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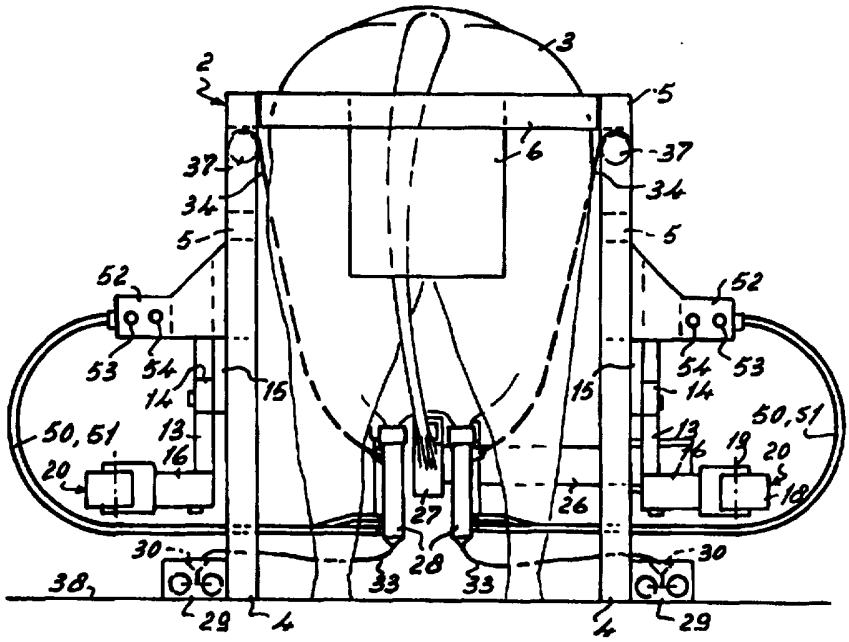
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(57) Abstract

The invention relates to an implement for milking animals, such as cows, comprising one or more milking robots (11) with one or more teat cups (28) and using one or more milking parlours (1). In the above implement, the teat cups (28) are provided with means of transport, with the aid of which a teat cup (28) during the movement to a teat cup carrier (29) is kept in an approximately upright position. To realize this, the means of transport comprise at leat two cables (33; 34) connected with the teat cups (28), where one cable (33) extends essentially horizontally and one cable (34) extends essentially vertically.

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AN IMPLEMENT FOR AND A METHOD OF MILKING ANIMALS

The present invention relates to an implement for milking animals, such as cows, comprising one or more milking robots with teat cups and using one or more milking parlours.

Such implements are well-known.

With an implement of the above-mentioned type it is not always possible to prevent the environment in which the milking robot is operating from becoming polluted. Especially the faeces of the animals can pollute the floor of the milking parlour. Particularly when the upper ends of the teat cups come into contact with the floor of the milking parlour, the milk may become contaminated. The latter may result in that the milk deteriorates in quality. Of course, this is highly undesirable, because lower grade milk may mean to the farmer a lower price.

The invention has for its objective to provide an implement of the above type where the above disadvantage does not occur or is at least considerably reduced.

According to the invention, this is achieved by the fact that a teat cup is provided with one or more cables or similar means of transport, with the aid of which the teat cup during the movement to a teat cup carrier is kept in an approximately upright position.

According to a feature of the invention, the teat cup is continuously or virtually continuously kept in an approximately upright position when it is moving to the teat cup carrier and when it is being disconnected from a teat. By this it is achieved that the upper end of the teat cup does not

easily come into contact with the floor of the milking parlour, which may result in an improvement in the milk quality. In an exemplary embodiment of the invention, the means of transport comprise at least two cables connected with the teat cup. Accordingly, the invention also relates to an implement for milking animals, such as cows, using one or more milking robots with one or more teat cups and comprising one or more milking parlours, characterized in that a teat cup is provided with at least two cables connected with the teat cup. According to a further feature of the invention, one cable extends essentially horizontally and one cable extends essentially vertically. In this manner, the teat cups can be fastened in the implement in a simple, inexpensive, but sound way. According to a further feature of the invention, the teat cup is provided with a cable fastening near the upper end and near the lower end. Accordingly, the invention also relates to an implement for milking animals, such as cows, using one or more milking robots with teat cups and using one or more milking parlours, characterized in that the teat cup is provided with a cable fastening near the upper end and one near the lower end. According to a further feature of the invention, the cable extending essentially vertically has one end connected with a cable fastening provided on the milking parlour and the other end connected with the cable fastening provided near the upper side of the teat cup. According to another feature of the invention, the essentially horizontally extending cable has one end secured to a withdrawing member disposed near the milking parlour and the other end secured to the cable fastening disposed near the underside of the teat cup. When the teat cup is to be disconnected from the teat, the relevant teat cup can then be moved virtually horizontally to a side of the milking parlour by means of a withdrawing member and the cables.

According to a feature of the invention, the cable fastening for the essentially vertically extending cable is disposed on a frame beam extending in the longitudinal direction of the milking parlour. According to a further feature of the invention, the cable fastening is placed at approximately 1/4 of the total length of the milking parlour as measured from

the rear side of the milking parlour. The afore-mentioned cable fastening is, according to still another further feature of the invention, disposed near the top side of the milking parlour, preferably at a height of at least 1 m as measured from the floor of the milking parlour.

According to another aspect of the invention, the cable fastening of the essentially horizontally extending cable is disposed on a pneumatic cylinder of the withdrawing member. According to a further feature of the invention, the pneumatic cylinder is disposed close to the floor of the milking parlour and extends in the longitudinal direction of the milking parlour. In the exemplary embodiment of the invention, on both sides of the milking parlours there are provided two cylinders, each comprising a cable fastening.

According to a further feature of the invention, the implement comprises stands where the teat cups are placed upon completion of the milking and at least two robot arms, each provided with a gripper, with the aid of which the teat cups can be coupled to the teats. Accordingly, the invention further relates to an implement for milking animals, such as cows, using one or more milking robots with teat cups and using one or more milking parlours, characterized in that the implement comprises stands where the teat cups are placed upon completion of the milking and at least two robot arms provided with a gripper, with the aid of which the teat cups can be coupled to the teats. In the exemplary embodiment of the invention, according to a feature of the invention, on each longitudinal side of the milking parlour there is provided a robot arm. The two robot arms are capable of being active simultaneously and, accordingly, capable of connecting two teat cups simultaneously. In this manner it is achieved that in a relatively short time the teat cups can be connected to the teats of an animal to be milked.

In order to realize a sound coupling between a gripper and a teat cup, the gripper comprises an electromagnet and the gripper is provided with a seating recess curved in accordance with the shell of a teat cup. The teat cup is capable of being firmly and rapidly seized simply by energizing

the electromagnet, and it is simply disengaged by de-energizing the electromagnet.

According to a further feature of the invention, the stands where the teat cups are placed upon completion of the milking comprise a holder provided with a conical seating corresponding with the conical shape of the underside of the teat cup. By means of the conical seating it is possible to arrange a teat cup in one and the same position on the holder each time after milking. Due to the fact that the teat cups are arranged in a pre-defined position of rest on the holder, the teat cups are capable of being seized simply and efficiently by the gripper. According to a feature of the invention, a holder having two seatings is disposed close to each longitudinal side of the milking parlour.

According to still another aspect of the invention, near the central portion of the seating in the holder there is provided a hole, through which the essentially horizontally extending cable is led, the arrangement being such that in the holder the cable extends in the longitudinal direction of the milking parlour to the cable fastening of the pneumatic cylinder.

According to a feature of the invention, the implement comprises a robot arm equipped with a detector, such as a laser sensor, to locate the positions of the teats of an animal to be milked.

The invention will now be further explained with reference to the accompanying drawings, in which:

Figure 1 is a plan view of an implement for milking animals, which is provided with a milking robot having on each longitudinal side a gripper for seizing the teat cups;

Figure 2 shows a side view of the implement for milking animals according to Figure 1, where the means of transport, through which the teat cups are kept in an upright attitude when travelling, are clearly visible;

Figure 3 shows the implement for milking animals during operation, as viewed in the direction of the arrow III in Figure 1;

Figure 4 shows the implement for milking animals, as

shown in Figures 1 and 2, in non-operating condition;

Figure 5 shows an enlargement of a detail of the gripper of the milking robot as well as a teat cup, and

Figure 6 is a top view of a section taken on the line VI-VI in Figure 5.

Figure 1 shows a plan view of a milking parlour 1 with a fencing 2 enclosing an animal, a cow in the present case. As is depicted in Figure 2, the fencing 2 comprises posts 4 and, in between them, cross beams 5 situated at a certain distance and parallel to each other. The milking parlour 1 is provided with an entrance door 6 on the rear side and an exit door 7 on the longitudinal side. On a cross beam 5 near the front side of the milking parlour 1 there is also provided a feed trough 8, wherein the animal 3 can be given concentrates. For identification of the animal 3, round the neck of the animal there is provided a collar 9 with a transmitter 10 which operates in conjunction with an animal recognition system (not shown).

In the vicinity of the milking parlour 1 there is furthermore provided a milking robot 11 which comprises a robot arm 12 on each longitudinal side of the milking parlour 1. On the robot arm 12 there is provided a vertical support 13 which is connected with a parallelogram-type hinged arm construction 14. The other end of the parallelogram-type hinged arm construction 14 is connected with a likewise vertically disposed supporting beam 15 connected with a cross beam 5 of the fencing 2. The robot arm 12 is capable of being moved vertically by means of a cylinder (not shown). The robot arm 12 comprises a first arm part 16 and a second arm part 18 capable of pivoting about a vertical shaft 17. On the end of the second arm part 18 there is provided a gripper 20 capable of rotating about a vertical shaft 19. A further robot arm 21 is mounted on the longitudinal side of the milking parlour 1 which is opposite to the exit door 7. The further robot arm 21 comprises a first arm part 22, of which one end is pivotably mounted on a vertical shaft 23 with a fork 24 fixedly connected with a post 4 of the milking parlour 1. The other end of the first arm part 22 is pivotably mounted on a vertical shaft 25 with a

second arm part 26, whose end is provided with a detector 27 for finding the teat positions of the animal 3. In the present embodiment of the invention, the sensor 27 is designed as a laser detector and it is capable of being swung through an angle of approximately 150°.

Further, the milking robot 11 is equipped with four teat cups 28, which are arranged on a teat cup carrier 29 (Figure 4) in pairs on both sides of the milking parlour when the milking robot 11 is out of operation. The teat cup carrier or holder 29 is provided with a conical seating 30 corresponding with the lowermost conical part of a teat cup 28. In the present exemplary embodiment, on the two longitudinal sides of the milking parlour 1 there is provided a holder 29 having two conical recesses 30 situated behind each other as seen in the longitudinal direction of the milking parlour 1 on the floor beside the milking parlour 1.

Each teat cup 28 is also provided with means of transport 32, with the aid of which the respective teat cup 28 is kept continuously or virtually continuously in an approximately vertical position during the teat cup 28 movement to the teat cup carrier 29 and during the disconnection from the teat. As Figure 4 shows, the means of transport 32 comprise a cable 33 extending essentially horizontally and a cable 34 extending essentially vertically. The vertical cable 34 has one end connected with a cable fastening 35 which is disposed near the top side of the teat cup 28, on the shell 36 of the teat cup 28 (Figure 5). The other end of the vertical cable 34 is connected with a cable fastening 37 which is disposed on a cross beam 5 of the fencing 2. The cable fastening 37 is a cylindrical body which also constitutes a guide for the end of the vertical cable 34. The length of the vertical cable 34 is dimensioned such that the upper part of the teat cup 28 can not come into contact with the floor 38 of the milking parlour 1. In the conical part 31 on the underside of the teat cup 28 there is provided a cable fastening 39, by means of which one end of the horizontal cable 33 is connected with the teat cup 28. As is shown in Figure 5, the horizontal cable 33 passes through a hole 40 in the teat cup carrier 29. The hole 40 has

a first vertical part 41 which is provided in the centre of the conical seating 30 and, perpendicular to the first part 41, a second part 42 extending in the longitudinal direction of the milking parlour 1. The two horizontal cables 33 of one pair of teat cups 28 leave the teat cup carrier 29 approximately parallel to each other and extend in the longitudinal direction of the milking parlour to the withdrawing members 43. In the present exemplary embodiment of the invention, the withdrawing members 43 are designed as pneumatic cylinders, but they may also be hydraulic cylinders or electric equivalents of cylinders. On each longitudinal side of the milking parlour 1, in the exemplary embodiment of the invention, there are provided two pneumatic cylinders 44 side by side and parallel to each other. The cylinders 44 have the rear side of the cylinder housing connected with a strip 45 fixedly connected with a post 4 of the fencing 2. The end of the piston rod 46 of the pneumatic cylinder 44 comprises a cable fastening to which the horizontal cable 33 is fastened. In order to be able to apply a pneumatic cylinder 44 as compact as possible in the implement and to have still the possibility of paying off the horizontal cable sufficiently, a pulley mechanism 48 is used in the present embodiment of the invention. The pulley mechanism 48 comprises a roller guide designed as a cable fastening 47 surrounded by the horizontal cable 33 disposed in a loop and a vertical shaft 49, to which the end of the horizontal cable 33 is fastened.

The teat cups 28 are further provided with a milk tube 50 and a pulsation tube 51, which extend from the teat cup 28 in a loop, transversely to the longitudinal direction of the milking parlour 1, to a collector block 52. The collector block 52 is fitted on a cross beam 5 of the fencing 2. The loops in the milk tube 50 and the pulsation tube 51 are dimensioned such that the teat cups 28 are capable of moving from the position of rest on the teat cup carrier 29 as shown in Figure 4 to underneath the udder of the animal 3 as shown in Figure 3. Due to that the tubes 50 and 51 are fastened to the teat cups 28 through a loop, the animal is permitted to move during milking without the teat cups 28 being disconnected. The collector

block 52 is furthermore provided with a milk discharge line 53 for removing the milk obtained and a vacuum line 54 for the vacuum required during milking.

The gripper 20 comprises a block-shaped holder 55 which is rotatable about the vertical shaft 19 and which is, at the end, provided with a recess 56 (Figures 5 and 6) curved in accordance with the shell 36 of a teat cup 28. In the vicinity of the curved recess 56, in the block-shaped holder 55, there is provided a curved electromagnet 57 which may be energized or not.

The operation of the construction with the implement for milking animals as set forth hereinbefore is as follows:

After an animal 3 has entered the milking parlour 1 through the entrance door 6, the animal 3 is automatically identified by the animal recognition system by means of the transmitter 10. After the animal 3 has been identified by the animal recognition system, an amount of concentrates in the feed trough 8 may be supplied to the animal 3. Subsequently, by means of a (non-shown) computer, the robot arm 21 with the laser detector 27 thereon is swung to underneath the animal and, by means of the laser detector 27, the positions of the teats of the animal are determined and applied to the computer. Then the computer issues one or more signals to the two robot arms 12 which are disposed on the longitudinal side of the milking parlour 1 and which, acting on the basis of these signals, put the grippers 20 with the curved recess 56 to close to a shell of the teat cup 28. In the present embodiment of the invention, first, the teat cups 28 to be connected to the hind teats of the animal 3 to be milked are seized. Even before the curved recess 56 of a block-shaped holder 55 comes near the shell 36 of the teat cup 28, the computer issues a signal to the electromagnet 57 so as to produce an electromagnetic field in the vicinity of the curved recess 56 of the gripper 20. When the gripper 20 has approached the metal shell 36 of a teat cup 28 to a sufficient distance, the teat cup 28 is firmly drawn against the curved recess 56 of the block-shaped holder 55 owing to the presence of the electromagnetic field. A change in the electromagnetic field is caused by the metal shell 36,

whereupon a signal is issued to the computer, signifying that the teat cup 28 has been coupled. The last mentioned signal can also be issued by a different type of sensor, such as a contact sensor, which is disposed in the block-shaped holder 55 or by means of a position determination through the detector 27.

The computer then issues a signal to the means of transport 32 of the relevant teat cup 28 which release the pneumatic cylinder 44 on account of this signal, all this being arranged such that the teat cup 28 can be lifted from the seating 30 of the teat cup carrier 29 by means of the robot arm 12 without being obstructed by the horizontal cable 33. Subsequently, the teat cup 28 is moved horizontally to underneath a hind teat of the animal 3 (Figure 3). When the teat cup 28 is moving to the teat, the vertical cable 34 swings along with the teat cup 28 and the horizontal cable 33 is also carried along. By means of the gripper 20, the teat cup 28 is then connected to the teat of an animal 3 to be milked, whereupon the milking of the relevant udder quarter may start. During milking, there is made a faintly curved loop in the horizontal cable 33 which permits a teat cup 28 to move along when the animal 3 moves during milking.

After the teat cups 28 have been connected to the hind teats, the robot arms 12 with their grippers 20 are put to the remaining two teat cups 28 and these are connected to the fore teats in a similar way. After it has been detected by means of a sensor (not shown) that an udder quarter is empty, the computer issues a signal to the relevant pneumatic cylinder 44, whereupon this cylinder 44 is energized, resulting in that the corresponding horizontal cable 33 is stretched and the teat cup 28 is drawn to the seating 30 of the teat cup carrier 29. During the motion to the teat cup carrier 29, the teat cup 28 is kept in an approximately upright attitude by the vertical cable 34. This prevents the top side of the teat cup 28 from coming into contact with the possibly contaminated floor 38 of the milking parlour. After all teat cups 28 have been thus disconnected from the teats of an animal 3 to be milked, the exit door 7 is opened and the animal 3 is allowed to leave the milking parlour 1, whereupon an other animal is permitted to

enter the milking parlour 1 and the teat cups 28 can again be connected and the animal be milked.

The invention is not limited to that which has been set forth hereinbefore, but it also applies to that which is represented in the drawings.

CLAIMS

1. An implement for milking animals, such as cows, using one or more milking robots (11) with teat cups (28) and comprising one or more milking parlours (1), characterized in that a teat cup (28) is provided with one or more cables (33; 34) or similar means of transport, with the aid of which a teat cup (28) during the movement to a teat cup carrier (29) is kept in an approximately upright position.

2. An implement according to claim 1, characterized in that the teat cup (28) is continuously or virtually continuously kept in an approximately upright position when it is moving to the teat cup carrier (29) and when it is being disconnected from a teat.

3. An implement according to claim 1 or 2, characterized in that the means of transport comprise at least two cables (33; 34) connected with the teat cup (28).

4. An implement for milking animals, such as cows, comprising one or more milking robots (11) with one or more teat cups (28) and comprising one or more milking parlours (1), characterized in that a teat cup (28) is provided with at least two cables (33; 34) connected with the teat cup (28).

5. An implement according to claim 3 or 4, characterized in that one cable (33) extends essentially horizontally and one cable (34) extends essentially vertically.

6. An implement according to any one of the preceding claims, characterized in that the teat cup (28) is provided with a cable fastening (35; 39) near the upper end and one near the lower end.

7. An implement according to any one of the preceding claims, characterized in that the cable (34) extending essentially vertically has one end connected with a cable fastening (37) provided on a milking parlour and the other end connected with the cable fastening (35) provided near the upper side of the teat cup (28).

8. An implement according to any one of the preceding claims, characterized in that the essentially horizontally extending cable (33) has one end secured to a withdrawing

member (43) disposed near the milking parlour (1) and the other end secured to the cable fastening (39) disposed near the underside of the teat cup.

9. An implement according to claim 7, characterized in that the cable fastening (37) is disposed on a frame beam (5) extending in the longitudinal direction of the milking parlour (1).

10. An implement according to claim 9, characterized in that the cable fastening (37) is disposed near the top side of the milking parlour (1).

11. An implement according to any one of the preceding claims, characterized in that the cable fastening (47) of the essentially horizontally extending cable (33) is disposed on a pneumatic cylinder (44) of the withdrawing member (43).

12. An implement according to claim 11, characterized in that the pneumatic cylinder (44) is disposed close to the floor (38) of the milking parlour (1) and extends in the longitudinal direction of the milking parlour (1).

13. An implement according to claim 11 or 12, characterized in that on both sides of the milking parlour (1) there are provided two cylinders (44).

14. An implement according to any one of the preceding claims, characterized in that the implement comprises stands (29) where the teat cups (28) are placed upon completion of the milking and at least two robot arms (12), each provided with a gripper (20), with the aid of which the teat cups (28) can be coupled to the teats.

15. An implement according to claim 14, characterized in that on each longitudinal side of the milking parlour (1) there is provided a robot arm (12).

16. An implement according to claim 14 or 15, characterized in that the gripper (20) is provided with a recess (56) curved in accordance with the shell of a teat cup (28).

17. An implement according to any one of claims 14 through 16, characterized in that the gripper (20) comprises an electromagnet (57).

18. An implement according to any one of the preceding claims, characterized in that the stands (29) where the teat

cups (28) are placed upon completion of the milking comprise a holder (30) provided with a conical seating corresponding with the conical shape (31) of the underside of a teat cup (28).

19. An implement according to claim 18, characterized in that near each longitudinal side of the milking parlour (1) there is provided a holder (29) with two seatings (30).

20. An implement according to claim 18 or 19, characterized in that near the central portion of the seating (30) in the holder there is provided a hole (41; 42), through which the essentially horizontally extending cable (33) is led, the arrangement being such that in the holder (29) the cable (33) extends in the longitudinal direction of the milking parlour (1).

21. An implement according to any one of the preceding claims, characterized in that the implement is provided with a robot arm (21) equipped with a detector (27), such as a laser sensor, to locate the positions of the teats of an animal to be milked.

22. An implement according to any one of the preceding claims, characterized in that the essentially vertically extending cable (34) is situated along a side of the animal.

23. An implement according to any one of the preceding claims, characterized in that the teat cup (28) constitutes a connection between two cables (33; 34).

24. An implement for milking animals, such as cows, using one or more milking robots (12) with teat cups (28) and using one or more milking parlours (1), characterized in that the teat cup (28) constitutes a connection between two cables (33; 34), by means of which the teat cup (28) is transported.

25. A method of milking animals, such as cows, whereby at least two robot arms (12) with gripping means (20) connect two teat cups (28) to two teats, whereupon milking with these teat cups (28) starts, while two other teat cups (28) are connected to two other teats by means of the gripping means (20) to start milking subsequently.

26. A method according to claim 25, characterized in that, with the aid of the gripping means (20), during milking with a teat cup, an other teat cup (28) is connected to an

other teat.

27. A method according to claim 25 or 26, characterized in that a teat cup (28) is supported by one or more cables (33; 34).

28. An implement according to any one of the preceding claims and/or as set forth in the accompanying description and drawings.

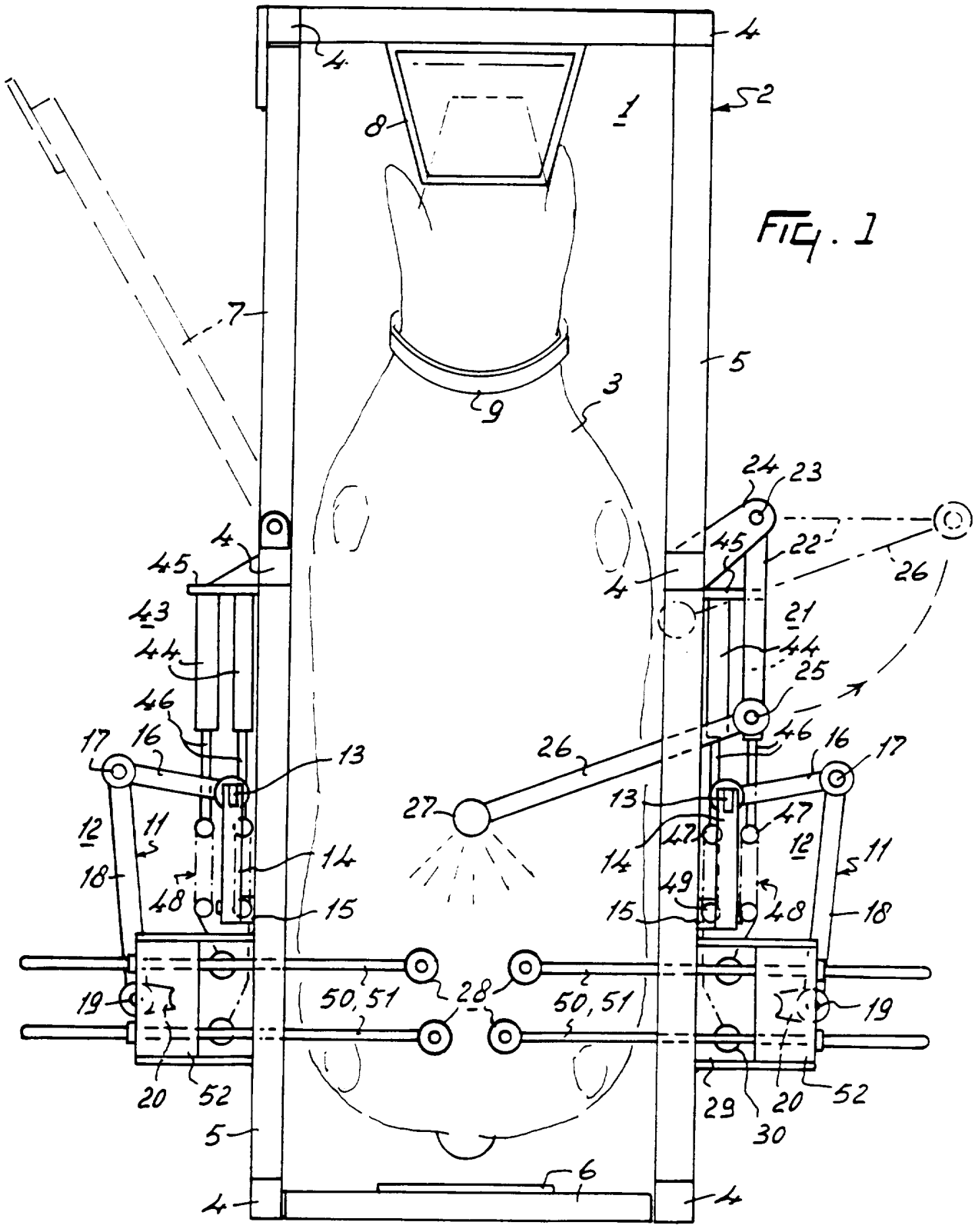

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FIG. 1

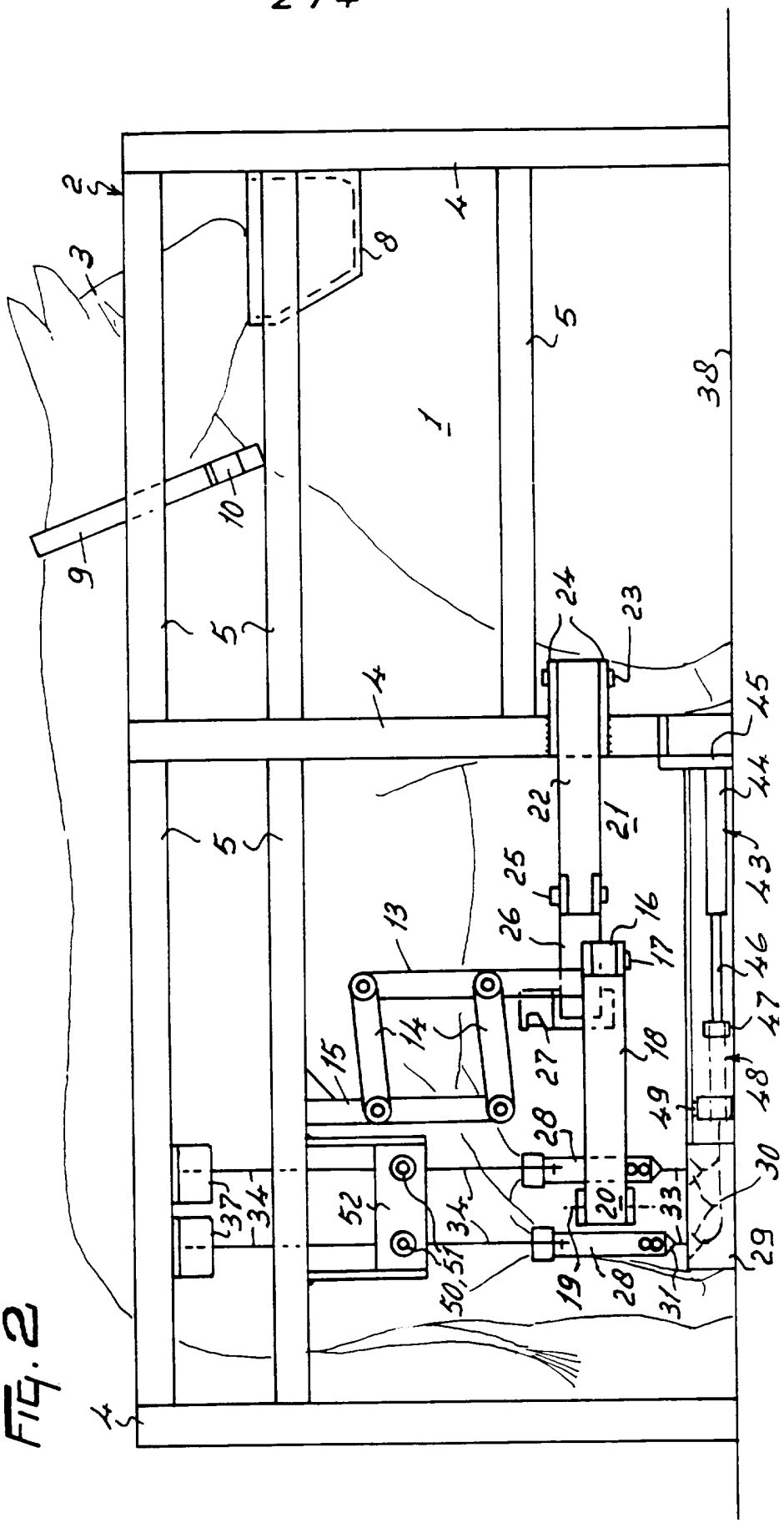

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FIG. 2

FIG. 3

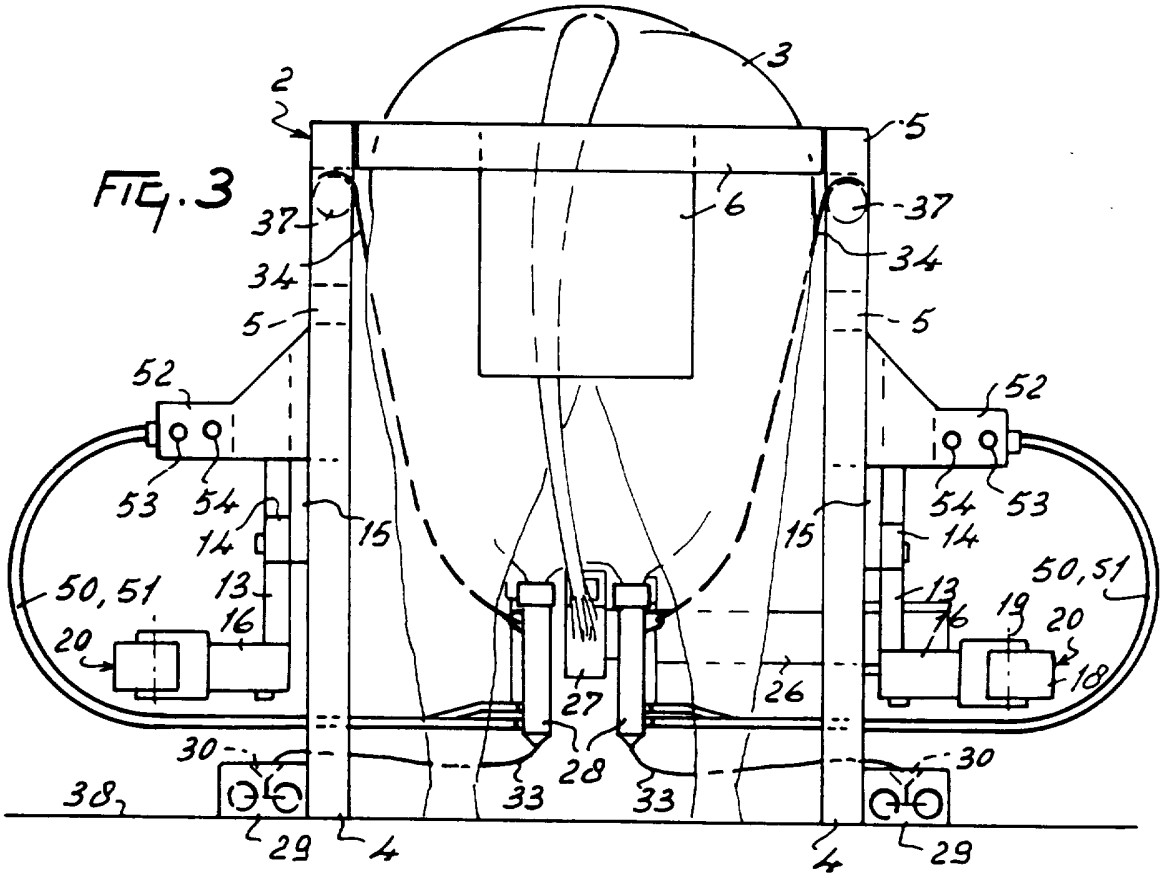
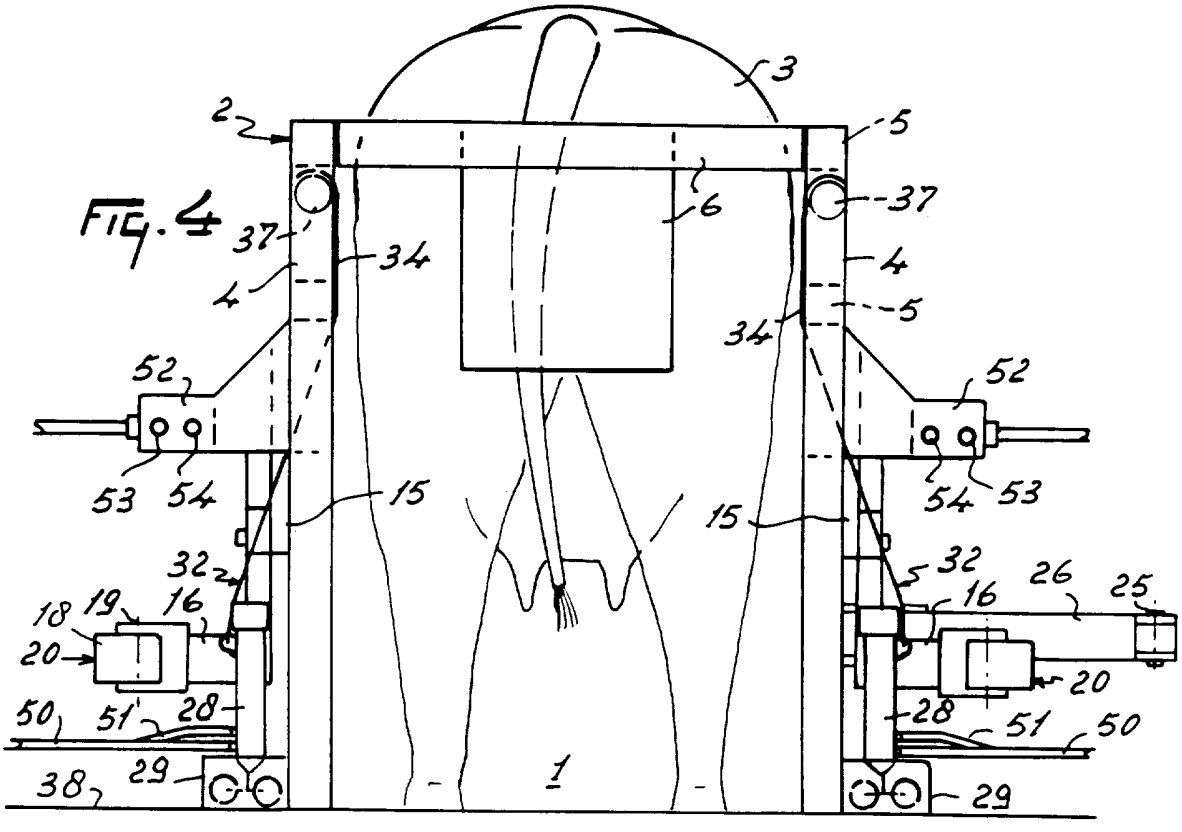

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FIG. 4


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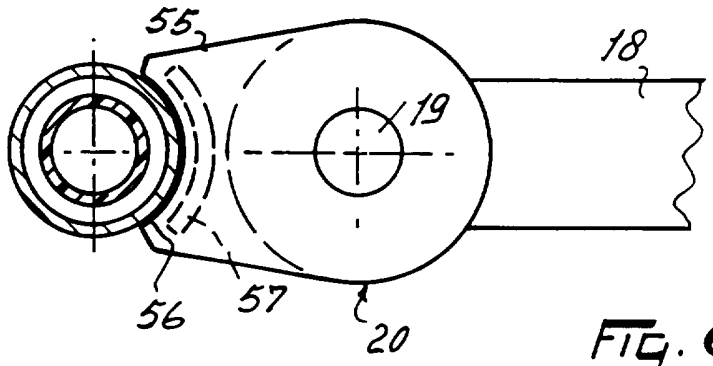
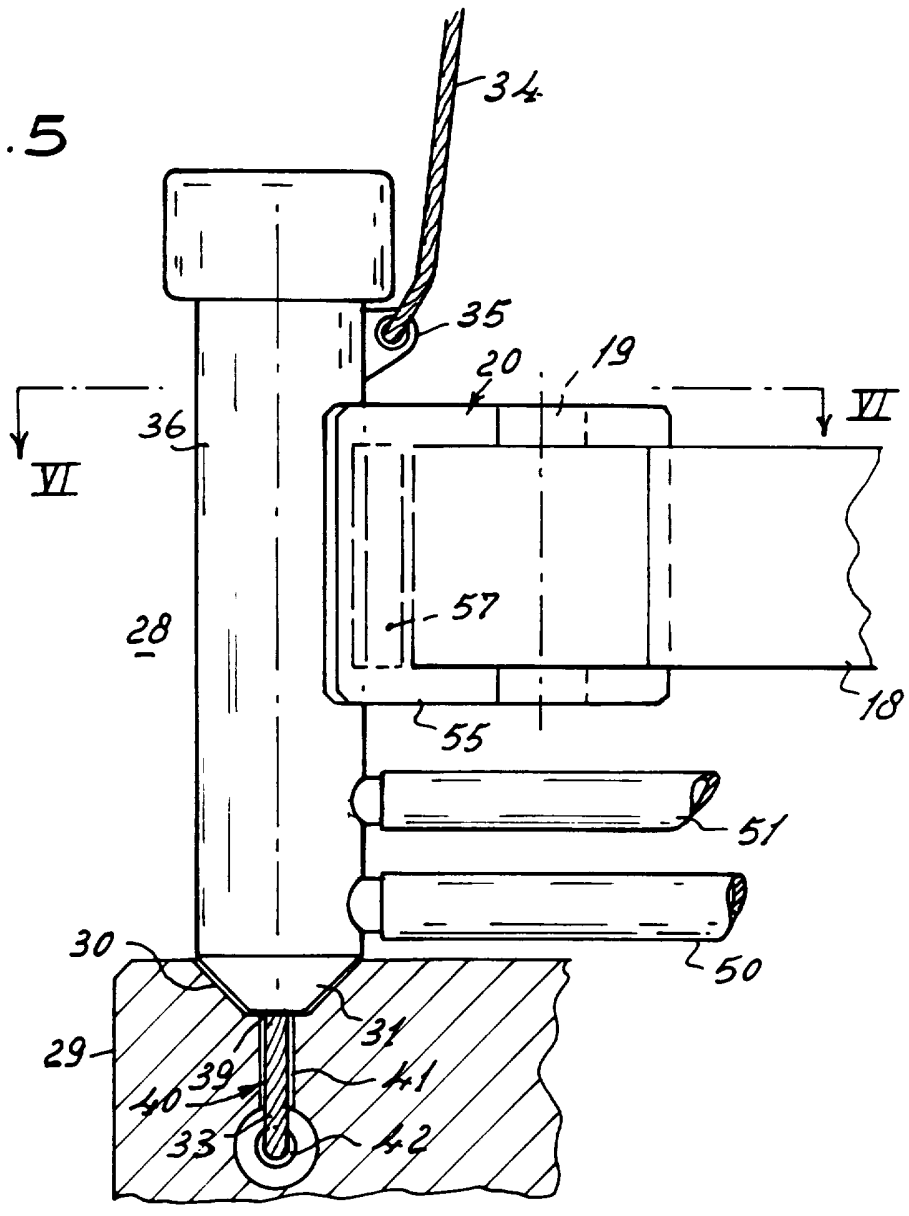

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FIG. 6

FIG. 5


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INTERNATIONAL SEARCH REPORT

Inte· onal Application No
PCT/NL 95/00298

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A01J5/017

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)
IPC 6 A01J

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

Electronic data base consulted during the international search (name of data base and, where practical, 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.
Y	EP,A,0 069 560 (THE GASCOIGNE GROUP LIMITED) 12 January 1983 see abstract see page 4, line 1 - line 33; figures 1-3 see claims 1-3	1,28
Y	EP,A,0 545 916 (VAN DER LELY) 9 June 1993 see abstract see column 6, line 32 - column 7, paragraph 4 see claim 1; figures 6,7	1,28
A	FR,A,2 593 668 (DAFFINI) 7 August 1987 see abstract see page 1, line 1 - line 7 see claims; figures	1,28

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 November 1995	12.02.96

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	PIRIOU, J

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Inter onal Application No
PCI/NL 95/00298

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,4 726 322 (TORSIUS) 23 February 1988 see column 2, line 31 - column 3, line 31; figure 2 -----	1,28

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INTERNATIONAL SEARCH REPORT

'ernational applicauon No.
PCT/NL95/00298

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims: 1-24 and 28 as far as related to 1-24
2. Claims: 25 and 26-28 as far as related to 26

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searches without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-24 and 28 as far as related to 1-24

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

.nformation on patent family members

Inte onal Application No
PCT/NL 95/00298

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP-A-0069560	12-01-83	NONE		
EP-A-0545916	09-06-93	NL-A-	8701735	16-02-89
		EP-A-	0630564	28-12-94
		EP-A-	0630565	28-12-94
		EP-A-	0634096	18-01-95
		EP-A-	0643909	22-03-95
		AT-T-	116798	15-01-95
		DE-D-	3852767	23-02-95
		DE-T-	3852767	13-07-95
		DE-A-	3875414	26-11-92
		EP-A,B	0300582	25-01-89
		EP-A-	0448132	25-09-91
		EP-A-	0480541	15-04-92
		JP-A-	1051030	27-02-89
		US-A-	4838207	13-06-89
FR-A-2593668	07-08-87	NONE		
US-A-4726322	23-02-88	NL-A-	8502434	01-04-87
		EP-A,B	0213660	11-03-87