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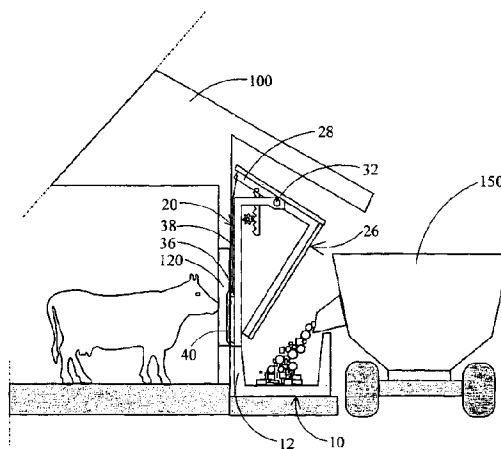
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(54) Title: CATTLE FEEDING APPARATUS



(57) Abstract: The invention relates to a feeding apparatus in a cattle building (100), placed in its entirety outside the outer wall line of the cattle building. The feeding apparatus comprises a trough (10) for livestock feed (200) and a turning element (26) protecting the trough from the weather. Animals in the cattle building can access the trough through a feeding aperture (120) in the outer wall. The turning element is jointed (32) onto the edge of the trough and/or the outer wall of the cattle building by means of L-shaped support elements (20). Thanks to the jointed attachment, the turning element can be turned away from above the trough so that feed can be added into the trough from outside the cattle building using a tractor-pulled feed dispenser wagon (150), for example. The feeding apparatus further comprises a safety device (36, 38, 40) which raises an animal's head away from the trough when feed is being dispensed. The apparatus can be equipped with a turning mechanism so that the turning element can be turned by means of an actuator. The components of the feeding apparatus can be advantageously manufactured as prefabricated elements and assembled on the cattle farm.



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## Cattle feeding apparatus

The invention relates to a feeding apparatus for feeding livestock in a cattle building, which feeding apparatus includes a trough for livestock feed placed outside the outer wall line of the cattle building and a wall-like movable turning element  
5 protecting the trough from the weather.

As cattle farms tend to get bigger and bigger as regards the quantity of livestock, farms need to obtain and handle ever larger amounts of coarse fodder to feed the livestock. Therefore, more and more farms have been compelled to mechanize the dispensation of feed by means of various waggons and feed dispensing devices. To  
10 an increasing extent, farms have begun using tractor-pulled feed dispenser waggons which can also be used to dispense concentrates in addition to coarse fodder or roughage. The waggons are equipped so as to be capable of mixing these feed components into a homogenous mixture, which is why such waggons are sometimes called compound feed waggons. Having mixed the feed the waggon dispenses it to  
15 the livestock by means of a moving belt placed transversely in the waggon.

Traditionally the feed has been dispensed to the livestock by pulling a compound feed waggon with a tractor along a feeding table inside the shed. This has imposed requirements on the width of the feeding lanes, for the waggon and tractor are very wide, and in the future they probably will be even wider. Animal safety concerns  
20 add to the width requirement of the feeding lane: for example, safety precautions have to be taken in order to prevent animals from sticking their tongues in the moving parts of the waggon when dispensing feed. Furthermore, to maintain good hygiene, the feed dispensed from the waggon must not get onto the same track with the bacteria-carrying wheels of the waggon, but it must be dropped completely  
25 outside the track of the waggon wheels. As these factors contribute to the width requirements of the feeding table, the shelters become wider and take more area and, hence, are more expensive to build. Moreover, pulling the feed waggon with a tractor inside the cattle building results in harmful exhaust gas emissions in the building.

30 Solutions are also known in which feed is dispensed to the livestock from outside the cattle building, through an aperture in the outer wall of the building. Such solutions, however, are rare applications implemented in individual farms, and are not in general use. Current solutions, in which feeding is realized from outside, require that the load-bearing outer wall line of the building be broken, which calls for

expensive extra structures in the building. Furthermore, the solutions have in practice proven unwieldy and have involved obvious shortcomings in animal safety.

5 A livestock feeding solution realized from outside the cattle building is known from the Finnish journal "Maito ja Me" 2/1999 pp. 17-18. In this solution the feed trough is placed outside the load-bearing outer wall line of the cattle building and the feed is dispensed into the trough by a feed-dispenser waggon moving outside the cattle building. In the solution, a panel protecting the trough is hinged onto the eaves structure of the cattle building so that the panel can be swung in for the duration of feed dispensation.

10 A drawback of this solution is its poor animal safety. The head of an animal may be caught between the edge of the inward-swinging panel and the edge of the trough, which may cause serious injury to the animal. Furthermore, the solution described is an application for a single particular cattle shelter, implemented on the site, wherefore its design and building costs are very high. Realization of the solution requires  
15 that the eaves structure of the cattle building be such that the swinging panel can be attached to it.

The object of the invention is to provide a novel prefabricated feeding apparatus for cattle buildings, eliminating the drawbacks and disadvantages associated with current feeding techniques.

20 The feeding apparatus according to the invention comprises a trough placed outside the load-bearing outer wall line of a cattle building, in which trough the livestock feed is dispensed. Animals in the cattle building can reach the feed in the trough through a feeding aperture in the outer wall of the cattle building. Above the trough there is a turning element which protects the trough from the weather. Thanks to the  
25 turning element, the conditions at the trough correspond to those inside the cattle building. The turning element can be turned so that feed can be added in the trough from outside the cattle building.

30 The basic idea of the invention is that the turning element is attached to the cattle building's load-bearing outer wall or other load-bearing vertical structures by means of support elements. The support elements make the attachment of the turning element simple, and there is no need to place any structural requirements on the eaves structures of the cattle building, for example.

In a preferred embodiment of the invention the components of the feeding apparatus, the turning element, support elements and the trough are prefabricated ele-

ments. Using prefabricated elements makes the construction of the feeding apparatus quick and simple.

5 In a second preferred embodiment of the invention the trough, turning element and support elements in the feeding apparatus are integrated into a single prefabricated feeding element. In this embodiment the installation of the feeding apparatus is done by placing a desired number of feeding elements parallelly on the outer wall line of the cattle building.

10 In a third preferred embodiment of the invention the feeding apparatus is equipped with a safety device protecting livestock from injury when the turning element is turned away from above the trough in order to add feed in the trough.

More precisely, a feeding apparatus according to the invention is characterized by that which is specified in the characterizing part of claim 1. Some preferred embodiments of the invention are presented in the dependent claims.

15 An advantage of the invention is that it saves in the building costs of the cattle building. As the feed can be dispensed to the animals from outside the building, there is no need to have a wide feeding table inside the building. Therefore, the cattle building can be made narrower.

20 Another advantage of the invention is that it is hygienic. The invention eliminates the necessity of driving a tractor and feed waggon inside the cattle building so that dirt and bacteria will not be carried into the building. Moreover, there will be no exhaust gas emissions in the cattle building.

A further advantage of the invention is that it is safe to animals. As there is no need to drive a tractor and feed waggon inside the cattle building, the risk of injury to livestock is reduced.

25 A yet further advantage of the invention is that the feeding apparatus is simple in structure and its components can be mass-produced advantageously into elements which will be assembled on the site.

The invention is below described more closely. Reference is made to the accompanying drawings in which

30 Fig. 1 shows by way of example a cross section of a feeding apparatus according to the invention when the apparatus is in the feeding position,

Fig. 2 shows by way of example a cross section of a feeding apparatus according to the invention when feed is being added in the feeding apparatus,

5 Fig. 3 shows by way of example a feeding apparatus according to the invention in a frontal view, and

Fig. 4 shows by way of example a cross section of a preferred embodiment of a feeding apparatus according to the invention.

Fig. 1 shows by way of example a cross section of a feeding apparatus according to the invention. The feeding apparatus comprises a trough 10 the cross sectional  
10 shape of which resembles the letter U and which comprises two sides, an inner side 12 and outer side 14. The trough is placed right next to the outer wall line 110 of the cattle building 100 so that the inner side 12 of the trough faces the outer wall line. The 'outer wall line' refers here to the load-bearing support structure line at the side of the cattle building supporting the roof structures of the cattle building. The outer  
15 wall may comprise a solid wall structure or a line of pillars, for example, where the spaces between the pillars are open. The trough 10 may be made of any suitable material such as concrete, wood, plastics, fiberglass or a composite material. The trough may be placed direct on leveled ground, or a special support structure, e.g. a concrete slab 130, may be placed below the trough.

20 The feeding apparatus comprises support elements 20 having a vertical rail 22 and horizontal rail 24, which support elements are advantageously made of a metal material and resemble an upside-down L. The support elements are attached by the downward-pointing end of the vertical rail 22 to the upward-pointing edge of the inner side 12 of the trough 10. The support elements are further attached to the load-  
25 bearing vertical structures of the outer wall line 110 of the cattle building in such a manner that the vertical rail 22 is placed against the outer wall line and the horizontal rail 24 of the support element is placed in an approximately horizontal position facing away from the outer wall line 110. The support elements may be attached to the framework of the outer wall line e.g. by means of bolts or, if the  
30 framework is metal, by welding. Fig. 1 is a cross-sectional view of the feeding apparatus so it only shows one support element. There are at least two support elements in the feeding apparatus, whereby there is one near each end of the trough 10. Advantageously there are several support elements and they are placed at suitable intervals along the whole length of the trough.

The feeding apparatus further comprises a turning element 26, which is a wall-like element the cross-sectional shape of which resembles an L. The framework of the turning element is comprised of L-shaped peripheral elements 27 advantageously made from metal tube profiles and comprising two shanks; a top shank 28 and side shank 30. The peripheral elements can be made not only of metal but also of some other suitable material such as wood, for example. The peripheral elements 27 are attached by the top shank 28 to the end of the horizontal rail 24 of the support element 20 by means of a joint pin 32. When the feeding apparatus is in the feeding position depicted in Fig. 1, the top shank of the peripheral element is in a substantially horizontal position and the side shank in a substantially vertical position.

Lining panels 34 are attached to the side surfaces of the top shank and side shank of the turning element, constituting the walls of the turning element. The lining panels may be made of any suitable plate-like material, say, building board. The lining panels may consist of the same homogenous material throughout, or they may comprise different layers of material. For instance, the surface of the lining panels may be metal or wood, and there may be thermal insulating material between the surface boards. Advantageously the lining panels are at least partly transparent material, such as acrylic plastic. Thanks to the thermally insulating lining panels the turning element 26 provides a shelter which covers the trough and protects it from the weather so that the conditions inside the feeding apparatus correspond to those in the cattle building. In warm countries, the lining panels in the turning element could comprise e.g. wind mesh which holds the wind but lets the cattle building to be ventilated through the walls of the turning element.

The feeding apparatus further comprises a safety device which forces the livestock to move away from the trough when feed is being added into the feeding apparatus. This prevents livestock injuries. The safety device comprises a blocking bar 36 connected to the end of the top shank 28 of the peripheral element 27 by means of a chain 38. A guide rail 40 is attached to the vertical rail 22 of the support element 20 at the feeding aperture 120 on the outer wall 110, leaving between the guide rail and vertical rail a gap slightly wider than the diameter of the blocking bar 36, to which gap the end of the blocking bar is fitted. The blocking bar can thus be moved up and down in the gap between the guide rail and vertical rail by lifting or lowering the chain 38. When the feeding apparatus is in the feeding position according to Fig. 1, the blocking bar is situated near the level of the upper surface of the inner side 12 of the trough 10, thus not preventing livestock from reaching the trough.

Fig. 1 further shows a turning mechanism by means of which the position of the turning element 26 can be changed. The turning mechanism comprises a shaft 42 parallel to the longitudinal direction of the cattle building, jointed onto the vertical rail of the support element 20, comprising toothed wheels 44 and toothed bars 46 attached to the top shanks 28 of the peripheral element 27. The toothed bars are placed against the toothed wheels 44 so that the rotational movement of the shaft 42 and the toothed wheel attached thereto causes the toothed bar attached to the top shank 28 of the turning element to ascend or descend, whereby the turning element 26 rotates around the joint pin 32. The mechanism further comprises an actuator 48 or motor (Fig. 3) to rotate the shaft 42. It is obvious to a person skilled in the art that the turning mechanism needn't be just like the mechanism shown in Fig. 1, but it may also be another kind of mechanism, such as an electromechanical or hydraulic mechanism. Moreover, the feeding apparatus does not necessarily have to have a turning mechanism but indeed can be realized without one. In that case the turning element is operated manually.

Fig. 1 shows feeding apertures 120 in the outer wall line 110 of the cattle building through which the livestock in the building can reach the feed 200 in the trough. The outer wall line may also be realized so that there is no solid wall structure at the wall line but only vertical structures supporting the roof structure of the building. In that case the feeding apertures 120 are in practice as large as the whole outer wall line 110 and the wall of the turning element 26 in the feeding apparatus serves as the outer wall of the cattle building, providing thermal insulation and protection from the weather.

Fig. 2 shows by way of example a cross-sectional drawing of a feeding apparatus according to the invention when feed 200 is being added into the feeding apparatus. For the duration of adding the feed the turning element 26 in the feeding apparatus is turned into the tilted position shown in Fig. 2. This position is reached by rotating the turning element around the joint pin 32. Rotation of the turning element can be done manually or by means of a turning mechanism in the manner described in conjunction with Fig. 1. Tilting the turning element causes the top shank 28 of the turning element to rise, whereby the chain 38 attached to the end of the top shank lifts the blocking bar 36 up. The lifting up of the blocking bar forces the animal to raise its head from the trough 10 so that the edge of the turning element moving towards the inner side 12 of the trough will not hit the animal.

When the turning element 26 of the feeding apparatus is in the tilted position according to Fig. 2, feed can be easily added into the trough 10 from outside the

cattle building. Addition of feed can be done advantageously by means of a tractor-pulled feed dispenser waggon 150. When the feed has been dispensed, the turning element is rotated back to the feeding position shown in Fig. 1.

5 Fig. 3 shows by way of example a side view of a cattle building 100 against the outer wall 110 of which there has been installed a feeding apparatus according to the invention. The trough 10, turning element 26 and turning mechanism in the feeding apparatus can be advantageously manufactured at an element plant to produce prefabricated elements of the same width. The support elements supporting the turning element may also be prefabricated elements. Assembly of the feeding  
10 apparatus is done on the cattle farm, where a desired number of prefabricated elements are placed in parallel against the outer wall line of the cattle building, and solid walls are built at the ends of the feeding apparatus. The shafts 42 of the turning mechanism are connected by means of coupling parts into one single shaft connected to the actuator 48. This way, the whole feeding apparatus at the side of the  
15 cattle building can be opened for addition of feed at once. The prefabricated elements of the feeding apparatus can be packed in a very small space so that transportation and storage of the elements is inexpensive. Not all parts of the feeding apparatus need be prefabricated elements, but some of them can be constructed on the site. For example, the trough 10 can be cast in concrete on the  
20 site, and prefabricated support elements and turning elements can be attached thereto.

Fig. 4 shows by way of example a cross section of a preferred embodiment of a feeding apparatus according to the invention, where the support elements 20, turning element 26 and trough 10 are integrated into one single feeding element 60. The  
25 feeding element is thus a prefabricated component, and a desired number of these components are placed side by side along the outer wall line of the cattle building. When the feeding elements have been installed, the turning mechanism for the turning element 26 is installed, whereafter the feeding apparatus is completed and ready to operate. In Fig. 4 the angle between the top shank 28 and side shank 30 of the turning element 26 is clearly more than 90 degrees. The lining panel 34 attached  
30 to the top shank is made of a watertight material, providing a slanting roof for the feeding element. This way the eaves of the cattle building 100 need not be so long as to protect the feeding element from rain. This is advantageous especially when feeding elements are installed in existing cattle buildings, avoiding the need for  
35 expensive and laborious alteration work on the eaves structures.



In Fig. 4 the feeding elements are not installed in direct contact with the load-bearing outer wall line 110 of the cattle building, but a U-shaped fitting element 62 made from a metal profile has been first attached to the wall line, whereafter the feeding elements 60 are attached by the vertical rail 22 of the support element to the vertical side of the fitting element. By using suitable fitting elements a straight attachment line can always be provided for the feeding elements even if the outer wall line itself were not straight. Fitting elements may also be used when there are on the outer surface of the outer wall line equipment or parts which prevent direct attachment of the feeding element onto the outer wall line. The length of the feeding element can be chosen freely. In cattle buildings with framed designs the length of the feeding element is advantageously equal to the distance of adjacent framed structures.

The surface 64 of the trough 10 in the feeding element 60 shown in Fig. 4 consists of a hard and wear-resistant material such as metal plate or reinforced plastic, for example. In between the surface sections of the trough there is some light and porous filling material 66, which may be e.g. cellular plastic. Thanks to the lightness of the filling material the trough 10 and the whole feeding element 60 is light so that the feeding element can be installed and moved around without special tools or heavy lifting apparatus. Because of the lightness of the feeding element, the trough 10 in the feeding element need not necessarily be placed on the ground but the bottom surface of the trough may be above the ground. Thus the whole weight of the feeding element is transferred onto the outer wall line 110 of the cattle building via the support elements 20 and fitting elements 62. Therefore it is not necessary to provide a separate foundation for the feeding apparatus, thus saving in building costs. Furthermore, as the trough is above the ground, possible soil frosting in winter will not damage the feeding apparatus or cause malfunctioning therein.

The livestock feeding apparatus described above finds particular utility as a feeding apparatus for neat cattle, but it can be used for feeding all livestock or domestic animals raised in animal shelters.

Above it was described some preferred embodiments of a feeding apparatus according to the invention. The invention is not limited to the solutions described above but the inventional idea may be applied in numerous ways within the scope defined by the claims.

## Claims

1. A feeding apparatus for feeding animals in a cattle building (100), which feeding apparatus comprises a trough (10) for livestock feed (200), placed outside the load-bearing outer wall line (110) of the cattle building, and a wall-like movable turning element (26) protecting the trough (10) from the weather, **characterized** in that the turning element (26) is arranged so as to be attached to the outer wall line (110) of the cattle building (100).  
5
2. A feeding apparatus according to claim 1, **characterized** in that the feeding apparatus comprises support elements (20) for attaching the turning element (26) to the outer wall line (110).  
10
3. A feeding apparatus according to claim 2, **characterized** in that the support elements (20) comprise a vertical rail (22) and horizontal rail (24) and the support elements are attached by the end of the vertical rail to the trough (10) and/or by the side of the vertical rail to the outer wall line (110) of the cattle building (100).
- 15 4. A feeding apparatus according to any one of claims 1 to 3, **characterized** in that the turning element (26) comprises peripheral elements (27) and lining panels (34) attached to the peripheral elements.
5. A feeding apparatus according to claim 4, **characterized** in that the lining panels (34) are made of a thermally insulating material.
- 20 6. A feeding apparatus according to claim 4, **characterized** in that at least part of the lining panels (34) are made of a transparent material.
7. A feeding apparatus according to any one of claims 3 to 5, **characterized** in that the turning element (26) is jointed (32) onto the horizontal rail (24) of the supporting element (20).
- 25 8. A feeding apparatus according to any one of claims 1 to 7, **characterized** in that the feeding apparatus further comprises a turning mechanism to move the turning element (26) away from above the trough (10).
9. A feeding apparatus according to claim 8, **characterized** in that the turning mechanism comprises a shaft (42), toothed wheels (44) attached to the shaft, toothed bars (46) attached to the turning element (26), and an actuator (48) for rotating the shaft.  
30

10. A feeding apparatus according to any one of claims 1 to 9, **characterized** in that the feeding apparatus further comprises a safety device to move the animal's head away from the trough (10).
11. A feeding apparatus according to claim 10, **characterized** in that the safety device comprises a blocking bar (36) arranged so as to be lifted upwards when the turning element (26) is tilted away from above the trough (10).
12. A feeding apparatus according to any one of claims 1 to 11, **characterized** in that the feeding apparatus is manufactured from prefabricated components or elements.
13. A feeding apparatus according to any one of claims 2 to 12, **characterized** in that the trough (10), turning element (26) and support elements (20) are integrated into one single ready-to-install feeding element (60).

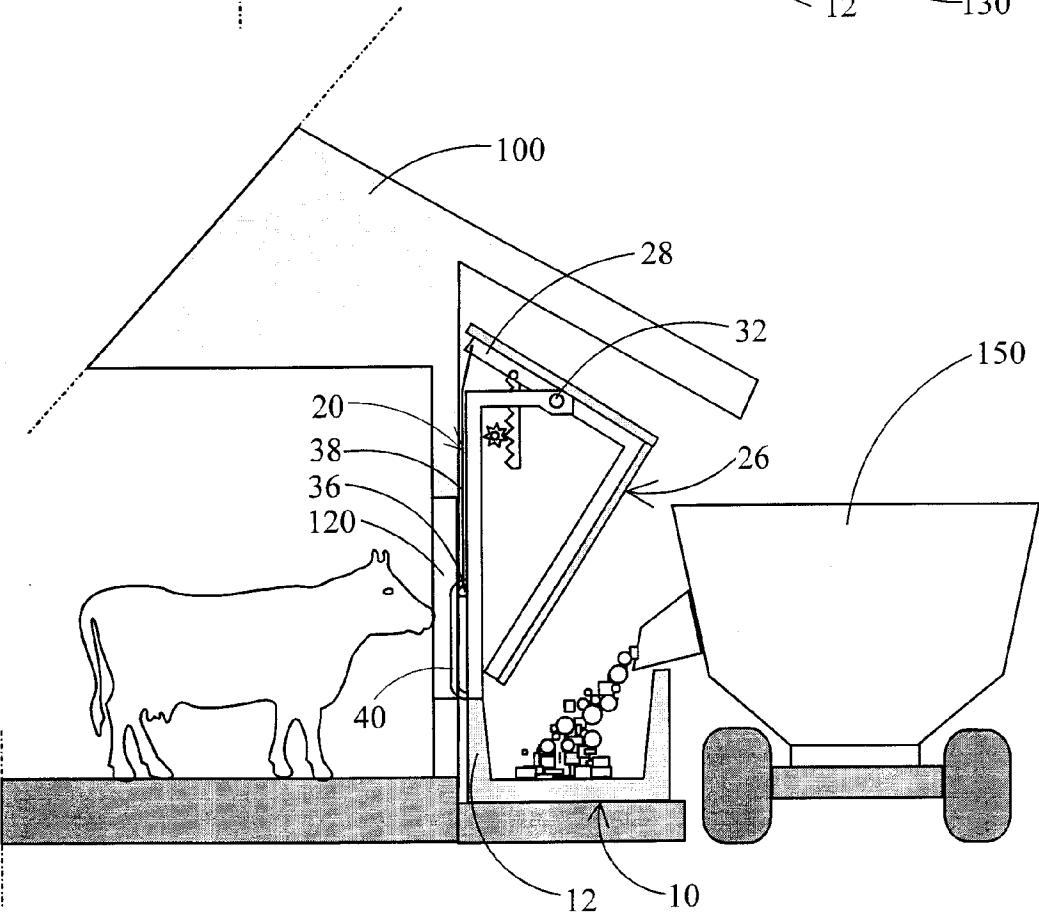
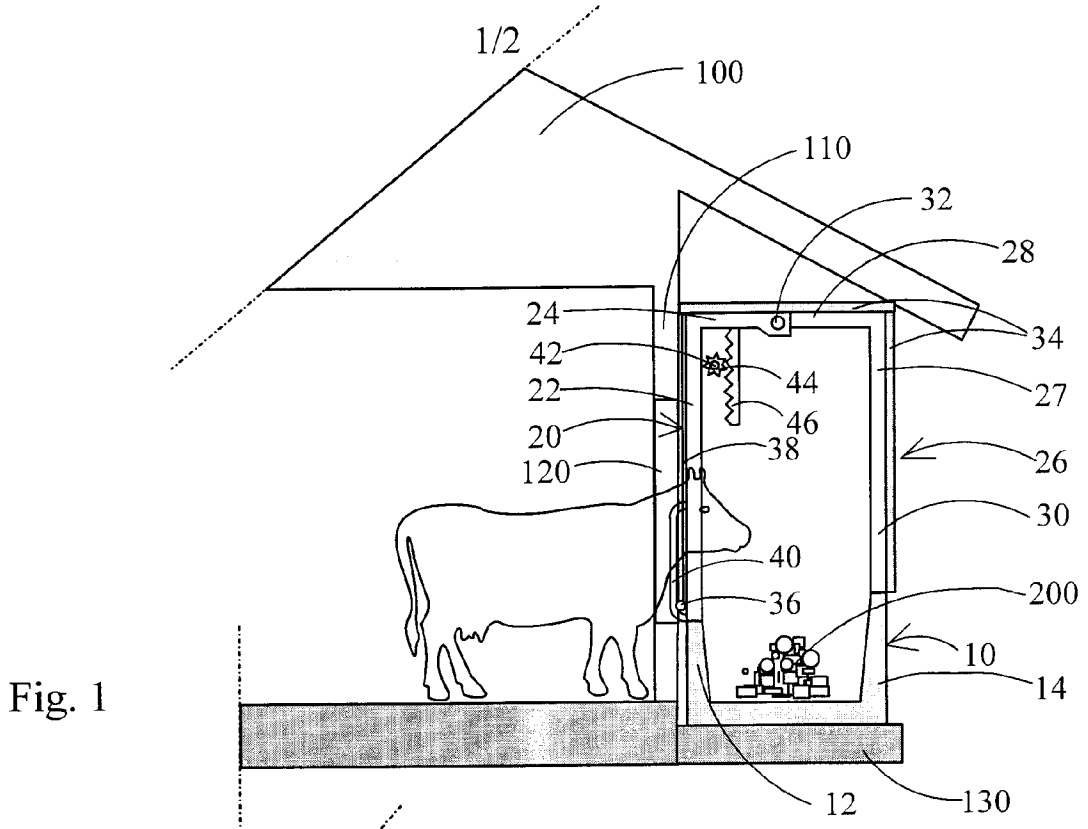


Fig. 2

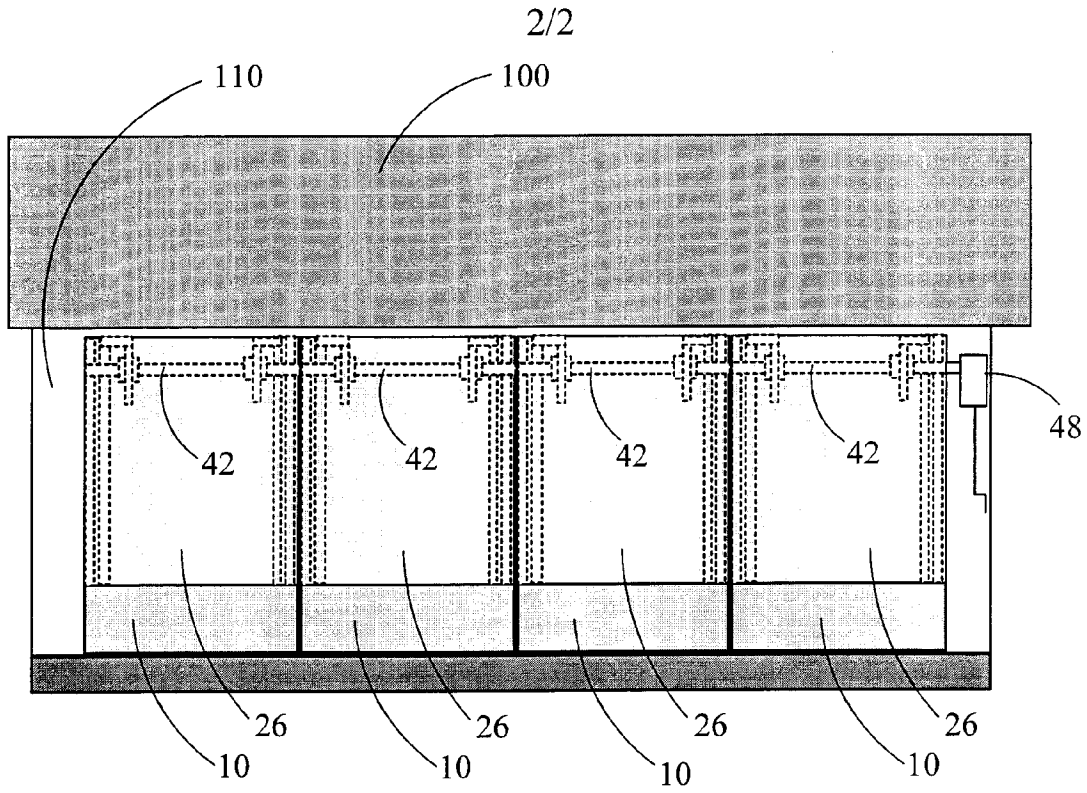


Fig. 3

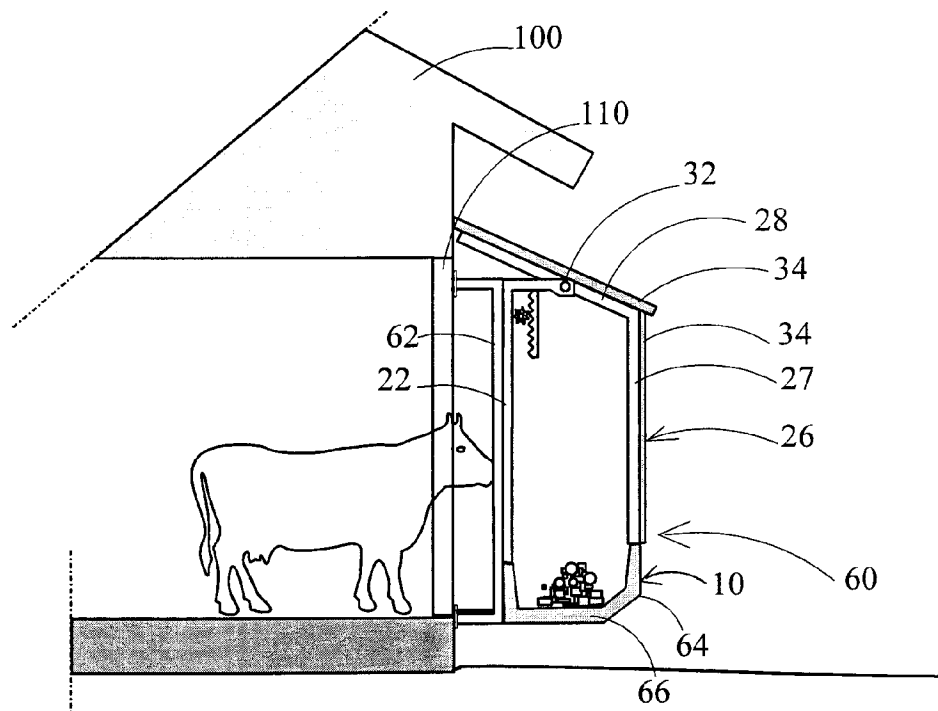


Fig. 4

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 01/00245

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A01K 1/10

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A01K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 936653 A (RUDOLFH BURTON FIELDING), 11 Sept 1963 (11.09.63), page 1, line 12 - line 62; page 2, line 127 - page 3, line 2 --	1,2,12,13
A	CH 139110 A (JULES RUEDIN-RUEDIN), 16 June 1930 (16.06.30), claim 9 --	10
X	CH 186184 A (HANS FREI), 16 November 1936 (16.11.36), claim 1 -- -----	1,2

 Further documents are listed in the continuation of Box C. See patent family annex.

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INTERNATIONAL SEARCH REPORT  
Information on patent family members

International application No.  
PCT/FI 01/00245

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 936653 A	11/09/63	NONE	
CH 139110 A	16/06/30	NONE	
CH 186184 A	16/11/36	NONE	