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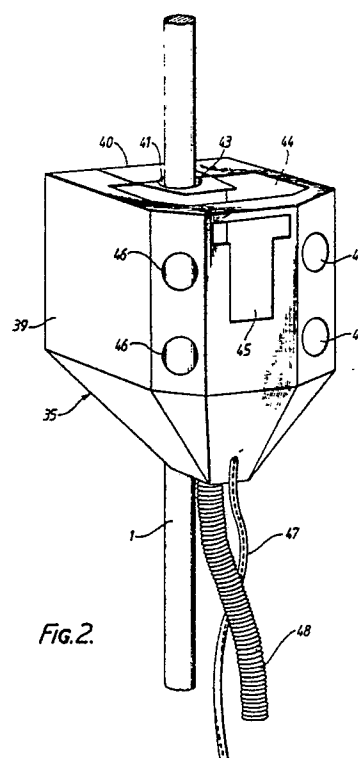
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54 **Method and device for treating surfaces of elongated objects.**

57 The invention relates to a method and a device for treating surfaces of elongated objects (1), such as steel cables (1), beams, pipes and the like. Use is hereby made of a cabinet (35) surrounding the object (1) and being movable relatively to the object (1) in the longitudinal direction of the object. Inside the cabinet there is arranged a spray nozzle, which is connected to a pipe (47) for the supply of the treatment medium to the spray nozzle. At the same time a discharge pipe (48) is connected to the cabinet (35). The cabinet is provided with at least one inspection glass (45) and an opening (45, 46) joined by a glove-shaped means located inside the cabinet (35). The operator can put his hand in said glove-shaped means for the operation of the spray nozzle which is movably arranged inside the cabinet (35).



EP 0 306 104 A1

Method and device for treating surfaces of elongated objects.

The invention relates to a method for treating surfaces of elongated objects, such as steel cables, beams, pipes and the like, whereby the elongated object is surrounded with a cabinet which is movable along the elongated object and in which there is at least one spray nozzle present, to which there is connected a pipe for supplying a treatment medium to the spray nozzle, whilst a sub-atmospheric pressure is generated in the cabinet during operation.

It happens frequently that elongated objects, such as steel cables, beams, pipes or the like, which may e.g. form part of a construction, such as a bridge or the like, must be subjected to a surface treatment. Such a surface treatment may e.g. comprise blasting the surfaces of the elongated objects and/or spraying them with an anticorrosive medium, such as red lead, paint or the like.

EP-A- 0061792 discloses a cable cleaning system whereby use is made of a covering which is movable along the cable, in which covering a number of spray nozzles have a fixed arrangement. It is not possible hereby to check the treatment taking place inside the covering by means of the treatment medium supplied during operation. In order to effect that the intended treatment is carried out as well as possible there will be a tendency to supply an excess of treatment medium. This leads to an uneconomical use of the treatment medium, however, and the discharge of an excess of used treatment medium may cause great problems, e.g. with relation to the pollution of the environment and the like.

In order to be able to ensure an effective, controllable treatment of the elongated objects a working platform is moved along said elongated objects, which may extend e.g. vertically or at an acute angle with the horizontal, by means of suitable hoisting means, one or more workmen being present on said working platform to carry out the required treatment, usually making use of a spray nozzle. A great deal of dust, paint vapour or the like is released hereby and in order to protect the environment, passers-by, any passing vehicles and the like as well as possible from released dirt the working platform is surrounded by curtains. Also such a solution has several disadvantages, however. Thus a very voluminous covering is obtained with the curtains or the like, which cannot ensure an effective shutting off, however. Furthermore the person(s) on the platform are present in the environment where the dust, paint vapour and the like are released, so that special safety measures have to be taken in order to protect the person(s) in question as well. (cf. DE-U-8632792)

The purpose of the invention is to obtain a method as described above, whereby the disadvantages attached to the methods used so far can be met.

According to the invention use is made for this purpose of a cabinet in whose wall there is provided at least one inspection glass, as well as at least one opening joined by a glove-shaped means located inside the cabinet, and a hand is put into said glove-shaped means from the outside in order to operate the spray nozzle which is movably arranged inside the cabinet and which can be operated by hand.

When using the method according to the invention a simple, compact cabinet can be used by means of which the treated part of the elongated object can be effectively sealed relatively to the environment, whilst the person carrying out the work can take place outside the cabinet, so that no special measures have to be taken for the protection of said person. The person has a good view of the work via the inspection glass thereby and by manipulating the spray nozzle in the right manner he can effect an optimum treatment of the surface with a minimum use of treatment medium.

With an effective construction it will even be possible to make the cabinet so light that it can be supported by the hand(s) or arm(s) of the operator put in the glove-shaped means, so that the operator can easily move the cabinet along the elongated object during operation in order to be able to work the desired length of said elongated object.

It is noted that the French patent 644.246 discloses a method for cleaning housefronts, whereby a platform supporting a person can be moved up and down along the housefront by means of a hoisting device. Near the place to be cleaned there is furthermore suspended a covering made of cloth or the like material, said covering being provided with an inspection opening and an opening for the passage of a spray nozzle. The device disclosed in said patent will not be suitable, however, for efficiently treating elongated objects, such as cables, beams, pipes and the like.

A similar device for working flat objects, in particular for etching figures in glass panes or the like is disclosed in US-A-4.281,485.

A further aspect of the invention relates to a cabinet for carrying out the method described above, whereby the cabinet is provided with a casing with two opposite holes for the passage of an elongated object, whilst a part of the casing can be removed relatively to the other part of the casing in order to be able to place the cabinet around the elongated object, a spray nozzle is

provided inside the cabinet, to which spray nozzle there is connected a pipe passed through the wall of the cabinet for the supply of treatment medium and whereby there is also connected to the cabinet a pipe which is in communication with the interior of the cabinet and which can be connected to a vacuum source. According to the invention the cabinet is hereby provided with at least one inspection glass, as well as with at least one opening to which there is connected a glove-shaped means which is located in the interior of the cabinet, whilst the spray nozzle is movably arranged inside the cabinet. A simple and light construction of the cabinet can hereby be effected, whilst an efficient treatment of the object to be treated can be effected by means of the spray nozzle, without thereby exposing the environment and/or the operator to harmful and/or objectionable substances or vapours which are released during the treatment.

According to a further aspect of the invention a device, to be moved efficiently along an elongated object, for supporting at least one person is also obtained when the device is provided with a frame and with travelling wheels coupled to the frame, said travelling wheels being arranged in pairs above one another, whilst two pairs are located, spaced from each other, in the longitudinal direction of the elongated object and two working platforms are fixed to the frame, a first platform being arranged near the highest pair of travelling wheels whilst the second platform is arranged at a lower level than the first platform, such that said second platform is located under the elongated object during operation.

Such a device is particularly suitable for being moved along objects which extend at an acute angle with the horizontal, because the device will be able to maintain its desired position at all times, irrespective of the question on which platform a person carrying out the work or the like on the elongated object takes place.

The invention will be further explained hereinafter with reference to a possible embodiment of the construction according to the invention illustrated in the accompanying figures.

Fig 1 is a diagrammatic, perspective view of a device to be moved along an elongated object, such as a cable.

Fig 2 is a larger-scale, diagrammatic and perspective view of a cabinet to be moved along a cable or the like.

Fig 3 illustrates the frame of the cabinet illustrated in fig 2.

Fig 4 is a diagrammatic, perspective view of a detachable part of the encasing of the cabinet.

The device illustrated in fig 1 comprises a frame part 2 which is movable along an elongated object such as a cable 1, said frame part 2 being

provided with a first pair of travelling wheels 3 and 4 located above one another and a second pair of travelling wheels 5 and 6 located above one another. As will be apparent from fig 1 the first pair of travelling wheels 3 and 4, seen in the longitudinal direction of the cable 1, is thereby located at some distance from the pair of travelling wheels 5 and 6. The travelling wheels 3 and 5 bear against the upper side of the cable and the travelling wheels 4 and 6 respectively, arranged under the travelling wheels 3 and 5, bear against the lower side of the cable thereby. As will furthermore be apparent from fig 1 a circular groove is thereby provided in the travelling wheels, the shape of said groove being adapted to the outer circumference of the elongated object 1. The wheels 3 - 6 are freely rotatable, relatively to the frame 2, about horizontally extending axes of rotation.

To the frame 2 there are coupled, by means of horizontally extending pivot pins 7, the ends of a pair of beams 8 also extending parallel to each other. The beams 8 have a fixed connection to a frame beam 9 connecting the ends of the beams 8. To the ends of the frame beam 9 remote from the beams 8 there are fixed beams 10 extending into the extension of said beams 8. To the ends of said beams 10 there is fixed a beam 11 extending parallel to the beam 9. To the ends of the beams 9 and 11 there are fixed uprights 12 and 13 respectively. The ends of the uprights 13 are mutually connected by a beam 14 extending parallel to the beam 11. Between the ends of the uprights 12 and 13 there are provided beams 15. The beams 9 - 11 may support a floor which forms a working platform, on which one or more persons can take place.

At some distance below the coupling points 7 of the frame beams 8 there are coupled, by means of pins 16 extending parallel to the pins 7, the ends of telescopic beams 17. The ends of the telescopic beams 17 remote from the pivot pins 16 are pivotally coupled to the beam 11 by means of pins extending parallel to the pins 16.

At some distance above the pins 7 the ends of telescopic beams 19 are coupled to the frame 2 by means of pivot pins 18 extending parallel to said pins 7.

The ends of the beams 19 remote from the pivot pins 18 are pivotally coupled, by means of pivot pins extending parallel to the pins 18, to the frame beam 9 near the ends of the frame beams 8 coupled to the frame beam 9.

It will be apparent that by shortening and/or lengthening the lengths of the telescopic beams 17 and 19 the position of the working platform supported by the frame beams 9 - 11 can be adjusted such that, independently of the angle which the cable 1 includes with the horizontal, said working

platform can be arranged at least substantially horizontally.

Between the two wheels 3 and 4 of the highest pair of wheels there is located a frame beam 20 extending parallel to the frame beam 9, said frame beam 20 being pivotally coupled to the frame 2 by means of a pivot pin (not shown) extending parallel to the pins 7, 18 and 16. To the beam 20 there are fixed beams 21 extending perpendicularly to said beam, which beams 21 connect the beam 20 to beams 22 being in line and extending parallel to the beam 20. Between the beams 21 and the frame 2 there are provided telescopic cross beams 23, which are pivotally connected both to the frame 2 and to the frame beams 21 by means of pivot pins 24 extending parallel to the pins 7.

To the ends of the frame beam 20 there are fixed upwardly extending beams 25. To the ends of the frame beams 22 there are fixed beams 26 and 27, also extending upwardly.

The upper ends of the beams 25 and 26 are mutually connected by a cross beam 28, whilst the upper ends of the frame beams 26 and 27 are mutually connected by a cross beam 29.

The beams 20 - 22 serve to support a pair of floor parts 30 and 31 forming a further working platform.

Between the upper ends of the beams 25 and 12 there are furthermore provided cords 32.

In order to be able to provide the device described above on an elongated object, such as a cable 1, in the illustrated manner the wheels 3 and 5 will be mounted easily detachably in the frame 2 in a manner not shown. Then the device can be arranged relatively to the cable 1 or the like in the illustrated manner, for which purpose both the frame 2 and the frame part formed by the parts 20 - 29 and supporting the upper working platform 30, 31 is constructed at least substantially U-shaped. Subsequently the wheels 3 and 5 can be replaced so that the elongated object is well-retained between the wheels 3, 4 and 5, 6 respectively. If necessary the two working platforms can be adjusted in a desired horizontal position by adjusting the length of the telescopic parts 17, 19 and 23.

As furthermore appears from fig 1 the working platform formed by the floor parts 30 and 31 is thereby located approximately centrally between the axes or rotation of the wheels 3 and 4 of the highest pair of wheels. Furthermore the working platform supported by the frame beams 9 - 11 is located at a lower level.

The device can furthermore be moved along the elongated object by means of a winch, of which a cable 33, extending at least substantially parallel to the elongated object 1, will be connected to a cable 34 connected to the device at a point which is located under the elongated object 1 in a plane

through the centre line of the elongated object 1 and the centre of the frame beam 14.

The construction of the device described above is such that it will always tend to maintain the position illustrated in fig 1, irrespective of the question whether a person who is to carry out work on the elongated object 1 is standing on the higher or on the lower platform. The person in question can easily change over from the one platform to the other platform thereby and thus efficiently inspect and/or work (or the like) the elongated object from all sides.

Fig 2 illustrates a cabinet 35 which is movable along an elongated object 1. Said cabinet comprises the frame 36 illustrated in fig 3, which frame is built up of a number of mutually connected profile beams 37. As will be apparent from fig 3 the arrangement is thereby such that the frame 36 has a more or less U-shaped construction, such that in the frame there is formed an elongated slot 38, open at one side and extending over the entire height of the frame 36. As illustrated in fig 2 said frame 36 is covered with an encasing or plating 39, whilst the slot 38 can be closed with a casing part 40, which is detachably connected to the frame. In the ends of said casing part there are provided semi-circular openings 41 and 42 in the illustrated embodiment. To the boundary edges of said openings 41 and 42 there are fixed semi-circular sealing means (not shown) of an elastic material, such as rubber or the like.

As will be apparent from fig 2 the semi-circular openings 41 and 42 are located opposite corresponding semi-circular openings 43 when the casing part 40 is fixed to the frame 36, said openings 43 being provided in the encasing 39 near the ends of the casing part 40, all this such that the elongated object 1 can extend concentrically through the holes formed by the opposed openings 41, 43 and 42, 43 respectively.

Also to the boundary edges of the openings 43 there will be fixed semi-circular sealing means of an elastic material, such that said sealing means with the joining sealing means fixed to the edges of the openings 41 and 42 surround and seal said elongated object 1.

As is furthermore illustrated in fig 2 transparent parts 44 and 45 forming inspection glasses are provided in the encasing. Also four holes 46 are provided in the encasing which are joined by glove-shaped means (not shown in the figures), known by themselves, which are located in the interior of the encasing, such that the passages 46 are shut off by said glove-shaped means, whilst a person can put his hands in said glove-shaped means from the outside in order to be able to grab and manipulate objects located in the interior of the cabinet 35.

A spray gun or spray nozzle (not shown) is located in the interior of the cabinet 35 and connected to a pipe 47 passed through the wall of the cabinet, via which pipe treatment medium, such as blasting material, e.g. glass grains supplied under pressure, e.g. by means of pressurized air, can be supplied in order to be able to subject the surface of the elongated object 1 to a desired treatment.

To the bottom end of the cabinet there is furthermore connected a pipe 48, which may be connected to a vacuum source, such as a vacuum pump for generating a certain sub-atmospheric pressure in the interior of the cabinet 35.

The cabinet 35 is preferably constructed light enough for the cabinet to be moved along the elongated object 1 by one person, when said person puts his hands through a pair of holes 46, so that the cabinet can be carried by the two arms of the person in question and be moved along the elongated object 1 in the longitudinal direction of the elongated object 1. The person in question can simultaneously operate the spray gun arranged inside the cabinet or the like.

It will be apparent that after removal of the casing part 40 the cable can be moved into the U-shaped passage 38 which is then open after which, after the casing part 40 has been provided, the part of the elongated object 1 located inside the cabinet 35 is shut off from the environment. The outside surface of the elongated object can then be cleaned by blasting or be injected with an anti-corrosive agent by means of the spray gun or the like. The cabinet 35 can be provided around the elongated object above the device illustrated in fig 1 and be operated by a person supported by said device, whereby the device illustrated in fig 1, together with the cabinet 35, can be moved along the cable 1 during operation. When the cable 1 or the like is sprayed with paint or the like device 1 and the cabinet 35 can gradually be moved from the upper end of the cable or the like toward the lower end of the cable, so that the device does not move across the treated surfaces.

Claims

1. Method for treating surfaces of elongated objects, such as steel cables, beams, pipes and the like, whereby the elongated object is surrounded with a cabinet which is movable along the elongated object and in which there is at least one spray nozzle present, to which there is connected a pipe for supplying a treatment medium to the spray nozzle, whilst a sub-atmospheric pressure is generated in the cabinet during operation, characterized in that use is made of a cabinet in whose wall there is provided at least one inspection glass, as

well as an opening joined by a glove-shaped means located inside the cabinet, and a hand is put into said glove-shaped means from the outside in order to operate the spray nozzle which is movably arranged inside the cabinet and which can be operated by hand.

2. Method according to claim 1, characterized in that the cabinet is supported by the hand(s) or arm(s) put in the glove-shaped means and is moved along the elongated object during operation.

3. Cabinet for carrying out the method according to claims 1 or 2, whereby the cabinet is provided with a casing with two opposed holes for the passage of an elongated object, whilst a part of the casing can be removed relatively to the other part of the casing in order to be able to place the cabinet around the elongated object, a spray nozzle is provided inside the cabinet, to which spray nozzle there is connected a pipe passed through the wall of the cabinet for the supply of treatment medium, and whereby there is also connected to the cabinet a pipe which is in communication with the interior of the cabinet and which can be connected to a vacuum source, characterized in that the cabinet is provided with at least one inspection glass, as well as with at least one opening to which there is connected a glove-shaped means which is located in the interior of the cabinet, whilst the spray nozzle is movably arranged inside the cabinet.

4. Cabinet according to claim 3, characterized in that inside the cabinet there are provided at least two openings, to each of which there is connected a glove-shaped means, such that both the left hand and the right hand can be put in a glove-shaped means.

5. Cabinet according to claims 3 or 4, characterized in that at least two openings, to which glove-shaped means are connected, are provided above one another in the cabinet.

6. Cabinet according to any one of the claims 3 - 5, characterized in that the cabinet comprises a frame provided with an encasing, said frame having an at least substantially U-shaped construction, seen in the longitudinal direction of an elongated object to be received, whereby the slot surrounded by the U-shaped frame can be covered by the removable casing part.

7. Cabinet according to any one of the preceding claims, characterized in that sealing means are provided near the holes provided in the casing for the passage of an elongated object, said holes butting against the outer circumference of the elongated object to seal it during operation.

8. Device, to be moved along an elongated object, such as steel cables, beams, pipes and the like, said device being provided with a frame and with travelling wheels coupled to the frame, said

travelling wheels being arranged in pairs above one another, whilst two pairs are located, spaced from each other, in the longitudinal direction of the elongated object and two working platforms are fixed to the frame, a first platform being arranged near the uppermost pair of travelling wheels whilst the second platform is arranged at a lower level than the first platform, such that said second platform, as well as the centre of gravity of the device, will be located under the elongated object during operation.

9. Device according to claim 8, characterized in that the platforms can be adjusted relatively to the frame about horizontally extending pivot pins.

10. Device according to claims 8 or 9, characterized in that the upper platform is built up of a pair of floor parts which are located on both sides of the uppermost pair of wheels, seen in plan view.

11. Device according to any one of the claims 8 - 10, characterized in that the upper platform is located approximately centrally between the axes of rotation, located above one another, of the uppermost pair of wheels.

12. Device according to any one of the claims 8 - 11, characterized in that the lower platform is arranged lower than the uppermost pair of wheels and higher than the lowermost pair of wheels.

13. Combination of a device according to any one of the preceding claims 8 - 12 and a cabinet according to any one of the preceding claims 3 - 7, to be moved along elongated objects, such as steel cables, beams, pipes and the like.

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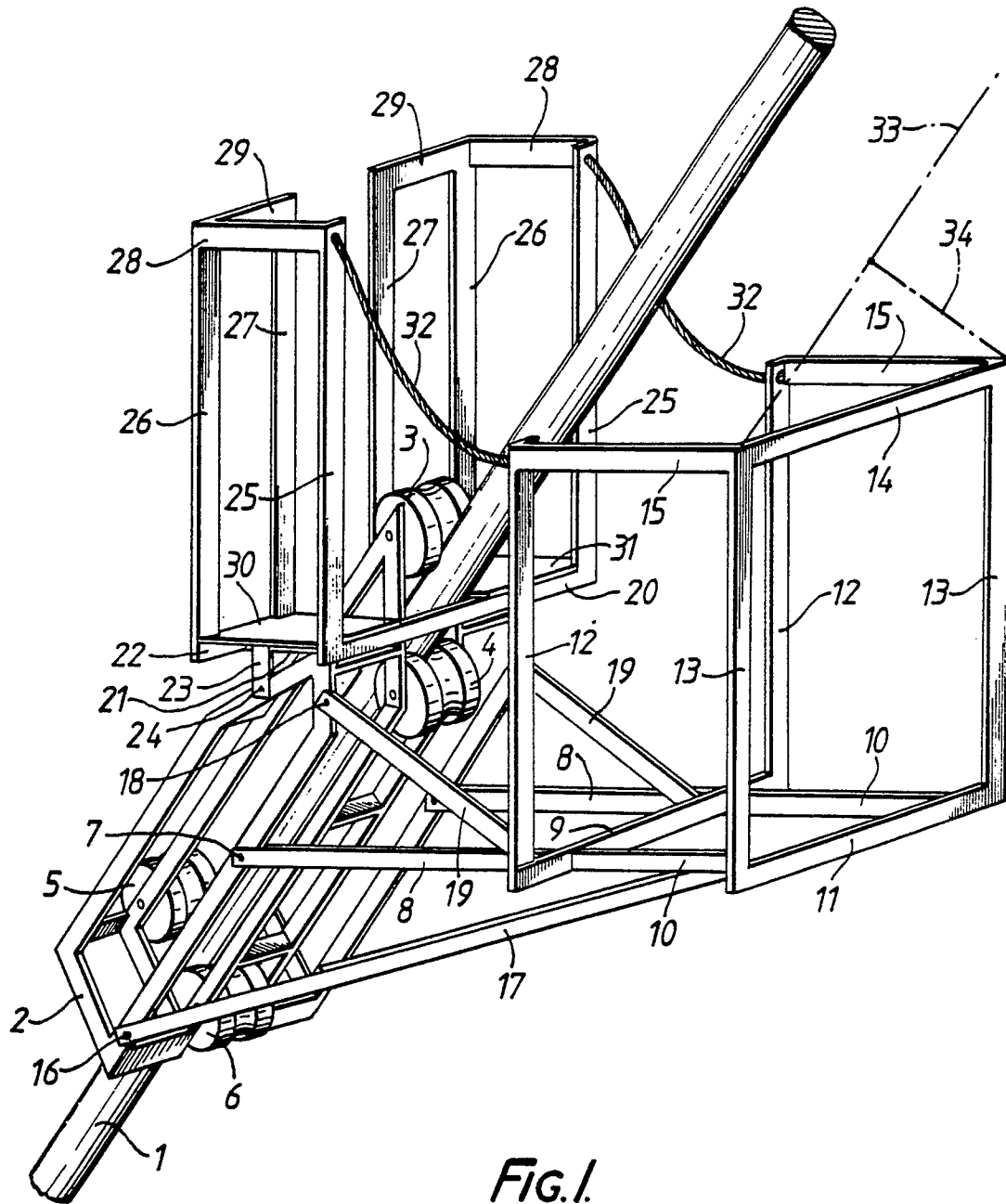


FIG. 1.

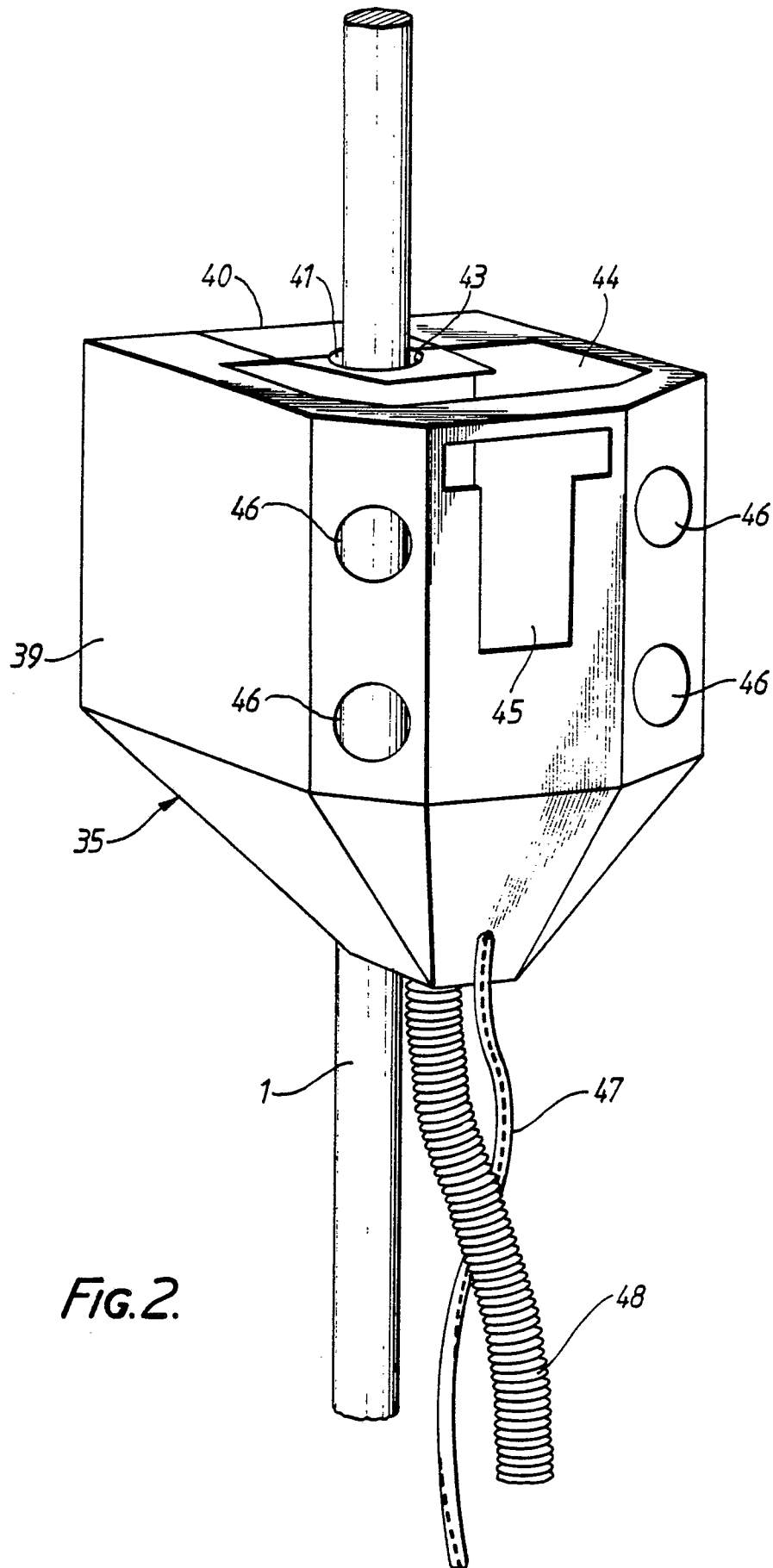
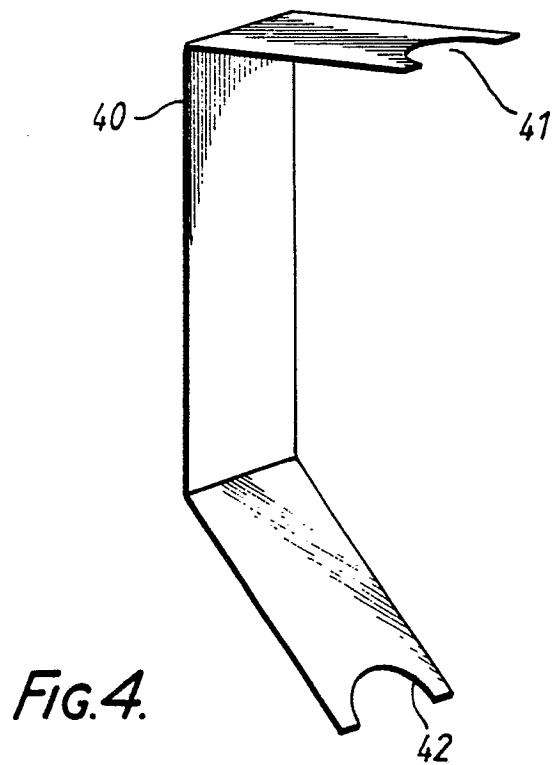
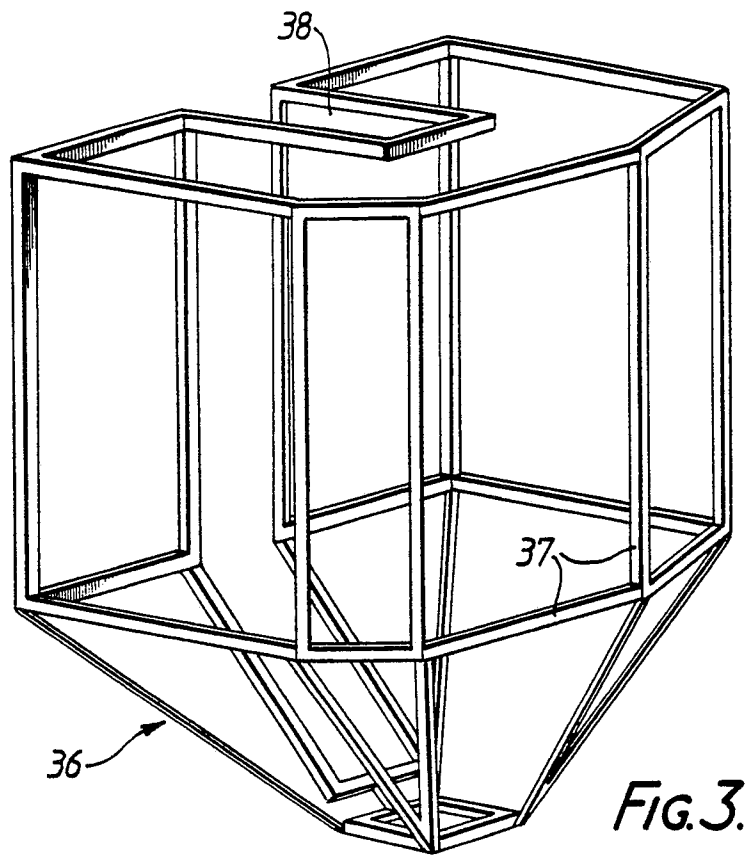


FIG. 2.





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	US-A-4 281 485 (CHARITY) * Column 3, line 24 - column 4, line 16; figure 1 * ---	1-3,7	B 05 B 15/12 B 61 B 7/02 B 61 B 12/00 E 01 D 19/10 B 24 C 3/06
A	FR-A- 664 246 (PUTZEYS) * Whole document * ---	1,3,4	
A	EP-A-0 061 792 (SHELL) * Page 2, lines 16-24; page 3, lines 7-26; page 4, lines 16-29; figures 1,2 * ---	1,3,6,7	
A	DE-U-8 632 792 (GKASSL et al.) * Page 12, lines 6-21; figure 2 * -----	8	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 05 B B 24 C B 61 B E 01 D E 04 G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20-10-1988	Examiner JUGUET J.M.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			