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(54) **System of object identification and control of actuating means thereof**

(57) The present invention concerns an object identification and control system, comprising means of operation of a plurality of objects that can alternatively be coupled with said means of operation, means of control of said means of operation and means of identification of said objects, said means of identification being connected to said means of control, wherein said objects are agricultural tools, said means of identification comprise a station of housing and identification of one or more mechanical coupling elements of said means of operation and said objects, said station of housing being provided with a housing seat (16) for each mechanical coupling

element (17,18), compatible with said mechanical coupling element (17,18) and with no other, each housing seat (16) being provided with means of detecting the presence of the correspondent mechanical coupling element (17,18), said means of detecting of each seat (16) being all connected to a control unit, programmed according to the signal received from any of said means of detecting, controlling said means of operation, each mechanical coupling element (17,18) being compatible with only one of said objects and with no other, said means of operation comprising a motor and means of transmission arranged respectively within a handle (15) and a support shaft.

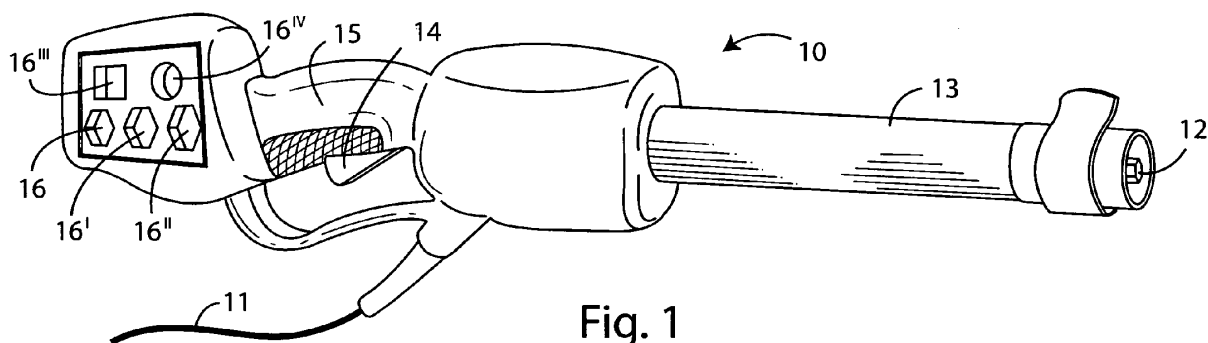


Fig. 1

Description

[0001] The present invention concerns an object identification and control system.

[0002] More in detail, the invention relates to a system of the said kind, for remote identification in complete safety of tools or devices in general, and for the consequent control of the operative parameters of the same devices by means of means of motion or command in general, controlled by means of control.

[0003] Specifically, the identification and control system according to the present invention will be described with reference in particular to the field of devices for agricultural use, but it has to be agreed that this shall not be understood in a way to limit the scope of protection of the patent, being on the contrary possible for a person skilled in the art to extend the same system to other applications.

[0004] Still more in particular, the present invention will be described with reference to motor devices of interchangeable automatic tools for use in agriculture.

[0005] As it is well known, at present a plurality of automatic tools for use in agriculture are available in commerce, specifically realised for harvesting (fruits, berries, coffee, olives), but also for pruning (chain saws, jig saws, hedge trimmers, scissors, hedge clippers), and blowers, fans, blades, pumps. All these tools must be used at a certain distance, for example in order to allow to the user to reach the trees without having to climb stairs, and for this purpose it is envisaged that they may be arranged at the end of rods (either fixed or telescopic). In order to facilitate the use of these tools, in the case wherein the same are arranged at the end of the rods, it was also proposed to arrange the drive motor of said tools (and other heavy components of the equipment) no more within the tools themselves, but rather at the end remaining in the hands of the user. The handles of these rods are therefore provided with a housing for the motor and with a switch for its on/off, and such rods are consequently provided with means of transmission of motion (a transmission shaft, possibly telescopic) from the motor till the end of the rod. Moreover, to minimise the number of devices needed by an operator, it was additionally proposed that at the end of the rod opposite to the handle different interchangeable tools can be applied. Each of these tools could need to be used according to modalities and speeds which are different from the others, so the handle is also provided with manual adjusting means of the motor speed, so that the operator can adjust it according to the specific tool applied at the end of the rod.

[0006] A problem of this kind of devices is the possibility that the operator can select the wrong operating speed, with the risk of affecting the activity that is taking place and, in some cases, even the integrity of the tool applied on the rod.

[0007] In order to solve this problem, in different field from that specifically examined in this specification with exemplificative purposes, different identification systems

were proposed, making use for example of a device of housing of the tool in an operative position, provided with means of identification of the tool itself and of generation and transmission by wire of an identification signal to the motor means, or alternatively with the technology identified with the acronym RFID (Radio Frequency IDentification), according to which the tools are provided with electronic devices (called transponders), inside which the identity data of the tool are stored, to be communicated to a remote device in response to a radio signal emitted by said remote device.

[0008] However, the systems of this kind are not easily applicable, in particular to tools arranged at the end of a rod, in the first case as a consequence of the presence of wires, which could constitute an hindrance to the transmission of motion along the rod, in the second case because of the possible presence of interference signals, due for example to the presence in the immediate vicinity of a different tool applied at a different rod and moving system.

[0009] In the light of the above, it is evident the need for an object identification and control system allowing for the completely sure identification of the tools applied to the means of motion without incurring in the drawbacks of the solutions according to the prior art.

[0010] In this context it is included the solution according to the present invention, which aims to provide an object identification and control system wherein the identification is carried out indirectly, ie not where the tools are applied, but directly next to the drive motor of the same.

[0011] These and other results are obtained according to the present invention by proposing an object identification and control system which consists of interchangeable elements of mechanical interface between said means of operation and said objects, each mechanical coupling element being compatible with one and only one of said objects, and of a station of housing and identification of said interchangeable elements of mechanical interface, when not in use, said station being positioned in proximity of a device of control of said means of operation and detecting the presence of each of said interchangeable elements of mechanical interface and according to such a detection sending a signal to said device of control.

[0012] The purpose of the present Invention is therefore to provide an object identification and control system which allows to overcome the limits of the solutions according to the prior art and to obtain the technical results previously described.

[0013] A further purpose of the invention is that said system can be realised with substantially limited costs, as far as both the production costs and the operative cost.

[0014] Another object of the invention is to provide an object identification and control system which is substantially simple, safe and reliable

[0015] It is therefore a specific object of the present

invention an object identification and control system, comprising means of operation of a plurality of objects that can alternatively be coupled with said means of operation, means of control of said means of operation and means of identification of said objects, said means of identification being connected to said means of control, wherein said objects are agricultural tools, said means of identification comprise a station of housing and identification of one or more mechanical coupling elements of said means of operation and said objects, said station of housing being provided with a housing seat for each mechanical coupling element, compatible with said mechanical coupling element and with no other, each housing seat being provided with means of detecting the presence of the correspondent mechanical coupling element, said means of detecting of each seat being all connected to a control unit, programmed according to the signal received from any of said means of detecting, controlling said means of operation, each mechanical coupling element being compatible with only one of said objects and with no other, said means of operation comprising a motor and means of transmission arranged respectively within a handle and a support shaft.

[0016] In particular, according to the invention, said means of operation can comprise a motor and means of transmission of motion from said motor to said objects.

[0017] Moreover, still according to the invention, said means of identification are positioned in proximity of said means of control.

[0018] Always according to the present invention, said mechanical coupling elements can be constituted by a body provided with means of coupling with said means of operation and with means of coupling with said objects, said means of coupling with said means of operation being the same for all the interface elements and said means of coupling with said objects being different for each interface element, each interface element being compatible with only one of said objects and with no other.

[0019] Alternatively, according to the invention, said means of coupling with said means of operation are constituted by an interlocking shaped seat, which is inserted on a correspondent pin of said means of operation, or by a threaded seat, which is screwed on a corresponding threaded bolt of said means of operation.

[0020] It is evident the efficiency of the device of the present invention, which allows the identification of objects in an indirect manner, i.e. not through the true identification of the object and its use in the position wherein the object itself is applied, but rather through the detection of 'failure of a mechanical coupling from the respective corresponding seat of said housing means clustering of identification, placed in proximity of the means-means clustering of control of operation of the objects themselves, but rather through the detection of the absence of the corresponding mechanical coupling element from the respective housing seat of said means of identification, positioned in proximity of the means of control of

means of operation of the objects themselves.

[0021] The present invention will now be described, for illustrative but not limitative purposes, according to a preferred embodiment, with particular reference to the figures of the enclosed drawings, wherein:

- figure 1 shows a perspective view of an object identification and control system according to the present invention,
- figure 2 shows a perspective view of the object identification and control system of figure 1, to which it is applied a telescopic rod and an agricultural tool, in particular a hacksaw,
- figures 3A, 3B and 3C show various agricultural tools for use with the object identification and control system of figure 1,
- figures 4A, 4B and 4C show a plan view of various mechanical coupling elements for use with the object identification and control system of figure 1, according to a first embodiment of the invention,
- figures 5A, 5B and 5C show a perspective view of the different mechanical coupling elements of figures 4A, 4B and 4C,
- figure 6 shows a perspective view of the transmission shaft of a tool, which can be interfaced with the means of operation of the system of figure 1, through the interface elements of figures 4A, 4B and 4C,
- figure 7 shows a perspective view of the end of the transmission shaft of the system of figure 1, according to a first embodiment of the invention, which can be used with the interface elements of figures 4A, 4B and 4C,
- figures 8A, 8B and 8C show a plan view of different mechanical coupling elements for use with the object identification and control system of figure 1, according to a second embodiment of the invention,
- figures 9A, 9B and 9C show a perspective view of the different mechanical coupling elements of figures 8A, 8B and 8C,
- figure 10 shows a perspective view of the transmission shaft of a tool, which can be interfaced with the means of operation of the system of figure 1, through the interface elements of figures 8A, 8B and 8C, and
- figure 11 shows a perspective view of the end of a second transmission shaft of the system of figure 1, according to a second embodiment of the invention, which can be used with the interface elements of figures 8A, 8B and 8C.

[0022] Making preliminarily reference to figures 1 and 2, the object identification and control system according to a preferred embodiment of the present invention comprises a casing 10, inside of which an electric motor (not shown) is positioned, powered by means of an electric cable 11 and connected to a motor shaft 12, arranged inside a hollow rod 13 of support. The electric motor and the motor shaft 12 constitute the means of operation of the system according to the present invention. The elec-

tric motor is also connected to a switch 14, manually operable by an operator, said switch being arranged on a handle 15. The electric motor and the switch 14 are additionally connected to each other by means of an electric circuit (not shown), to which a control unit (not shown) is connected. The control unit, together with the switch 14, constitutes the means of control of the system according to the present invention. The control unit is in its turn connected to a plurality of seats 16, 16', 16'', ... for housing the respective mechanical coupling elements (shown in figures 4A and 5A, 4B and 5B, 4C and 5C, respectively with reference numbers 17, 17', 17''; and in figures 8A and 9A, 8B and 9B, 8C and 9C, respectively with reference numbers 18, 18', 18''), which constitute the means of identification of the system according to the present invention.

[0023] With reference in particular to figure 2, the motor shaft and the relative hollow rod 13 can be prolonged by the application of an extension consisting of a fixed or telescopic support shaft 19, inside of which means of transmission of motion are arranged which can be of different type, such as for example a gear, a worm, or a flexible or fixed or telescopic transmission shaft. At the end of the extension, figure 2 shows a chainsaw 20, which can be interchanged with other tools suitable for being moved by the means of operation according to the invention, for example tools of harvesting fruits, berries, coffee or olives, but also chain saws, jig saws, hedge trimmers, scissors, hedge clippers, blowers, fans, blades, pumps. By way of example, figures 3A, 3B and 3C show respectively a shaker of olives 21, a hacksaw 22 and a mower 23. As already shown above, such tools are examples of objects to which the system according to the present invention can be applied, such objects being able to cover other kinds of products to which the teachings of the present invention can be broadened without requesting any inventive effort by a person skilled in the art.

[0024] With reference to figures 4-7, the connection of these tools to the means of transmission of motion, i.e. for example to the motor shaft 12 or to its extension, is obtained through an interlocking coupling between the end of the motor shaft 12 and a seat of the driven shaft of each tool, possibly through the interposition of interface elements 17, 17', 17'' which can be interchanged with each other. In particular, each interface element 17, 17', 17'' is provided with an identical seat 26 for the interlocking coupling at the end of the transmission shaft 12 and with a different external surface 27, 27', 27'', for interlocking coupling in a corresponding seat of the drive shaft of a corresponding different tool. The coupling can also be realised directly between the motor shaft 12 and the seat 24 of the driven shaft 25 of a particular tool 20.

[0025] Thanks to the different size and/or shape of its external surface, each interface element can be used with a specific tool and is incompatible with other tools.

[0026] As already described with reference to figures 1 and 2, the means of identification of the system according to the present invention are constituted by a plurality

of seats 16, 16', 16'', ... each seat being suitable for housing a respective mechanical coupling element 17, 17', 17''. The control unit of the system is connected to said seats in a way to detect the presence in each of them of the respective mechanical coupling element. In operation, according to the detected presences, the control unit is programmed to impart to the means of operation different operative modes, for example different rotation speed.

[0027] For example, the detection of the presence of all the mechanical coupling elements in their respective seats signals that to the means of operation can be connected only the tool that can be coupled directly, the control unit imparting to the motor the corresponding mode of operation. The absence of a specific mechanical coupling element 17 signals that to the means of operation can be connected only the tool that can be coupled by means of said specific mechanical coupling element 17, the control unit imparting to the motor the corresponding mode of operation, different from that of the previous case.

[0028] In case of absence of more mechanical coupling elements, the control unit prevents starting the motor, i.e. commands the operation according to a safe mode, such as to allow an operation that does not compromise the tool possibly applied to the means of operation and neither the result of the performed work, also by executing it in a non optimised mode.

[0029] With reference to figures 8-11, it is shown an alternative way of realisation of the system of the present invention, wherein the interface elements 18, 18', 18'' are all provided with an identical threaded seat 28 for coupling by screwing at the threaded end 29 of the transmission shaft 12 and with a different external surface 27, 27', 27'', for the interlocking coupling in a corresponding housing of the driven shaft of a corresponding different tool, in any aspect similar to the external surface of the interface elements shown with reference to figures 4-5. In the case shown with reference to figures 8-11, the coupling cannot be on the contrary realised directly between the motor shaft 12 and the seat 24 of the driven shaft 25 of a specific tool 20.

[0030] The operative modes of the system of the invention by means of the interface elements shown with reference to figures 8-11 are in any aspect coincident with those already shown with reference to figures 4-7.

[0031] The present description makes it evident that the solution according to the present invention allows the identification in complete safety, without any possibility of mistake of the operator, of the objects applied to the means of operation and the consequent adjustment of the operative modes of the same means of operation by the means of control, in such a way achieving the preset results.

[0032] The present invention has been described for illustrative but not limitative purposes, according to its preferred embodiments, but it is to be understood that variations and/or modifications can be made by those skilled in the art without departing from the relevant scope

of protection, as defined by the enclosed claims.

Claims

1. Object identification and control system, comprising means of operation of a plurality of objects that can alternatively be coupled with said means of operation, means of control of said means of operation and means of identification of said objects, said means of identification being connected to said means of control, **characterised in that** said objects are agricultural tools, said means of identification comprise a station of housing and identification of one or more mechanical coupling elements of said means of operation and said objects, said station of housing being provided with a housing seat for each mechanical coupling element, which is not compatible with any of the other mechanical coupling elements, each housing seat being provided with means of detecting the presence of the correspondent mechanical coupling element, said means of detecting of each seat being all connected to a control unit, programmed according to the signal received from any of said means of detecting, controlling said means of operation, each mechanical coupling element being compatible with only one of said objects and with no other, said means of operation comprising a motor and means of transmission arranged respectively within a handle and a support shaft.

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2. Object identification and control system according to claim 1, **characterised in that** said means of operation comprise a motor and means of transmission of motion from said motor to said objects.

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3. Object identification and control system according to claim 1 or 2, **characterised in that** said means of identification are positioned in proximity of said means of control.

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4. Object identification and control system according to any of the preceding claims, **characterised in that** said mechanical coupling elements are constituted by a body provided with means of coupling with said means of operation and with means of coupling with said objects, said means of coupling with said means of operation being the same for all the interface elements and said means of coupling with said objects being different for each interface element, each interface element being compatible with only one of said objects and with no other.

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5. Object identification and control system according to claim 4, **characterised in that** said means of coupling with said means of operation are constituted by an interlocking shaped seat, which is inserted on a correspondent pin of said means of operation.

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6. Object identification and control system according to claim 4, **characterised in that** said means of coupling with said means of operation are constituted by a threaded seat, that is screwed on a corresponding threaded bolt of said means of operation.

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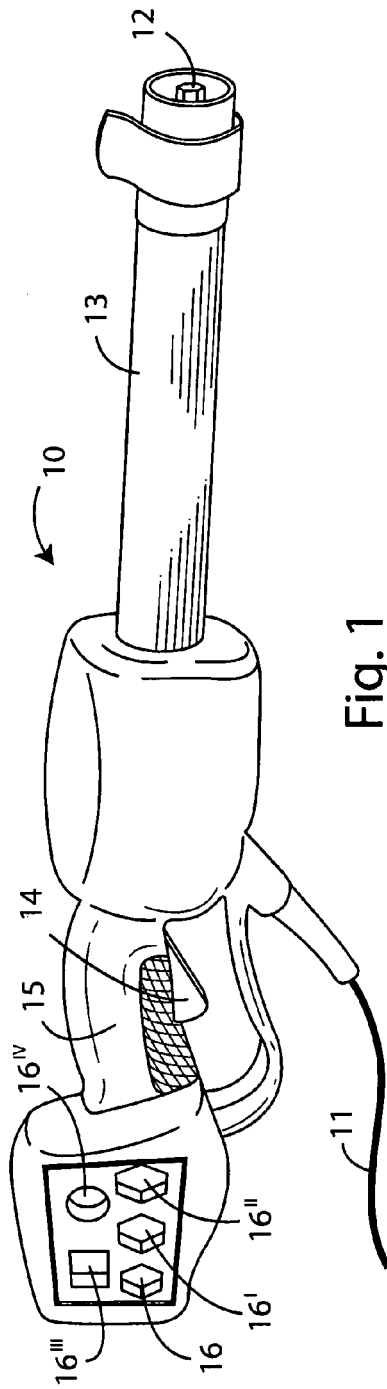


Fig. 1

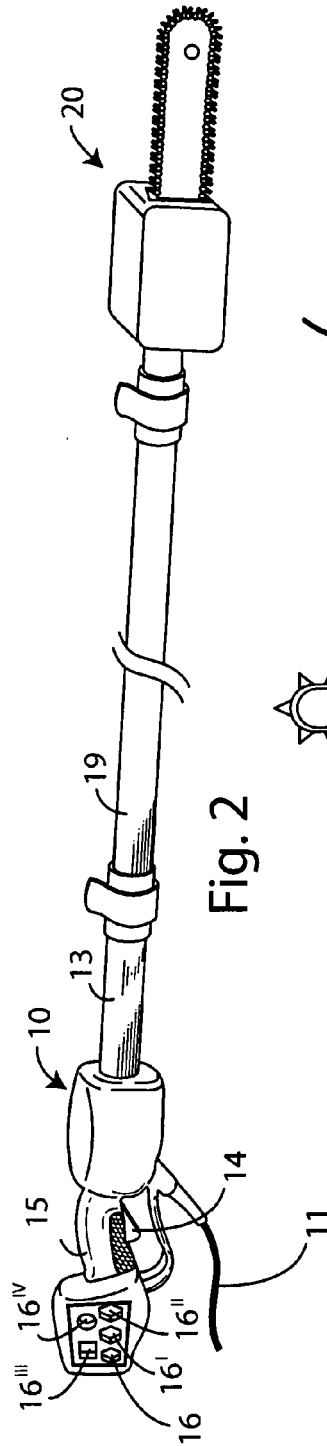


Fig. 2

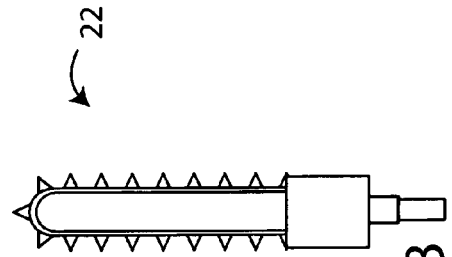


Fig. 3A

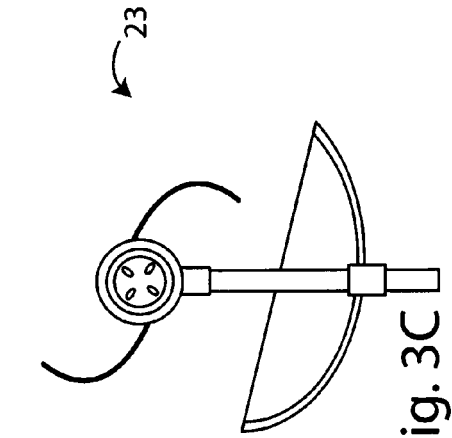


Fig. 3B

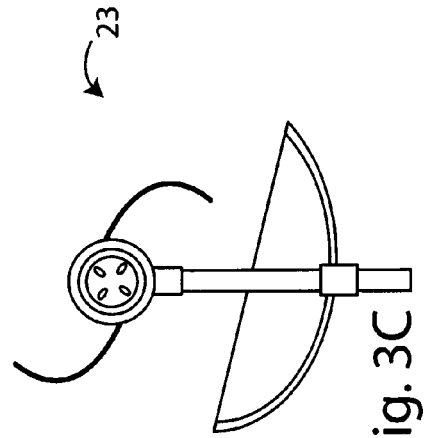
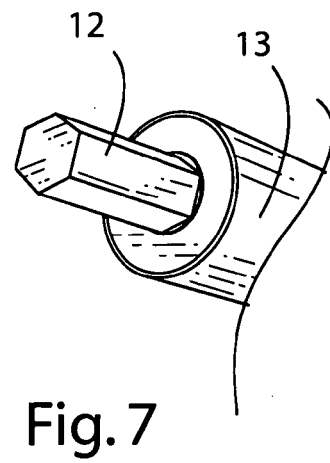
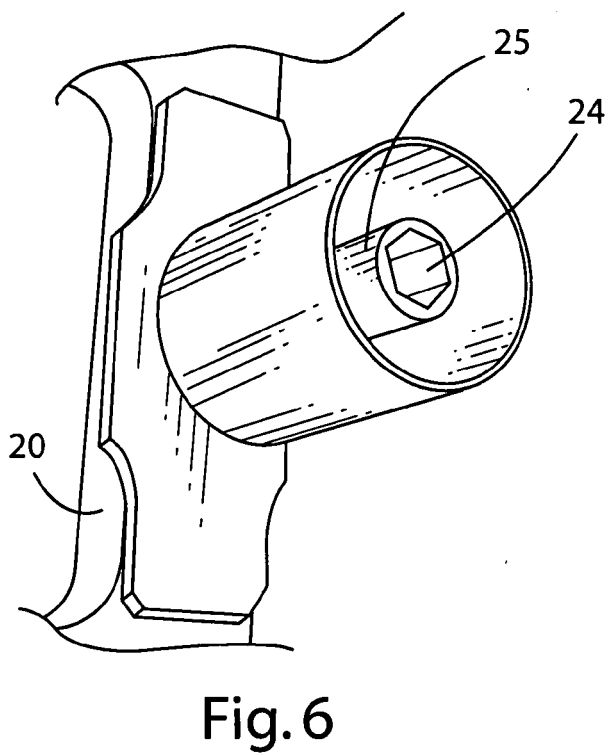
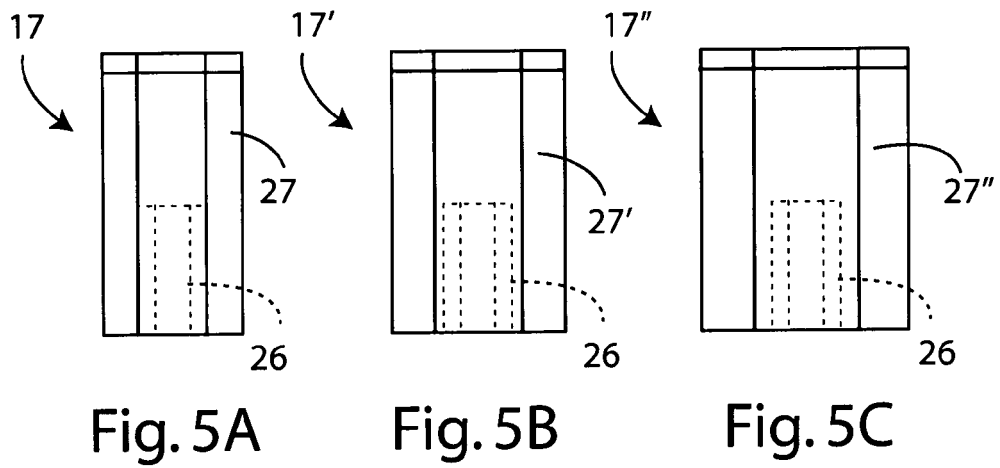
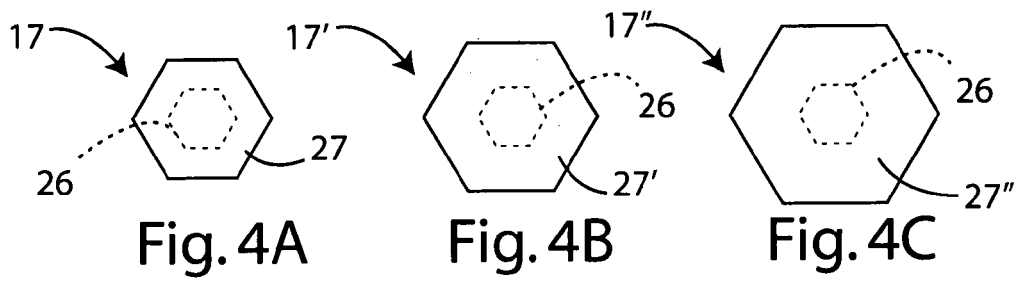


Fig. 3C



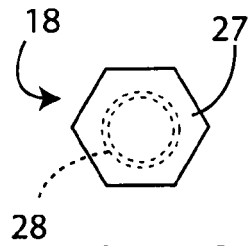


Fig. 8A

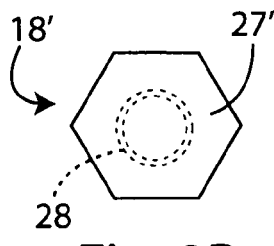


Fig. 8B

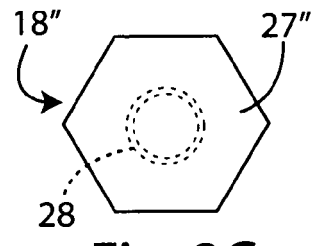


Fig. 8C

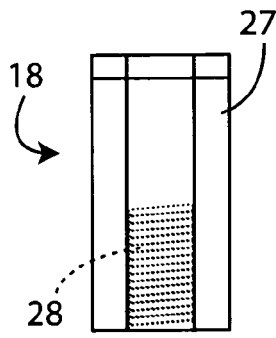


Fig. 9A

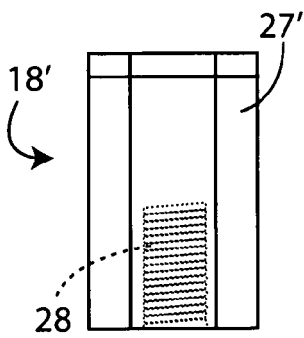


Fig. 9B

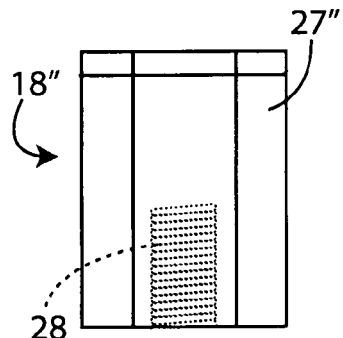


Fig. 9C

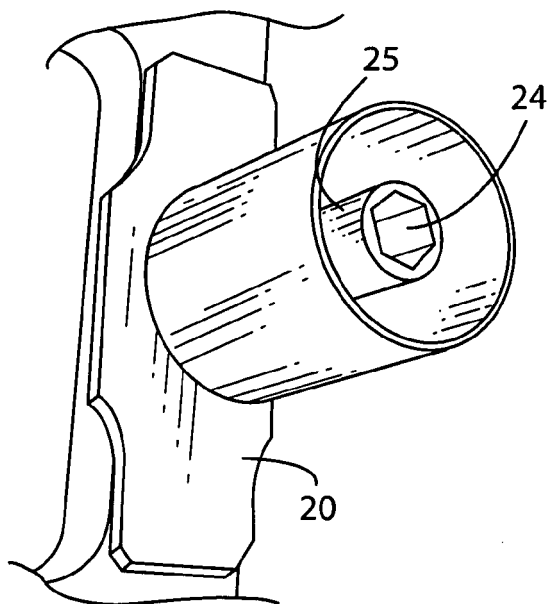


Fig. 10

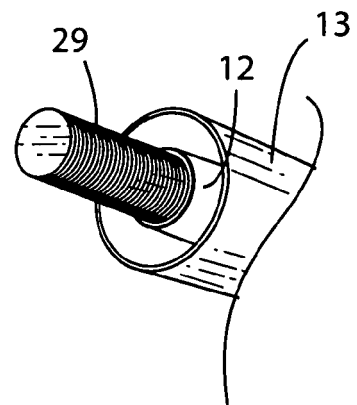


Fig. 11



EUROPEAN SEARCH REPORT

Application Number
EP 12 42 5105

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 075 906 A2 (BLACK & DECKER INC [US]) 14 February 2001 (2001-02-14) * abstract; figures 1-3 * * paragraph [0045] - paragraph [0061] * -----	1-6	INV. B25F3/00
A	EP 0 822 036 A1 (RYOBI NORTH AMERICA INC [US] MTD PRODUCTS INC [US]) 4 February 1998 (1998-02-04) * abstract; figures 1-6 * -----	1-6	
A	GB 2 054 035 A (BEAIRD POULAN DIV) 11 February 1981 (1981-02-11) * abstract; figures 6-10 * -----	1-6	
A	FR 1 116 778 A (M FEAU) 11 May 1956 (1956-05-11) * abstract; figures 1-7 * -----	1-6	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B25F A01G B23Q A63H A63F A61C
Place of search		Date of completion of the search	Examiner
The Hague		11 September 2012	Balzar, Maarten
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 42 5105

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11-09-2012

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
EP 1075906	A2	14-02-2001	AT	243606 T	15-07-2003
			AU	4722200 A	18-01-2001
			CN	1281775 A	31-01-2001
			DE	60003499 D1	31-07-2003
			DE	60003499 T2	19-05-2004
			EP	1075906 A2	14-02-2001
			US	6181032 B1	30-01-2001

EP 0822036	A1	04-02-1998	DE	69721659 D1	12-06-2003
			DE	69721659 T2	27-11-2003
			EP	0822036 A1	04-02-1998
			JP	10089322 A	07-04-1998
			US	5802724 A	08-09-1998

GB 2054035	A	11-02-1981	AU	537121 B2	07-06-1984
			AU	5930980 A	08-01-1981
			BE	883980 A1	16-10-1980
			BR	8003933 A	04-08-1981
			CA	1163201 A1	06-03-1984
			DE	3023628 A1	22-01-1981
			ES	8105821 A1	01-09-1981
			ES	8300933 A1	01-02-1983
			ES	8308614 A1	01-12-1983
			FR	2464637 A1	20-03-1981
			FR	2479894 A1	09-10-1981
			FR	2479898 A1	09-10-1981
			FR	2479935 A1	09-10-1981
			GB	2054035 A	11-02-1981
			IT	1131669 B	25-06-1986
			JP	1609813 C	15-07-1991
			JP	2020389 B	09-05-1990
			JP	56009182 A	30-01-1981
			MX	150344 A	18-04-1984
			SE	454336 B	25-04-1988
			SE	8004658 A	26-12-1980
			SE	8800498 A	15-02-1988
			SE	8800499 A	15-02-1988
			US	4286675 A	01-09-1981

FR 1116778	A	11-05-1956	NONE		
