chute having a first end and a second end. The second end is located below the first end. A contact-determining means determines the moment of contact of an amount of the particular sort of feed with a first place of the tube-shaped chute respectively the channel-shaped chute. A leaving-determining means determines the moment when the amount of the particular sort of feed leaves a second place of the tube-shaped chute respectively the channel-shaped chute, said second place being remote from the first place. A period-of-time-determining means determines the period of time between the moment of contact and the moment of leaving.

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A DEVICE FOR DETERMINING THE ADHESIVENESS FACTOR OF A PARTICULAR SORT OF FEED

The invention relates to a device for determining
5 the adhesiveness factor of a particular sort of seed.

A device for supplying feed is known from Dutch patent application 1010898. Although this known device functions properly in practice, it appears that, in order to guarantee proper sanitary conditions of the device, a regular
10 cleaning of the device is desirable. This cleaning takes much time and entails costs, while the device cannot be used during cleaning.

It is an object of the invention to obviate the drawbacks related to the cleaning at least partially.

15 For that purpose the invention relates to a device for determining the adhesiveness factor of a particular sort of feed, the device being provided with a tube-shaped chute respectively a channel-shaped chute having a first end and a second end, the second end being located below the first end,
20 with a contact-determining means for determining the moment of contact of an amount of the particular sort of feed with a first place of the tube-shaped chute respectively the channel-shaped chute, with a leaving-determining means for determining the moment when the amount of the particular sort
25 of feed leaves a second place of the tube-shaped chute respectively the channel-shaped chute, said second place being remote from the first place, and with a period-of-time-determining means for determining the period of time between the moment of contact and the moment of leaving. Although the
30 adhesiveness factor can be estimated by a person, this estimation always remains subject to subjective determination criteria. By means of the device according to the invention it is possible to obtain a uniform and objective determination of the adhesiveness factor. In this case the
35 starting point is the fact that the adhesiveness of feed can

be determined by the time required by the feed for being moved under the influence of gravitational force over a certain distance through a tube-shaped chute respectively a channel-shaped chute. These data can be used when supplying
5 feed to an animal.

In this case the period-of-time-determining means is in particular suitable for storing and/or displaying the period of time.

Although it is possible to determine the
10 adhesiveness factor manually with the aid of the determined period of time, it is preferred when the period-of-time-determining means can be connected with a computer which is provided with a program for converting the period of time into an adhesiveness factor, the adhesiveness factor being
15 stored and/or displayed. Such a program may comprise a comparison program and/or a correspondence table and/or an algorithm.

For the purpose of simulating a measurement situation which can be compared with the device used in
20 practice for supplying feed to animals, it is preferred when the tube-shaped respectively a channel-shaped chute makes an angle with the horizontal, said angle being situated between 45° and 80° , preferably between 65° and 75° . An unequivocal determination of the adhesiveness factor is obtained when the
25 measurement is carried out at one standard angle, for example of 73° .

An unequivocal determination of the adhesiveness factor is obtained when the measurement is carried out by means of a tube-shaped chute respectively a channel-shaped
30 chute whose surface, which can be brought into contact with the amount of the particular sort of feed, has a predetermined friction coefficient. It is particularly advantageous and hygienic when the tube-shaped chute respectively the channel-shaped chute is made of stainless
35 steel.

Although the amount of feed can be placed manually on the tube-shaped chute respectively the channel-shaped chute it is advantageous, for obtaining an accurate measurement, when the device is provided with a hopper for
5 containing a stock of the particular sort of feed. As a result of this, substances present on a hand, such as sweat and the like, do not influence the measurement results. The device is preferably provided with a metering means for supplying a certain amount of feed in metered portions to the
10 tube-shaped chute respectively the channel-shaped chute. This makes it possible always to test the same amount of feed, which contributes to the accuracy of the measurement results.

The invention will now be further elucidated with
15 reference to an embodiment shown in the drawing in which:

Figure 1 is a schematic cross-section of an embodiment of a device according to the invention.

In the embodiment shown in Figure 1 a framework 1
20 is disposed around a central axis 2, said framework 1 having a substantially circular circumference. At the upper side of the framework 1 there are provided a number of hoppers 9, 10 (two of which are shown in the drawing). For that purpose not further shown facilities are fitted to the framework 1 for
25 placing the hoppers 9, 10. Each hopper 9, 10 can contain a particular sort of feed.

The framework 1 may be provided with partition walls 4 that are detachably fitted to the framework 1.

Feed troughs 6 for the animals are disposed in
30 circular arrangement in the lower part of the device. By means of the geometry of the device, in the embodiment shown constituted by a feeding column, it is achieved that the construction occupies little space, while the accessibility of the feeding column to the animals is optimal from all
35 directions.

The feeding column is further provided with conveying means comprising a first conveyor 11 and a second conveyor 3 for conveying feed from the hopper 9, respectively 10 to the relevant feed trough 6. The feed can be conveyed directly from the hoppers 9, 10 to the feed troughs 6. In the embodiment shown there is provided a receptacle 12, for example centrally arranged, which receptacle receives an amount of feed which is conveyed by the first conveyor 11 from the hopper 9, 10 to the receptacle 12. As a first conveyor 11, an auger, gripper, belt conveyor or any other device known per se for conveying feed can be used.

A second conveyor 3, preferably constituted by a tube-shaped chute respectively a channel-shaped chute, is suitable for conveying the amount of feed from the receptacle 12 to the relevant feed trough 6. For the purpose of conveying the feed to the relevant feed trough 6 it is advantageous when the tube-shaped chute 3 is rotatably mounted in the feeding column. The tube-shaped chute respectively a channel-shaped chute is preferably made of stainless steel.

The device is provided with a control device 19. Said control device 19 controls the components of the device in such a way that the sorts of feed are supplied to the feed trough 6 in order of increasing adhesiveness factor.

The order in which the sorts of feed are placed in the hoppers may correspond with the order of increasing adhesiveness of the feed. By controlling the components accordingly it can be ensured that the conveying means pass in order along the hoppers and consequently take the sorts of feed out of the hoppers in order of adhesiveness. In this situation it is advantageous when the control device 19 is provided with a computer comprising a memory with a correspondence table containing data in relation to the contents of the hoppers. Although this way of supplying feed

to the hoppers is possible, this has to be carried out very carefully in order to avoid errors in the feed supply.

Such errors are avoided when the device is provided with feed-determining means 5 for determining the sort of feed in a hopper 9, 10. Such feed-determining means may comprise for example an olfactometer, a colour meter or picture recognition equipment (such as described for example in U.S. patent 4,843,561). The control device 19 is provided with a computer comprising a memory with a correspondence table containing values in relation to the adhesiveness factor of the sorts of feed 13, 14. Thus, when the feed-determining means 5 have determined the sort of feed, the computer can simply determine the adhesiveness factor.

The control device 19 thus ensures that, at the supply of feed, the feed having the lowest adhesiveness is conveyed first by the conveying means. This feed, moving relatively fast due to the small adhesiveness, may have a sweeping respectively cleaning effect on the rests of feed being left from a previous supply of feed.

In the embodiment shown the device is provided with a container, in the embodiment shown for example the hopper 10, for containing at least substantially non-adhering, edible packaging material. Said packaging material may be constituted for example by dry feed, in particular grass.

The first conveyor 11 supplies a certain amount of said packaging material to the receptacle 12, where it will be situated as a kind of bed 13 on the bottom of the receptacle 12.

When the bed 13 has been laid on the bottom, the first conveyor 11 of the hopper 9 is driven for supplying a certain amount of for example rather adhesive or wet feed to the receptacle, where said amount of feed 14 will be situated on the bed 13.

For the purpose of conveying the package consisting of the bed 13 and the amount of feed 14 to the tube-shaped

chute pipe 3, the receptacle 12 is provided with a bottom which is designed to be opened. In the embodiment shown this is realised in that the bottom of the receptacle 12 has two halves 16 and 17 which are hingeable about an axis 15. When
5 the halves 16, 17 move away from each other, there is thus created a chute aperture 18 through which the package falls into the tube-shaped chute 3.

The control device 19, although another control device may serve as well for that purpose, controls the
10 opening of the bottom of the receptacle 12. Said control device 19 preferably also controls the operation sequence of the first and second conveyors 11 respectively 3, so that first the edible packaging material and then the amount of feed will come into in the receptacle 12.

15 Due to the fact that the amount of feed 14 lies on the bed 13 of packaging material, for example a grass bed, in the case that the feed is adhesive, at least substantially no parts of feed will adhere to the components of the device that could come into contact with the feed. Moreover, the
20 package of feed and packaging material remains interesting for an animal to eat.

An extremely hygienic use of the device is obtained when the receptacle 12 has such a shape that, when the package of feed 14 and the bed 13 of edible packaging
25 material falls through the bottom, the bed 13 of edible packaging material will surround at least partially the feed 14. In this situation there can be applied in particular receptacles 12 narrowing in downward direction, while a desired shape can simply be determined by standard "trial and
30 error" experiments.

There are provided identification means 7 for identifying an individual animal. In the embodiment shown the identification means 7 are fitted to the framework 1, but it will be obvious that the identification means can also be
35 disposed at other places, such as for example the feed

troughs 6. With the aid of the identification means 7 the identity of an animal present at a feed trough 6 is automatically established. By means of correspondence tables stored in the memory of for example the control device 19 the amount of feed intended for that animal can be supplied. By means of a weighing device 20 known per se this amount can be determined. With the aid of data from the animal identification means 7 the control device 19 further controls the movement of the tube-shaped chute 3, so that the latter is located above the correct feed trough 6. The control device 19 further controls the drive of the conveyors 11.

For determining the adhesiveness factor of a sort of feed a certain amount of a sort of feed is supplied to the tube-shaped chute respectively a channel-shaped chute 3. A contact-determining means 8 determines the moment of contact of an amount of the particular sort of feed with a first place of the tube-shaped chute respectively the channel-shaped chute 3. A leaving-determining means 21 determines the moment when the amount of the particular sort of feed leaves a second place of the tube-shaped chute respectively the channel-shaped chute 3, said second place being remote from the first place. The contact-determining means 8 and the leaving-determining means 21 can be connected with the control device 19, in particular the computer thereof, the latter determining as a period-of-time-determining means the period of time between the moment of contact and the moment of leaving. Said period of time can be stored and/or displayed.

The computer is provided with a program for converting the period of time into an adhesiveness factor, which adhesiveness factor can then be stored and/or displayed. For the purpose of measuring the adhesiveness factor in a uniform, reliable and reproducible manner, the tube-shaped chute respectively a channel-shaped chute is placed at an angle with the horizontal, said angle being

approximately 73° . In order to place the tube-shaped chute
respectively the channel-shaped chute in the measurement
position, there may be provided non-shown means (such as
cylinders) for adjusting the angle of the tube-shaped chute
5 respectively the channel-shaped chute. However, a standard
measurement angle may also be situated between 45° and 80° ,
preferably between 65° and 75° . Moreover it is advantageous
when the surface of the tube-shaped chute respectively the
channel-shaped chute which can be brought into contact with
10 the amount of the particular sort of feed has a predetermined
friction coefficient. As a result of this the computer has
not to be provided with calculation programs taking the
various parameters into account when determining the
adhesiveness factor.

CLAIMS

1. A device for determining the adhesiveness factor of a particular sort of feed (13, 14), the device being provided with a tube-shaped chute respectively a channel-shaped chute having a first end and a second end, the second end being located below the first end, with a contact-determining means for determining the moment of contact of an amount of the particular sort of feed with a first place of the tube-shaped chute respectively the channel-shaped chute, with a leaving-determining means for determining the moment when the amount of the particular sort of feed leaves a second place of the tube-shaped chute respectively the channel-shaped chute, said second place being remote from the first place, and with a period-of-time-determining means for determining the period of time between the moment of contact and the moment of leaving.
2. A device as claimed in claim 1, characterized in that the period-of-time-determining means stores and/or displays the period of time.
3. A device as claimed in claim 1 or 2, characterized in that the period-of-time-determining means can be connected with a computer provided with a program for converting the period of time into an adhesiveness factor, the adhesiveness factor being stored and/or displayed.
4. A device as claimed in any one of the preceding claims 1, 2, or 3, characterized in that the tube-shaped chute respectively a channel-shaped chute makes an angle with the horizontal, said angle being situated between 45° and 80° , preferably between 65° and 75° .
5. A device as claimed in any one of the preceding claims, characterized in that the surface of the tube-shaped chute respectively a channel-shaped chute which can be brought into contact with the amount of the particular sort of feed has a predetermined friction coefficient.

6. A device as claimed in any one of the preceding claims, **characterized in that** the tube-shaped chute respectively a channel-shaped chute is made of stainless steel.

5 7. A device as claimed in any one of the preceding claims, **characterized in that** the device is provided with a hopper (9, 10) for containing a stock of the particular sort of feed (13, 14).

8. A device as claimed in claim 7, **characterized in**
10 **that** the device is provided with a metering device for supplying a certain amount of feed in metered portions to the channel-shaped chute respectively the tube-shaped chute.

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