

Description

[0001] The present invention relates to a throttle lever of a working machine incorporating a multi-purpose engine, for example a tiller, mower, tea leaf picker, cargo carrier, rice planting machine, harvester, binder, combine harvester, snowplow, atomizer, pump, etc., in order to control the engine revolution thereof. More particularly, the present invention relates to a throttle lever with an engine stop switch provided inside or outside the throttle lever, so that an operator may hold a handle of working machine with his finger being placed on a lever member of the throttle lever, and in case of emergency, the lever member can be rotated or moved, thereby the engine can be stopped immediately.

[0002] As an example of working machine relating to the present invention, a tiller has a pair of handle bars elongated from the main body of the tiller, and one of the pair of handle bars has a so-called throttle lever. An operator may rotate a lever member of the throttle lever in a proper direction according to working condition, thereby the fuel supply to the engine can be controlled, and accordingly the engine revolution speed may be accelerated or decelerated in order to carry out the working.

[0003] In this connection, while the operator drives the tiller, and for example, when the operator changes the moving direction of tiller from the forward direction to the rearward direction, there may be a case that the handle bars held by the operator suddenly rise due to several factors such as the reaction force against the revolution force, the shift of gravity center to the front of the tiller, etc., which may result in the state that the operator is unable to operate the tiller appropriately. This unable state of operation has resulted in a serious accident in many cases, for example, tilling blades of the tiller moving in the rearward direction harmed the operator, or the tiller lost its balance and fell on the ground during operating thereof, then the operator was caught in the tiller. Especially, the aged operators have been increasing in recent years, and the above mentioned accidental cases are rapidly increasing.

[0004] Accordingly, for the purpose of avoiding such a dangerous state, there have been provided an engine stop switch in order to stop the engine immediately in case of emergency. This type of engine stop switch in the prior art, for example a push button switch or rotation (dial type) switch, is provided apart from the throttle lever, such as at the center of any handle bar, or on the handle bar in the vicinity of a handle grip. In particular, there have been a prior art that a one-touch type push button switch is provided on a connecting part of the left handle bar and the right handle bar (that is, at the center of the both handle bars).

[0005] Further, in regard to other working machine such as a mower, there may be a case that the engine should be stopped immediately. To be discussed in detail, the mower will be used in the grassland, where in-

dustrial wastes incorporating stone or metal might be left. If the cutter blade of the mower touches the industrial waste incorporating stone or metal, the revolving blade might be affected by the remarkable revolution resistance, which might spoil the safety of working. In addition, there may also be the case that, for example, a metal pole of a guardrail (crash barrier) exists in the grassland, and if the cutter blade touches the metal pole, the same dangerous state as above discussed may occur. In such a case, the engine should be stopped immediately in order to avoid the danger, thus the same type of engine stop switch as the case of tiller has been provided on the mower.

[0006] However, the prior art has the following disadvantageous point.

[0007] According to the prior art as above discussed, in order to avoid the danger, the engine stop switch serving to stop the engine immediately is separately provided other than the throttle lever. However, in ordinary case, while the operator drives the tiller, the pair of handle bars of the tiller are held by the both hands of the operator, in a state that any finger of one hand of the operator is placed on the lever member of the throttle lever in order to control the engine revolution speed. Consequently, under several operation conditions, it becomes very difficult for the operator to further operate the engine stop switch, and in several cases, although the engine should be stopped immediately, there has been a possibility that the immediate engine stop will not be made. This also applies to the case of mower.

[0008] Further, according to the structure of the prior art, the engine stop switch provided apart from the throttle lever stops the engine by short-circuit of the electric power. However, when this type of engine stop switch is actuated, the lever member of the throttle lever is maintained as the operating position, that is, the position at which the fuel is still supplied, thus it is difficult to stop the engine surely and immediately. For example, during high-speed driving of engine, if the engine is stopped by operating the engine stop switch and thus by short-circuit of electric power, the fuel-air mixture may excessively introduced in the cylinder of engine. After that, when the engine should be re-started, the combustion chamber will be in the excessive state of fuel-air mixture, that is, so-called "wet spark plug", in which state the spark plug cannot be ignited and the engine cannot be restarted.

[0009] In addition, there are several tractor-type mowers in which the electric circuit of engine will be automatically short-circuited at the same time of turning OFF the clutch operation handle. However, according to this type of mower, the engine will be stopped every time the clutch is disengaged, and this has been a serious problem to the practical operation.

[0010] Based on the problems as above discussed, it is an object of the present invention to provide a throttle lever which can immediately stop the engine in case of emergency in order to avoid danger, and which can also

restart the engine immediately when the engine should be restarted.

[0011] To achieve the object mentioned above, according to claim 1 of the present invention, there is provided a working machine throttle lever to be attached to and detached from a working machine comprising a main body, a lever member rotatively attached to the main body and connected to a wire elongated from an engine of the working machine, and an engine stop switch. When the lever member is rotated in one direction, a revolution speed of the engine of the working machine is accelerated, and when the lever member is rotated in another direction, the revolution speed of the engine of the working machine is decelerated. Further, when the lever member is rotated by more than a predetermined amount in any of the one and another directions, the engine stop switch is actuated and the engine is stopped.

[0012] According to claim 2 of the present invention in regard to the working machine throttle lever of claim 1, the throttle lever is attached to a handle bar elongated from a main unit of the working machine in a state that the throttle lever may be attached to and detached from the handle bar.

[0013] According to claim 3 of the present invention, in regard to the working machine throttle lever of claim 1, the throttle lever is attached to a main unit of the working machine in a state that the throttle lever may be attached to and detached from the main unit.

[0014] According to claim 4 of the present invention, in regard to the working machine throttle lever of claim 1, the engine stop switch is incorporated inside the throttle lever.

[0015] According to claim 5 of the present invention, in regard to the working machine throttle lever of claim 1, the engine stop switch is provided outside the throttle lever.

[0016] According to claim 6 of the present invention, in regard to the working machine throttle lever of claim 4, there are further provided a main body switch element incorporated in the main body and a lever member switch element incorporated in the lever member. When the lever member is rotated by more than a predetermined amount in the one or another direction, the engine is stopped by short-circuiting both of the switch elements.

[0017] According to claim 7 of the present invention, in regard to the working machine throttle lever of claim 4, the engine stop switch comprises a main body switch element of which position on the main body has been determined and is fit into the main body, and a lever member switch element of which position on the lever member has been determined and is fit into the lever member. When the lever member is rotated by more than a predetermined amount in the one or another direction, the main body switch element and the lever member switch element of the engine stop switch becomes a predetermined position relation so that the en-

gine stop switch is actuated and the engine is stopped.

[0018] According to claim 8 of the present invention, in regard to the working machine throttle lever of claim 7, there are further provided protrusion on any one of the main body switch element and the main body and hollow on the other of the main body switch element and the main body so that a position of the main body switch element is determined by engagement of the protrusion with the hollow, and protrusion on any one of the lever member switch element and the lever member and hollow on the other of the lever member switch element and the lever member so that a position of the lever member switch element is determined by engagement of the protrusion with the hollow.

[0019] According to claim 9 of the present invention, in regard to the working machine throttle lever of claim 4, the main body switch element is integrally incorporated in the main body by insertion method during manufacturing of the main body, and the lever member switch element is integrally incorporated in the lever member by insertion method during manufacturing of the lever member.

[0020] According to claim 10 of the present invention, in regard to the working machine throttle lever of claim 5, there are further provided a lever member switch element outside the lever element and the other switch element outside a main unit of the working machine or a handle bar. When the lever member is rotated by more than a predetermined amount in the one or another direction, the engine is stopped by short-circuiting both of the switch elements.

[0021] According to claim 11 of the present invention, in regard to the working machine throttle lever of claim 5, the engine stop switch is attached on the lever member, and engine is stopped when the lever member is rotated by more than a predetermined amount as the engine stop switch becomes in contact with a main unit of the working machine.

[0022] According to claim 12 of the present invention, in regard to the working machine throttle lever of claim 1, there is further provided an idle mechanism attached to the throttle lever. An operator may confirm by feeling of resistance whether or not the lever member reaches just before a position at which the engine can be stopped, then the operator may further rotate the lever member in order to stop the engine.

[0023] According to claim 13 of the present invention, in regard to the working machine throttle lever of claim 12, the idle mechanism is incorporated in a space between the lever member and the main body. When an operator actuates the engine stop switch by rotating the lever member, a resistance force is given to the operator just before the engine stop switch is actuated, then the operator may further rotate the lever member in order to actuate the engine stop switch.

[0024] According to claim 14 of the present invention, in regard to the working machine throttle lever of claim 1, when the lever member is rotated by more than a pre-

determined amount in one direction, or when the lever member is rotated by more than the predetermined amount in another direction, the engine is stopped regardless of direction of rotation.

[0025] According to claim 15 of the present invention, in regard to the working machine throttle lever of claim 1, an attachment position of the lever member switch element or the main body switch element is adjustable, thereby a timing of engine stop is adjusted.

[0026] According to claim 16 of the present invention, in regard to the working machine throttle lever of claim 1, an operation part of the lever member is formed in a forked shape.

[0027] According to claim 17 of the present invention, in regard to the working machine throttle lever of claim 1, the fuel supply is cut when the lever member is rotated by more than a predetermined amount, and an engine electric power circuit is short-circuited at the same time.

[0028] According to claim 18 of the present invention, in regard to the working machine throttle lever of claim 1, there is further provided a waterproofing means covering the engine stop switch.

[0029] According to claim 19 of the present invention, in regard to the working machine throttle lever of claim 1, a metal fitting in order to attach the throttle lever to the working machine is attached to or detached from the throttle lever from the outside of the throttle lever.

[0030] According to claim 20 of the present invention, in regard to the working machine throttle lever of claim 1, a force is always applied by an elastic member to the throttle lever in a direction of decelerating a revolution speed of the engine.

[0031] Consequently, the engine stop switch in order to stop the engine immediately is provided outside or inside the throttle lever, and when the lever member of the throttle lever is rotated by more than a predetermined amount in one or another direction, the engine stop switch is actuated in case of emergency, thus the engine can be stopped. Therefore, in a normal operation, the fingers of the operator are always placed on the lever member of the throttle lever in order to carry out the working by controlling the revolution speed of the engine, the rotation of the lever member by these fingers in case of emergency can be accomplished easily. Accordingly, in case of emergency, the operator may rotate the lever member of the throttle lever by more than a predetermined amount in one or another direction without being confused, thus the engine can be stopped immediately.

[0032] Preferably, the throttle lever may be attached to a handle bar elongated from a main unit of the working machine.

[0033] Preferably, the throttle lever may be attached to a main unit of the working machine.

[0034] In regard to the attachment of engine stop switch to the throttle lever, the engine stop switch may be incorporated inside, or provided outside, the throttle lever.

[0035] When the engine stop switch is incorporated inside the throttle lever, there may be further provided a main body switch element incorporated in the main body and a lever member switch element incorporated in the lever member. When the lever member is rotated by more than a predetermined amount in the one or another direction, the engine is stopped by short-circuiting both of the switch elements.

[0036] When the engine stop switch is incorporated inside the throttle lever, the engine stop switch may comprise a main body switch element of which position on the main body has been determined and is fit into the main body, and a lever member switch element of which position on the lever member has been determined and is fit into the lever member. When the lever member is rotated by more than a predetermined amount in the one or another direction, the main body switch element and the lever member switch element of the engine stop switch become a predetermined position relation so that the engine stop switch is actuated and the engine is stopped.

[0037] Preferably, as an example of the engagement mechanism described above, there may be provided protrusion on any one of the main body switch element and the main body and hollow on the other of the main body switch element and the main body so that a position of the main body switch element is determined by engagement of the protrusion with the hollow, and also protrusion on any one of the lever member switch element and the lever member and hollow on the other of the lever member switch element and the lever member so that a position of the lever member switch element is determined by engagement of the protrusion with the hollow.

[0038] Preferably, when the engine stop switch is incorporated inside the throttle lever, the main body switch element may be integrally incorporated in the main body by insertion method during manufacturing of the main body, and the lever member switch element may be integrally incorporated in the lever member by insertion method during manufacturing of the lever member.

[0039] On the other hand, when the engine stop switch is provided outside the throttle lever, there may be provided a lever member switch element outside the lever element and the other switch element outside a main unit of the working machine or a handle bar. When the lever member is rotated by more than a predetermined amount in the one or another direction, the both of the switch elements become in contact with each other, thus the engine is stopped by short-circuiting both of the switch elements.

[0040] Preferably, the engine stop switch may be attached on the lever member, and engine is stopped when the lever member is rotated by more than a predetermined amount as the engine stop switch becomes in contact with a main unit of the working machine.

[0041] Preferably, there may be provided an idle mechanism attached to the throttle lever. An operator

may confirm by feeling of resistance whether or not the lever member reaches just before a position at which the engine can be stopped, then the operator may further rotate the lever member in order to stop the engine.

[0042] Preferably, when the idle mechanism is provided, the idle mechanism may be provided in a space between the lever member and the main body. When an operator actuates the engine stop switch by rotating the lever member, a resistance force is given to the operator just before the engine stop switch is actuated, then the operator may further rotate the lever member in order to actuate the engine stop switch.

[0043] Preferably, the engine may be stopped when the lever member is rotated by more than a predetermined amount in one direction, or when the lever member is rotated by more than the predetermined amount in another direction, regardless of direction of rotation.

[0044] Preferably, an attachment position of the lever member switch element or the main body switch element may be adjustable, thereby a timing of engine stop can be adjusted. Preferably, an operation part of the lever member may be formed in a forked shape.

[0045] Preferably, the fuel supply may be cut when the lever member is rotated by more than a predetermined amount, and an engine electric power circuit may be short-circuited at the same time.

[0046] Preferably, there may be a waterproofing means covering the engine stop switch.

[0047] Preferably, a metal fitting in order to attach the throttle lever to the working machine may be attached to or detached from the throttle lever from the outside of the throttle lever.

[0048] Preferably, a force may always be applied by an elastic member to the throttle lever in a direction of decelerating a revolution speed of the engine.

[0049] With this structure, as compared with the prior art in which the engine stop switch is provided separate from the throttle lever, more effective operation can be accomplished, thus the safety may improve as well. In case of emergency, according to the prior art, the operator may feel danger to himself and be confused, thereby the appropriate action in order to avoid the danger cannot be performed, which would result in a serious accident. On the other hand, according to the present invention, such a danger may surely be avoided, and the higher safety can be obtained.

[0050] When the engine stop switch is incorporated inside the throttle lever, since the structural member of the engine stop switch will not be exposed to the outside of the throttle lever, the function of the engine stop switch will not be spoiled due to intervention of other parts, and the malfunction of the engine stop switch can also be prevented. Further, the engine stop switch will not spoil the aesthetic of the throttle lever.

[0051] When the engine may be stopped regardless of direction of the rotation of the throttle lever, further effective operation and higher safety can be obtained.

[0052] With this structure, in particular, since the en-

gine stop switch comprises, a main body switch element of which position on the main body has been determined and is fit into the main body, and a lever member switch element of which position on the lever member has been determined and is fit into the lever member, the position of each switch element can be determined easily and accurately, thus the more precision engine stop switch can be obtained.

[0053] Further, since the lever member switch element and the main body switch element are assembled according to the hollow-protrusion structure engaged with each other, the assemble thereof can be made by accurately determining the engagement position.

[0054] Further, when the engine stop timing is adjustable, the desired stop timing corresponding to various working machines can be obtained.

[0055] Further, when an operation part of the lever member is formed in a forked shape, further facile operation during emergency stop of the engine can be accomplished.

[0056] Further, when a waterproofing means covering the engine stop switch is provided, high durability can be obtained for a long period.

[0057] Further, when a metal fitting in order to attach the throttle lever to the working machine may be attached to or detached from the throttle lever from the outside of the throttle lever, the attachment or detachment of the throttle lever can be made easily.

[0058] Further, when a force is always be applied by an elastic member to the throttle lever in a direction of decelerating a revolution speed of the engine, the position of the lever member may become just before the engine stop automatically by simply release the finger grip of the operator.

[0059] Further, when the idle mechanism is provided at a space between the lever member and the main body, the desired idle function may be obtained without requiring the complicated structure outside the throttle lever. When the idle mechanism is incorporated inside the throttle lever, the malfunction of the engine stop switch may also be prevented (if the idle mechanism is provided outside the throttle lever, debris may be caught in the idle mechanism, thereby the idle mechanism cannot be operated, or malfunction thereof will occur).

[0060] The invention will be described below in detail with reference to the accompanying drawings, in which:

Figure 1 is a side view showing an overall structure of a tiller according to a first embodiment of the present invention;

Figure 2 is a perspective view showing a structure of a grip of the left handle bar of the tiller and a throttle lever provided adjacent to the grip according to the first embodiment of the present invention;

Figure 3 is a perspective view showing the structure of the grip of the left handle bar of the tiller and the throttle lever provided adjacent to the grip, also explaining a state that the throttle lever is rotated in

the direction of accelerating of engine revolution speed according to the first embodiment of the present invention;

Figure 4 is a perspective view showing the structure of the grip of the left handle bar of the tiller and the throttle lever provided adjacent to the grip, also explaining a state that the throttle lever is rotated in the direction of decelerating of engine revolution speed according to the first embodiment of the present invention;

Figure 5 is a perspective view showing an external appearance of the throttle lever according to the first embodiment of the present invention;

Figure 6 is a perspective view showing an external appearance of the throttle lever according to the first embodiment of the present invention;

Figure 7 is a plan view showing a structure of an end member of the throttle lever according to the first embodiment of the present invention;

Figure 8 is a plan view showing a structure of a leaf spring member of the throttle lever according to the first embodiment of the present invention;

Figure 9 is a plan view showing a structure of a lever member of the throttle lever according to the first embodiment of the present invention;

Figure 10 is a plan view showing a structure of a lever member switch element of the throttle lever according to the first embodiment of the present invention;

Figure 11 is a plan view showing a structure of a main body switch element of the throttle lever according to the first embodiment of the present invention;

Figure 12 is a plan view showing a structure of the end member of the throttle lever according to the first embodiment of the present invention;

Figure 13 is an exploded front view of the throttle lever according to the first embodiment of the present invention, showing the order of assembly process of each part shown in Figs. 7 through 12;

Figure 14 is a side view showing the overall structure of the tiller according to the first embodiment of the present invention, also explaining a state that the tiller is tilted toward the front due to occurrence of any trouble;

Figure 15 is a perspective view showing the overall structure of the tiller according to the first embodiment of the present invention, also explaining a normal operation state;

Figure 16 is a perspective view showing the overall structure of the tiller according to the first embodiment of the present invention, also explaining a state that the tiller is tilted toward the front due to occurrence of any trouble;

Figure 17 is a view showing a relation between the position of the lever member switch element and the position of the main body switch element during normal operation according to the first embodiment of

the present invention;

Figure 18 is a view showing a relation between the position of the lever member switch element and the position of the main body switch element when the engine is stopped according to the first embodiment of the present invention;

Figure 19 is a perspective view showing a state that an operator carries a mower serving as a working machine according to a second embodiment of the present invention;

Figure 20 is a partial perspective view showing an expanded state that the operator holds a grip of the mower by the right and left hands of the operator according to the second embodiment of the present invention;

Figure 21 is a perspective view showing a state that an operator carries a mower serving as a working machine according to a third embodiment of the present invention;

Figure 22 is a partial perspective view showing an expanded state that the operator holds a grip of the mower by the right and left hands of the operator according to the third embodiment of the present invention;

Figure 23 is a perspective view showing a state that an operator carries a mower serving as a working machine according to a fourth embodiment of the present invention;

Figure 24 is a partial perspective view showing an expanded state that the operator holds a grip of the mower by the right and left hands of the operator according to the fourth embodiment of the present invention;

Figure 25 is a partial perspective view showing a structure that an engine stop switch is provided outside a throttle lever according to a fifth embodiment of the present invention;

Figure 26 is a perspective view showing an overall structure of a mower according to a sixth embodiment of the present invention;

Figure 27 is a perspective view showing a structure of a grip of the handle bar of the mower and a throttle lever provided adjacent to the grip according to the sixth embodiment of the present invention;

Figure 28 is a plan view showing a structure of an end member of the throttle lever according to the first embodiment of the present invention;

Figure 29 is a perspective view showing a structure of a throttle lever according to the sixth embodiment of the present invention;

Figure 30 is a plan view showing a structure of an end member of the throttle lever according to the sixth embodiment of the present invention;

Figure 31 is a plan view showing a structure of a leaf spring member of the throttle lever according to the sixth embodiment of the present invention;

Figure 32 is a plan view showing a structure of a lever member of the throttle lever according to the

sixth embodiment of the present invention;

Figure 33 is a plan view showing a structure of a lever member switch element of the throttle lever according to the sixth embodiment of the present invention;

Figure 34 is a plan view showing a structure of a main body switch element of the throttle lever according to the sixth embodiment of the present invention;

Figure 35 is a plan view showing a structure of the end member of the throttle lever according to the sixth embodiment of the present invention;

Figure 36 is an exploded front view of the throttle lever according to the sixth embodiment of the present invention, showing the order of assembly process of each part shown in Figs. 30 through 35;

Figure 37 is a plan view showing a relation between the main body switch element and the end member according to the sixth embodiment of the present invention;

Figure 38 is a view showing a relation between the positions of the switch elements with each other during normal operation according to the sixth embodiment of the present invention;

Figure 39 is a view showing a relation between the positions of the switch elements with each other when the engine is stopped according to the sixth embodiment of the present invention;

Figure 40 is a plan view showing a relation between a main body switch member and an end member according to a seventh embodiment of the present invention;

Figure 41 is a plan view showing a structure of a throttle lever provided with an idle mechanism according to an eighth embodiment of the present invention;

Figure 42 is a plan view showing a structure of the throttle lever provided with the idle mechanism according to the eighth embodiment of the present invention;

Figure 43 is a perspective view showing a structure of a throttle lever provided with an idle mechanism according to a ninth embodiment of the present invention;

Figure 44 is a perspective view showing an overall structure of a mower according to a tenth embodiment of the present invention;

Figure 45 is a side view showing an overall structure of a tiller according to an eleventh embodiment of the present invention;

Figure 46 is a perspective view showing an overall structure of an atomizer according to a twelfth embodiment of the present invention;

Figure 47 is a perspective view showing an overall structure of a pump according to a thirteenth embodiment of the present invention;

Figure 48 is a plan view showing a structure of a lever member and a lever member switch element

according to a fourteenth embodiment of the present invention;

Figure 49 is a plan view showing a structure of an engine stop switch provided outside a pump according to a fifteenth embodiment of the present invention;

Figure 50 is a plan view of an end member on which a main body switch element is provided according to a sixteenth embodiment of the present invention; Figure 51 is a sectional view showing a relation between the end member on which the main body switch element is provided, and a lever member, according to the sixteenth embodiment of the present invention;

Figure 52 is a sectional view showing a relation between the end member on which the main body switch element is provided, and the lever member, according to the sixteenth embodiment of the present invention;

Figure 53 is a plan view, as viewed from the outside, of an end member on which a main body switch element is provided according to a seventeenth embodiment of the present invention;

Figure 54 is a sectional view cut along a line A-A of Fig. 53 according to the seventeenth embodiment of the present invention;

Figure 55 is a plan view showing a state that a main body switch element is attached to an end member according to an eighteenth embodiment of the present invention;

Figure 56 is a view showing a structure of attachment of a throttle lever according to a nineteenth embodiment of the present invention;

Figure 57 is a view as viewed from an arrow B-B of Fig. 56 according to the nineteenth embodiment of the present invention;

Figure 58 is a view showing a structure of attachment of a throttle lever according to the nineteenth embodiment of the present invention;

Figure 59 is a sectional view showing a state of a throttle lever in a normal operation according to a twentieth embodiment of the present invention; and Figure 60 is a sectional view showing a state of the throttle lever when an engine is stopped according to the twentieth embodiment of the present invention.

First Embodiment

[0061] A first embodiment of the present invention will now be described with reference to Figures 1 through 16.

[0062] The first embodiment refers to an application of the present invention to a tiller. Fig. 1 illustrates an overall structure of a tiller according to an first embodiment of the present invention, in which there is a main body of tiller 1 incorporating an engine 3 as well as a dynamo 5. The dynamo generates an electric power,

which is sent to the engine 3 via an ignition cable 7 so that the fuel-air mixture in the engine 3 may be ignited.

[0063] There is a frame 9 at the bottom of the main body of tiller 1, and a drive shaft 11 is provided under the frame 9. A detachable tilling part 13 is attached to the drive shaft 11. Accordingly, the driving power of the engine 3 is transmitted to this drive shaft 11 via an unillustrated power transmission mechanism 4, thereby the tilling part is driven.

[0064] As to the power transmission mechanism 4, for example, a pulley-belt mechanism, a chain-sprocket mechanism, a gear group mechanism, etc., can be utilized.

[0065] For reference, Fig. 1 shows an example adopting the pulley-belt mechanism, of which part is illustrated by a virtual line.

[0066] As further illustrated in Fig. 1, there is a pair of handle bars 15, 15 elongated from the main body of tiller 1.

[0067] For reference, although Fig. 1 shows only the handle bar 15 on the right side of the pair of handle bars 15, 15, Figs. 15 and 16 show the both handle bars 15, 15.

[0068] The ends of the pair of the handle bars 15, 15 are respectively provided with grips 17, 17, and a throttle lever 19 is secured to the grip 17 of the handle bar 15 on the right side. There is a wire 21 connected to the throttle lever 19, and the other end of the wire 21 is connected to the engine 3. When the throttle lever 19 is rotated in an appropriate direction, the engine revolution speed can be controlled via the wire 21.

[0069] The handle bar 15 is further provided with a clutch lever 22, to which one end of a wire 24 is connected. This wire 24 is elongated along the handle bar 15, and the other end of the wire 24 is engaged with the power transmission mechanism 4 discussed above. When the clutch lever 22 is rotated in an appropriate direction, the power transmission is engaged or released via the wire 24.

[0070] There is an engine stop switch 23 incorporated in the throttle lever 19 so that the engine 3 can be stopped immediately.

[0071] It should be noted that, although the engine stop switch 23 is expressly illustrated outside the throttle lever 19 in Fig. 1 for the purpose of explanation, the engine stop switch 23 is in fact incorporated in the throttle lever 19.

[0072] The structure of the throttle lever 19 incorporating the engine stop switch 23 will be discussed with reference to Figs. 5 through 13. Figs. 5 and 6 are perspective views showing the external appearance of the throttle lever 19, and Figs. 7 through 12 are views showing the structural parts by exploding the throttle lever 19. Further, Fig. 13 is a view showing the order of assembly of these parts.

[0073] For reference, Figs. 1 through 4 show the throttle lever 19 only as a model for the purpose of explanation. The actual appearance of the throttle lever 19 is as

illustrated in Figs. 5 and 6, and the structural parts thereof are as illustrated in Figs. 7 through 12.

[0074] The throttle lever 19 comprises, an end member 25 as illustrated in Fig. 7, a leaf spring member 27 as illustrated in Fig. 8, a lever member 29 as illustrated in Fig. 9, a lever member switch element 31 (i.e. a switch element on the side of the lever member) as illustrated in Fig. 10, a main body switch element 33 (i.e. a switch element on the side of the main body) as illustrated in Fig. 11, and an end member 35 as illustrated in Fig. 12.

[0075] The illustration order of Figs. 7 through 12 corresponds to the order of assembly of each structural part shown in each drawing. That is, as illustrated in Fig. 13, the leaf spring member 27 is placed under the end member 25, and the lever member 29 is placed under the leaf spring member 27, and the lever member switch element 31 is placed under the lever member 29, and the main body switch member 33 is placed under the lever member switch element 31, and the end member 35 is placed under the main body switch element 33. The thus assembled parts are then fastened and fixed by a bolt 22, a washer 24 and a nut 26.

[0076] The head of this bolt 22 is accommodated in an unillustrated hollow space formed in the end member 25, and the nut 26 is also accommodated in an unillustrated hollow space formed in the end member 35.

[0077] The main body of the throttle lever 19 comprises the above discussed end member 25, the end member 35, etc., and the lever member 29 is rotatively attached to this main body.

[0078] Further, as illustrated in Fig. 6, a metal fitting 37 is secured to the end member 35. The metal fitting 37 is substantially in the shape of U, with which a grip 17 of the handle bar 15 is engaged, and they are fastened by unillustrated fastening bolt member and nut member. Thus the throttle lever 19 is attached and fixed to the grip 17.

[0079] The lever member switch element 31 and the main body switch element 33 will now be described in detail. The lever member switch element 31 is incorporated in the lever member 29 in a state that the rotation of the lever member switch element 31 is prohibited. The surface (at the rear of Fig. 10) of the lever member switch element 31 is provided with conductive members 31a, 31b at the angle of 180°. On the other hand, the main body switch element 33 is incorporated in the end member 35 in a state that the rotation of the main body switch element 33 is prohibited. The surface (at the front of Fig. 10) of the main body switch element 33 is provided with conductive members 33a, 33b at the angle of 180°. Consequently, the conductive members 31a, 31b of the lever member switch element 31 and the conductive members 33a, 33b are incorporated facing to each other.

[0080] Further, as illustrated in Fig. 10, a notch 31c is formed in the lever member switch element 31. On the other hand, a protrusion 29a is formed on the lever member 29 to be engaged with the above notch 31c

(see Fig. 13). As the protrusion 29a is engaged with the notch 31c, the rotation of the lever member switch element 31 is prohibited (that is, the lever member switch element 31 rotates together with the rotation of the lever member 29 as a whole unit). Similarly, a notch 33c is also formed in the main body switch element 33, and a protrusion 35a is formed on the end member 35 to be engaged with this notch 33c (see Fig. 13). As the protrusion 35a is engaged with the notch 33c, the main body switch element 33 is attached to the end member 35 in a state that the rotation of the main body switch element 33 is prohibited. The conductive members 33a, 33b have lead wires 34, 36 respectively connected thereto. One of the lead wires 34, 36 serves as the grounding cable, and the other is connected to an electric circuit.

[0081] In normal operation, as illustrated in Fig. 17, the conductive member 31a of the lever member switch element 31 and the conductive member 33a of the main body switch element 33 are electrically connected to each other, and the conductive member 31b of the lever member switch element 31 and the conductive member 33b of the main body switch element 33 are also electrically connected to each other. On the other hand, if the engine 3 should be stopped in case of emergency, the lever member 29 is rotated by more than a predetermined amount, thereby the lever member switch element 31 is also rotated by the same amount simultaneously. This rotation should be continued until the conductive members 31a, 31b of the lever member switch element 31 straddle the conductive members 33a, 33b of the main body switch element 33, as illustrated in Fig. 18, in order to short-circuit the electric circuit. Consequently, the engine 3 becomes the immediate stop.

[0082] The function of the present embodiment will now be described on the basis of the above structure. First, in regard to the normal operation, an operator 41 (as illustrated in Figs. 15 and 16) holds the grips 17, 17 of the pair of handle bars 15, 15 by the right hand 43 and the left hand 45. Then as illustrated in Fig. 2, the throttle lever 19 becomes caught by the fingers 43a of the right hand 43. In such a state, the operator 41 operates the tiller by moving in the forward or rearward direction, or by returning the tiller, with his fingers 43a controlling the revolution speed of the engine 3 by rotating the lever member 29 of the throttle lever 19 in an appropriate direction.

[0083] When the revolution speed of the engine 3 should be accelerated, as illustrated in Fig. 3, the lever member 29 of the throttle lever 19 is rotated downward (the state before rotation of the lever member 19 is illustrated by actual line, and the state after the rotation thereof is illustrated by virtual line). On the other hand, when the revolution speed of the engine 3 should be decelerated, as illustrated in Fig. 4, the lever member 29 of the throttle lever 19 is rotated upward (the state before rotation of the lever member 19 is illustrated by actual line, and the state after the rotation thereof is il-

lustrated by virtual line).

[0084] Second, if the engine 3 should be stopped immediately due to any reason, the lever member 29 of the throttle lever 19 is rotated upward by a large amount (more than a predetermined amount) until reaching the position as illustrated by broken line in Fig. 4. Consequently, the position relation of the engine stop switch 23 between the lever member switch element 31 and the main body switch element 33 changes from the state as illustrated in Fig. 17 to that of Fig. 18, thereby the electric circuit is short-circuited, and the engine 3 will be stopped.

[0085] When the engine 3 is stopped by the above method, the lever member 29 of the throttle lever 19 is rotated in order to decelerate the revolution speed of the engine 3, so that the fuel supply may be reduced. Accordingly, when the engine 3 is stopped, further to the short-circuit of the electric circuit, the reduction of the fuel supply is also done.

[0086] In the present embodiment, as illustrated by virtual line in Fig. 3, when the lever member 29 of the throttle lever 19 is rotated downward by a large amount (more than a predetermined amount), the electric circuit can also be short-circuited. Therefore the same function as that when the lever member 29 is rotated upward can be obtained, and the engine 3 can be stopped immediately in the same manner.

[0087] After the engine 3 is stopped by the above operation, if the lever member 29 of the throttle lever 19 is returned by an appropriate amount before the engine 3 makes the complete stop, the restart of the engine 3 can be accomplished. Therefore, when the operator 41 confirms that the dangerous state is avoided and returns the lever member 29 of the throttle lever 19 by the appropriate amount, the previous working can be started again easily.

[0088] The present embodiment has the following merits.

[0089] First, when the engine 3 should be stopped immediately, it is sufficient to rotate the lever member 29 of the throttle lever 19 in any of the appropriate directions by more than the predetermined amount, thereby the engine stop switch 23 is actuated and the engine 3 can be stopped immediately. At that time, since the operator 41 holds the grips 17, 17 of the handle bars 15, 15 by the both hands 43, 45, and since the fingers 43a of the right hand 43 are always placed on the lever member 29 of the throttle lever 19, if the engine 3 should be stopped immediately, it is not necessary to change holding of the hands or fingers for that purpose, and it is sufficient to only rotate the lever member 29 of the throttle lever 19 by maintaining the normal state that the fingers 43a are always placed. Therefore the immediate and sure operation of stopping of the engine 3 can be made, thereby the danger can be avoided.

[0090] Further, regardless of the direction of the rotation of the lever member 29 of the throttle lever 19, the engine 3 can be stopped immediately and surely, there-

fore the high level of safety can be obtained. To be discussed in detail, the engine 3 can also be stopped by rotating the lever member 29 by more than the predetermined amount in the direction of accelerating the revolution speed of the engine 3. Accordingly, for example, due to an inevitable accident, if the tiller 1 falls down and the lever member 29 is unintentionally rotated in the direction of accelerating the engine revolution speed and eventually the engine 3 becomes the exceeding high-speed revolution (over-revolution state), the engine 3 can be stopped automatically. Consequently, the safety obtained therefrom may become still higher.

[0091] In regard to the structure of the lever member switch element 31 and the main body switch element 33, the conductive members 31a and 31b, and 33a and 33b are respectively placed corresponding to each other at the angle of 180°, therefore the thickness relation of the lever member switch element 31 and the main body switch element 33 is well-balanced. That is, for example, there is no possibility that the lever member switch element 31 and the main body switch element 33 form a bank and cause the malfunction.

[0092] Further, according to the present embodiment, when the operator 41 tries to stop the engine 3 by rotating the lever member 29 of the throttle lever 19 in the direction of decelerating the revolution speed of the engine 3, that is, in the upward direction by more than the predetermined amount, further to the mere short-circuiting of the electric circuit, the fuel supply is also reduced. Accordingly, the conventional problem of so-called "wet spark plug" state when restarting the engine can surely be prohibited.

[0093] After the engine 3 is stopped, if the lever member 29 of the throttle lever 19 is returned before the engine 3 makes the complete stop, the engine 3 can be restarted easily. Therefore, after avoiding the dangerous state, the previous working can be started again promptly.

Second Embodiment

[0094] A second embodiment of the present invention will now be described with reference to Figs. 19 and 20. Although the first embodiment has been discussed by using the tiller as the example of the working machine, the second embodiment will refer to a mower as an example of the working machine.

[0095] Fig. 19 is a perspective view showing a state that an operator 103 is performing a work by carrying a mower 101. The mower 101 has a hollow shaft 105, and a rotative cutter blade 107 is attached to the top of the hollow shaft 105.

[0096] There is also an engine 109 attached to the basement of the hollow shaft 105. The rotation of the engine 109 rotates the cutter blade 107 via an unillustrated power transmission mechanism (a centrifugal clutch, a shaft, a gear mechanism, etc.) incorporated inside the hollow shaft 105. A grip 111 is provided at a

substantial center of the hollow shaft 105, and another grip 113 is further provided at a predetermined position closer to the basement of the shaft than that of the grip 111. As illustrated in Fig. 19, the operator 103 holds the grip 111 by the left hand 103a, and also holds the grip 113 by the right hand 103b.

[0097] There is a throttle lever 115 provided adjacent to the grip 113. When a lever member 115a of the throttle lever 115 is rotated in one direction, the revolution speed of the engine 109 is accelerated. When the lever member 115a is rotated in the other direction, the revolution speed of the engine 109 is decelerated. The details thereof are as illustrated in Fig. 20. When the lever member 115a is rotated in the clockwise direction of Fig. 20 (that is, the direction shown by an arrow L in Fig. 20), the revolution speed of engine 109 is accelerated, and when the lever member 115a is rotated in counterclockwise direction of Fig. 20 (that is, the direction shown by an arrow H in Fig. 20), the revolution speed of engine 109 is decelerated.

[0098] The structure of the throttle lever 115 is essentially the same as that of the first embodiment discussed above, in which the engine stop switch is incorporated. Therefore, if the engine 109 should be stopped in case of emergency, the lever member 115a of the throttle lever 115 is rotated in the clockwise direction of Fig. 20 (i.e. the direction of the arrow L in Fig. 20) by more than a predetermined amount. Consequently, the engine stop switch is actuated in order to short-circuit the electric circuit, thus the engine 109 can be stopped immediately.

[0099] In the second embodiment, likewise the case of the first embodiment, when the lever member 115a of the throttle lever 115 is rotated in the counterclockwise direction of Fig. 20 (i.e. the direction of the arrow H in Fig. 20) by more than a predetermined amount, the short-circuiting of the electric circuit and the immediate stop of the engine 109 can also be accomplished.

[0100] Therefore, according to the second embodiment of the present invention, the same effect as that of the first embodiment can be obtained.

Third Embodiment

[0101] A third embodiment of the present invention will now be described with reference to Figs. 21 and 22. The third embodiment also refers to the mower 101 as have been discussed in the second embodiment. However, the method of holding of the mower 101 by the operator 103 is different from that of the second embodiment. That is, according to the second embodiment, as illustrated in Fig. 20, the right hand 103b holds the upper part of the grip 113 from above so that the upper part of the grip 113 may be covered by the right hand 103b. On the other hand, according to the third embodiment, as illustrated in Fig. 21, the right hand 103b holds the lower part of the grip 113 from below so that the grip 113 may be lifted by the right hand 103b. Similarly, the left hand

103a also holds the lower part of the grip 111 from below so that the lower part of the grip 111 may be covered by the left hand 103a.

[0102] In such a state, as illustrated in Fig. 22, the index finger 123 of the right hand 103b rotates the lever member 115a of the throttle lever 115.

[0103] The other structure and function are the same as that described in the first embodiment of the present invention, therefore the detailed explanation thereof will not be made.

[0104] As above discussed, according to the third embodiment of the present invention, the same effect as discussed in the second embodiment of the present invention can be obtained.

Fourth Embodiment

[0105] A fourth embodiment of the present invention will now be described with reference to Figs. 23 and 24. The fourth embodiment also refers to a mower to which the present invention is applied, likewise the case of the second and third embodiments discussed above.

[0106] In regard to the mower 101 in the fourth embodiment, a pair of handle bars 131, 133 are secured to the hollow shaft 105. The operator 103 holds the handle bar 131 by the left hand 103a, and also holds the handle bar 133 by the right hand 103b. The throttle lever 115 is provided on the handle bar 133.

[0107] Fig. 24 shows an expanded state that the handle bar 133 is right hand 103b. The lever member 115a of the throttle lever 115 has protrusions 135, 137 in order to obtain more efficient operation, that is, the rotation of lever member 115a in the counterclockwise direction of Fig. 24 (the direction of an arrow H in Fig. 24) can be carried out by placing the finger of the right hand 103b on the protrusion 135, and the rotation of the lever member 115a in the clockwise direction of Fig. 24 (the direction of an arrow L in Fig. 24) can be carried out by placing the finger of the right hand 103b on the protrusion 137.

[0108] The other structure and function are the same as that described in the second and third embodiments of the present invention, therefore the detailed explanation thereof will not be made.

[0109] As above discussed, according to the fourth embodiment of the present invention, the same effect as discussed in the first and second embodiments of the present invention can be obtained.

Fifth Embodiment

[0110] The fifth embodiment of the present invention will now be described with reference to Fig. 25. Although the first through fourth embodiments refer to the structure that the engine stop switch 23 is incorporated inside the throttle lever 19, the fifth embodiment refers to a structure that the engine stop switch 23 is provided outside the throttle lever 19.

[0111] As illustrated in Fig. 25, there is a contact ter-

minial 200a provided outside the lever member 29 of the throttle lever 19, and there is also a contact plate 200b provided on the handle bar 15. When the engine should be stopped immediately, the lever member 29 of the throttle lever 19 is rotated upward of Fig. 25 by a large amount. Consequently, the contact terminal 200a becomes in contact with the contact plate 200b, thereby the electric circuit is short-circuited, and the engine can be stopped immediately.

[0112] According to the present structure that the exposed engine stop switch 23 is provided outside the throttle lever 19, the same effect as that described in the first through fourth embodiments of the present invention can also be obtained.

Sixth Embodiment

[0113] A sixth embodiment of the present invention will now be described with reference to Figs. 26 through 39. The sixth embodiment also relates to the mower to which the present invention is applied.

[0114] For reference, the sixth embodiment adopts another type of throttle lever of which shape and structure are different from those of the second embodiment.

[0115] Fig. 26 is a perspective view showing a state that a operator 203 is performing a work by carrying a mower 201. The mower 201 has a hollow shaft 205 serving as a handle bar, and a rotative cutter blade 207 is attached to the top of the hollow shaft 205.

[0116] There is also an engine 209 attached to the basement of the hollow shaft 205. The rotation of the engine 209 rotates the cutter blade 207 via an unillustrated power transmission mechanism (a shaft transmitting a rotative power from the engine 209 via a centrifugal clutch, a gear mechanism transmitting such a rotative power to the cutter blade 207, etc.) incorporated inside the hollow shaft 205. A grip 211 is provided at a substantial center of the hollow shaft 205, and another grip 213 is further provided at a predetermined position closer to the basement of the shaft than that of the grip 211. As illustrated in Fig. 26, the operator 203 holds the grip 211 by the left hand 203a, and also holds the grip 213 by the right hand 203b from below.

[0117] The method of holding of the grips in Fig. 26 is shown only as an example, and it is clear that the grips 211 and 213 may be held by the hands from above.

[0118] There is a throttle lever 215 provided adjacent to the grip 213. The throttle lever 215 is provided on the hollow shaft 205, at a substantial upper part of Fig. 26.

The state of attachment of the throttle lever 215 is shown in detail in Figs. 27 and 28. As illustrated in Fig. 28, one end of a wire 216 is connected to the throttle lever 215, and the other end of the wire 216 is connected to the fuel flow controller of the engine 209. When a lever member 229 of the throttle lever 215 is rotated in one direction, the fuel supply increases and thereby the revolution speed of the engine 209 is accelerated. When the lever member 229 is rotated in the other direction,

the fuel supply decreases and thereby the revolution speed of the engine 209 is decelerated. The details thereof are as illustrated in Fig. 28. When the lever member 229 is rotated in the counterclockwise direction of Fig. 28 (that is, the direction shown by an arrow L in Fig. 28), the revolution speed of engine 209 is accelerated, and when the lever member 229 is rotated in clockwise direction of Fig. 28 (that is, the direction shown by an arrow H in Fig. 28), the revolution speed of engine 209 is decelerated.

[0119] As illustrated in Fig. 26, there is an engine stop switch 223 incorporated in the throttle lever 215 so that the engine 209 can be stopped immediately.

[0120] It should be noted that, although the engine stop switch 223 is expressly illustrated outside the throttle lever 215 for the purpose of explanation, the engine stop switch 223 is in fact incorporated in the throttle lever 215.

[0121] The structure of the throttle lever 215 incorporating the engine stop switch 223 will be discussed with reference to Figs. 28 through 39. Fig. 28 is a perspective view showing the external appearance of the throttle lever 215, and Fig. 29 is also a perspective view showing the external appearance of the throttle lever 215. Figs. 30 through 35 are views showing the structural parts by exploding the throttle lever 215. Further, Fig. 36 is a view showing the order of assembly of these parts.

[0122] The throttle lever 215 is provided with an end member 225, and there are indications of "High" (the direction for accelerating the revolution speed of the engine 209) and "Low" (the direction for decelerating the revolution speed of the engine 209) on the surface of the end member 225. There is a leaf spring member 227 as illustrated in Fig. 31 positioned under the end member 225. Then, there is the lever member 229 discussed above (see Fig. 31) positioned under the leaf spring 227. There is a lever member switch element 231 as illustrated in Fig. 33 positioned under the lever member 229.

[0123] The lever member switch element 231 positioned under the lever member 229 is shown by broken line in Fig. 32.

[0124] Further, there is a main body switch element 233 as illustrated in Fig. 34 positioned under the lever member switch element 231, and there is also an end member 235 as illustrated in Fig. 35 positioned under the main body switch element 233.

[0125] The illustration order of Figs. 30 through 35 corresponds to the order of assembly of each structural part shown in each drawing. That is, as illustrated in Fig. 36, the leaf spring member 227 is placed under the end member 225, and the lever member 229 is placed under the leaf spring member 227, and the lever member switch element 231 is placed under the lever member 229, and the main body switch member 233 is placed under the lever member switch element 231, and the end member 235 is placed under the main body switch element 233. The thus assembled parts are then fastened and fixed by a bolt 222, a washer 224 and a nut

226. The head of this bolt 222 is accommodated in an unillustrated hollow space formed in the end member 225, and the nut 226 is also accommodated in an unillustrated hollow space formed in the end member 235.

[0126] The main body of the throttle lever 215 comprises the above discussed end member 225, the end member 235, etc., and the lever member 229 is rotatively attached to this main body.

[0127] Further, as illustrated in Fig. 29, a metal fitting 237 is secured to the end member 235. The metal fitting 237 is substantially in the shape of U, with which the hollow shaft 205 is engaged, and the hollow shaft 205 is fastened to the metal fitting 237 by unillustrated fastening bolt member and nut member. Thus the throttle lever 215 is attached and fixed to the grip hollow shaft 205.

[0128] The lever member switch element 231 and the main body switch element 233 will now be described in detail. The lever member switch element 231 is incorporated in the lever member 229 in a state that the rotation of the lever member switch element 231 is prohibited. The lever member switch element 231 has an insulator 232 made of resin, and the surface (at the rear of Fig. 33) of the insulator 232 is provided with conductive members 231a, 231b at the angle of 180°. In this connection, the structure of attachment of the lever member switch element 231 to the lever member 229 will be described. As illustrated in Fig. 32, there is a pair of hollows 229a, 229b on the lever member 229. Further, as illustrated in Fig. 33, there is a pair of protrusions 231c, 231d on the insulator 232 of the lever member switch element 231. Accordingly, the protrusions 231c, 231d are respectively engaged with the hollows 229a, 229b, thereby the lever member switch element 231 is secured to the lever member 229, thus the position of the lever member switch element 231 is determined.

[0129] On the other hand, the main body switch element 233 is incorporated in the end member 235 in a state that the rotation of the main body switch element 233 is prohibited. The main body switch element 233 has an insulator 230 made of resin, and the surface (at the front of Fig. 34) of the insulator 230 is provided with conductive members 233a, 233b at the angle of 180°. Consequently, the conductive members 231a, 231b of the lever member switch element 231 and the conductive members 233a, 233b are incorporated facing to each other.

[0130] Further, as illustrated in Fig. 34, there is a pair of protrusions 230a, 230b on the rear side of the insulator 230 of the main body switch element 233 in Fig. 34. Further, as illustrated in Fig. 35, there is a pair of hollows 235a, 235b on the end member 235. Accordingly, the protrusions 230a, 230b are respectively engaged with the hollows 235a, 235b, thereby the main body switch element 233 is secured to the end member 235, thus the position of the main body switch element 233 against the end member 235 is determined.

[0131] The state of attachment of the main body

switch element 233 to the end member 235 is as illustrated in Fig. 37.

[0132] The conductive members 233a, 233b have lead wires 234, 236 respectively connected thereto. One of the lead wires 234, 236 serves as the grounding cable, and the other is connected to an electric circuit.

[0133] In normal operation, as illustrated in Fig. 38, the conductive member 231a of the lever member switch element 231 and the conductive member 233a of the main body switch element 233 are in contact with each other, and the conductive member 231b of the lever member switch element 231 and the conductive member 233b of the main body switch element 233 are also in contact with each other. That is, the electric circuit is not short-circuited. On the other hand, if the engine 209 should be stopped in case of emergency, the lever member 229 is rotated by more than a predetermined amount as illustrated in Fig. 39, thereby the lever member switch element 231 is also rotated by the same amount simultaneously. This rotation should be continued until the conductive members 231a, 231b of the lever member switch element 231 straddle the conductive members 233a, 233b of the main body switch element 233, as illustrated in Fig. 39, in order to short-circuit the electric circuit. Consequently, the engine 209 becomes the immediate stop.

[0134] The lever member 229 is in a forked shape as illustrated in Fig. 28. That is, the operation side of the lever member 229 is provided with knobs 229a, 229b, thus the thumb of the right hand 203b of the operator 203 may be placed on the knob 229a, and the index finger of thereof may be placed on the knob 229b.

[0135] The function of the present embodiment will now be described on the basis of the above structure. First, in regard to the normal operation, the operator 203 holds the grips 211, 213 of the hollow shaft 205 by the left hand 203a and the right hand 203b, so that the throttle lever 215 may be operated by the right hand 203b. In such a state, the operator 203 operates the mower with his right hand 203b controlling the revolution speed of the engine 209 by rotating the lever member 229 of the throttle lever 215 in an appropriate direction. In normal operation, as illustrated in Fig. 28, when the revolution speed of the engine 209 should be accelerated, the lever member 229 is rotated by the index finger in the direction of H. On the other hand, when the revolution speed of the engine 209 should be decelerated, the lever member 229 is rotated by the thumb in the direction of L.

[0136] Second, if the engine 209 should be stopped immediately due to any reason, the lever member 229 of the throttle lever 215 is rotated upward by a large amount (more than a predetermined amount) in the direction of L in Fig. 28. Consequently, the position relation of the engine stop switch 223 between the lever member switch element 231 and the main body switch element 233 changes from the state as illustrated in Fig. 38 to that of Fig. 39, thereby the electric circuit is short-

circuited, and the engine 209 will be stopped. When the engine 209 is stopped by the above method, the lever member 229 of the throttle lever 215 is rotated in order to decelerate the revolution speed of the engine 209, so that the fuel supply may be reduced. Accordingly, when the engine 209 is stopped, further to the short-circuit of the electric circuit, the reduction of the fuel supply is also done.

[0137] In the present embodiment, when the lever member 229 of the throttle lever 215 is rotated by a large amount (more than a predetermined amount) in the direction of H in Fig. 27, the electric circuit can also be short-circuited. Therefore the same function as that when the lever member 229 is rotated in the direction of L can be obtained, and the engine 209 can be stopped immediately in the same manner.

[0138] After the engine 209 is stopped by the above operation, if the lever member 229 of the throttle lever 215 is returned by an appropriate amount before the engine 209 makes the complete stop, the restart of the engine 209 can be accomplished. Therefore, when the operator 203 confirms that the dangerous state is avoided and returns the lever member 229 of the throttle lever 215 by the appropriate amount, the previous working can be started again easily.

[0139] The present embodiment has the following merits.

[0140] First, when the engine 209 should be stopped immediately, it is sufficient to rotate the lever member 229 of the throttle lever 215 in any of the appropriate directions by more than the predetermined amount, thereby the engine stop switch 223 is actuated and the engine 209 can be stopped immediately. At that time, since the operator 203 holds the grips 211, 213 of the hollow shaft 205 by the both hands 203a, 203b, and since the fingers of the right hand 203b are always placed on the lever member 229 of the throttle lever 215, if the engine 209 should be stopped immediately, it is not necessary to change holding of the hands or fingers for that purpose, and it is sufficient to only rotate the lever member 229 of the throttle lever 215 by maintaining the normal state that the fingers of the right hand 203b are always placed. Therefore the immediate and sure operation of stopping of the engine 209 can be made, thereby the danger can be avoided.

[0141] Further, regardless of the direction of the rotation of the lever member 229 of the throttle lever 215, the engine 209 can be stopped immediately and surely, therefore the high level of safety can be obtained.

[0142] In regard to the structure of the lever member switch element 231 and the main body switch element 233, the conductive members 231a and 231b, and 233a and 233b are respectively placed corresponding to each other at the angle of 180°, therefore the thickness relation of the lever member switch element 231 and the main body switch element 233 is well-balanced. That is, for example, there is no possibility that the lever member switch element 231 and the main body switch element

233 form a bank and cause the malfunction.

[0143] Further, according to the present embodiment, when the operator 203 tries to stop the engine 209 by rotating the lever member 229 of the throttle lever 215 in the direction of decelerating the revolution speed of the engine 209, that is, in the direction of L in Fig. 28 by more than the predetermined amount, further to the mere short-circuiting of the electric circuit, the fuel supply is also reduced. Accordingly, the conventional problem of so-called "wet spark plug" state when restarting the engine can surely be prohibited.

[0144] After the engine 3 is stopped, if the lever member 229 of the throttle lever 215 is returned before the engine 209 makes the complete stop, the engine 209 can be restarted easily. Therefore, after avoiding the dangerous state, the previous working can be started again promptly.

[0145] According to the present embodiment, since the lever member switch element 231 and the main body switch element 233 are engaged with each other by hollow-protrusion structure, the lever member 229 and the end member 235 are fixed on the respective positions determined by the above discussed hollow-protrusion structure. Thus the facile assembly thereof as well as the determination of fixing positions under high accuracy can be accomplished.

[0146] Further, since the lever member 229 is in a forked shape, the immediate stop of the engine can be carried out easily. That is, the thumb and the index finger of the right hand 203b of the operator 203 are always placed on the knob 229a, 229b of the lever member 229, thus the operator 203 can operate the throttle lever 215 promptly.

[0147] The lever member switch element 231 and the main body switch element 233 are always in slidable contact with each other under the pressing force applied to each of the switch elements. Consequently, each of the contact surfaces is always brushed and free from rust, thus the stable operation condition can be obtained for a long period.

[0148] In the sixth embodiment of the present invention, in regard to the lever member switch element 231, although there is no express description of attachment of conductive members 231a, 231b to the insulator 232 made of resin, the attachment may be made by using an adhesive. Further, when a protrusion is provided on the insulator 232, and when hollows are provided on the conductive members 231a, 231b, the attachment may be made by engagement with each other.

[0149] The above attachment will also apply to that of main body switch element 233.

Seventh Embodiment

[0150] A seventh embodiment of the present invention will now be described with reference to Fig. 40. In the seventh embodiment, there is a variation of structure of attachment of the main body switch element 233 to

the end member 235. That is, the main body switch element 233 is provided with an insulator 230 made of resin, and a pair of conductive members 233a, 233b are provided on one side of the insulator 230 (the lower left side of the insulator 230 in Fig. 40). The conductive members 233a, 233b are positioned on, and penetrating in, the rim of the end member 235. The basements of the conductive members 233a, 233b are connected to lead wires 234, 236 respectively. In regard to the insulator 230, there is another insulator 238 provided on the insulator 230 on the other side of the conductive members 233a, 233b. The insulator 238 serves to present the same thickness as those of the conductive members 233a, 233b, so that the lever member switch element 231 may not be tilted due to difference of thickness of the lever member switch element 231 at several positions.

[0151] The other structure is the same as that of the sixth embodiment of the present invention.

[0152] According to the seventh embodiment, since the conductive members 233a, 233b are placed on the insulator 230 in a state that the conductive members 233a, 233b are placed on and penetrating in the end member 235, the positions of the conductive members 233a, 233b can be determined automatically. Therefore, it is no longer necessary to determine the position of the main body switch element 233 during assembly.

[0153] In addition, since the space between the conductive members 233a, 233b becomes shorter than the case of the sixth embodiment, the overall weight as well as the material cost can be reduced.

Eighth Embodiment

[0154] An eighth embodiment of the present invention will now be described with reference to Figs. 41 and 42. In the eighth embodiment, further to the structures of the sixth and seventh embodiments of the present invention as above discussed, there is an idle mechanism 301 provided on the throttle lever 215. The idle mechanism 301 comprises a leaf spring member 301a attached to the lever member 229 of the throttle lever 215 and a protrusion 301b protruding from the end member 225.

[0155] In regard to the relation of positions of the protrusion 301b and the leaf spring member 301a, when the lever member 229 is rotated in the direction of L in Fig. 42 in order to stop the engine 209, the leaf spring member 301a becomes in contact with the protrusion 301b and is going through over the protrusion 301b. This state is as illustrated in Fig. 42. At that time, the operator 203 will feel a considerable resistance to the rotation force, and may understand that the engine 209 can be stopped immediately by rotating the throttle lever 215 over this point this resistance. Accordingly, when the operator 203 feels this resistance, if the operator 203 further rotates the lever member 229 upward, the engine 209 can be stopped. Therefore, when the operator 203 feels the resistance to the rotation force, the operator

203 may confirm that the lever member 229 enters the area in which the engine 209 can be stopped. Thus, the operation condition will improve remarkably.

Ninth Embodiment

[0156] A ninth embodiment of the present invention will now be described with reference to Fig. 43. The ninth embodiment is a variation of position of attachment of the idle mechanism 301 of the eighth embodiment. That is, as illustrated in Fig. 43, the leaf spring member 301a of the idle mechanism 301 is attached to the side surface of the knob 229b of the lever member 229, and the protrusion 301b is also attached to the side surface of the end member 235. According to the ninth embodiment, the same function and effect as those of the eighth embodiment can be obtained.

Tenth Embodiment

[0157] A tenth embodiment of the present invention will now be described with reference to Fig. 44. In the tenth embodiment, the present invention is applied to a different type of mower. As illustrated in Fig. 44, a pair of handle members 412, 414 are provided on the hollow shaft 205, and the throttle lever 215 is attached to the handle member 412.

Eleventh Embodiment

[0158] An eleventh embodiment of the present invention will now be described with reference to Fig. 45. The eleventh embodiment is a variation of structure of the throttle lever of the first embodiment. That is, the throttle lever 215 according to the sixth through tenth embodiments of the present invention is applied to the first embodiment.

Twelfth Embodiment

[0159] A twelfth embodiment of the present invention will now be described with reference to Fig. 46. The twelfth embodiment refers to an atomizer to which the present invention is applied. An atomizer 501 is provided with a tank 503, and is also provided with an engine 505 under the tank 503. The throttle lever 19 according to the first embodiment as above discussed is attached to this atomizer 501 in order to control the revolution speed of the engine 505.

Thirteenth Embodiment

[0160] A thirteenth embodiment of the present invention will now be described with reference to Fig. 47. The thirteenth embodiment refers to a pump to which the present invention is applied. A pump 601 is provided with an engine 603 and a pump section 605. The throttle lever 19 incorporating the engine stop switch 23 accord-

ing to the first embodiment as above discussed is provided on this pump 601 in order to control the revolution speed of the engine 603 as well as to stop the engine 603 immediately.

Fourteenth Embodiment

[0161] A fourteenth embodiment of the present invention will now be described with reference to Fig. 48. According to the fourteenth embodiment, the position of the lever member switch element 231 of the sixth embodiment as above discussed can be adjusted.

[0162] For reference, Fig. 48 is a view that the lever member switch element 231 is seen from the reverse side of Fig. 32, that is, seen from the side of the lever member switch element 231.

[0163] The conductive member 231b has been formed so as to have a hollow, and an elongated groove 701 in a shape of arc is formed in this hollow of the conductive member 231b. This elongated groove 701 is also formed in the insulator 230 positioned under the conductive member 231b, and the elongated groove 701 is fixed by a screw member 703 penetrated in the lever member 229. When the position of the lever member switch element 231 should be adjusted, the screw member 703 is loosened, thus the lever member switch element 231 can be rotated within the length of the elongated groove 701. When the desired position is determined, the screw member 703 is fastened again.

[0164] Accordingly, the position of the lever member switch element 231 can be adjusted, thereby the timing of stopping of the engine 209 can be adjusted.

Fifteenth Embodiment

[0165] A fifteenth embodiment of the present invention will now be described with reference to Fig. 49. The fifteenth embodiment is a variation of the pump 601 of the thirteenth embodiment to which the present invention is applied. When the engine 603 is stopped, the lever member 29 is rotated in the clockwise direction of Fig. 49. Consequently, a function member 29c protruding from the lever member 29 rotates in the direction of main body of the pump 601, thereby a contact point 801 attached to the function member 29c becomes in contact with a resin member 803. Thus a kind of idle state is obtained.

[0166] When the lever member 29 is further rotated from this idle position, the contact point 801 goes over the resin member 803, and then becomes in contact with the main body made of metal. Accordingly, the electric circuit is short-circuited and the engine is stopped.

Sixteenth Embodiment

[0167] A sixteenth embodiment of the present invention will now be described with reference to Figs. 48, 50, 51 and 52. The sixteenth embodiment relates to an ex-

ample of waterproofing means of the present invention. As illustrated in Fig. 50, there is a groove 907 on the end member 235. On the other hand, as illustrated by virtual line in Fig. 48, there is a skirt 903 protruding from the lever member 231. Thus, when the lever member 231 is placed over the end member 235, the state as shown in Fig. 51 is obtained. In this state, the end member 235 is covered by the skirt 903 of the lever member 231, and since there is the groove 907 formed on the end member 235, the rotation of the lever member 231 is allowed. By providing this waterproofing means, the effect of waterproofing can be obtained.

[0168] In the above structure, the shape of the skirt 903 may be thinner so as to be deformed easily, so that the skirt 903 may be in close contact with the end member 235 easily. Further, there may be a seal 902 provided between the skirt 903 and the end member 235, as illustrated in Fig. 52, in order to obtain higher waterproofing effect. The seal 902 may be replaced by a waterproof sheet. Further, the seal function may also be obtained if the washer 24 according to the sixth embodiment, as illustrated in Fig. 36, is made of resin.

Seventeenth Embodiment

[0169] A seventeenth embodiment of the present invention will now be described with reference to Figs. 29, 53 and 54. As has been discussed in the sixth embodiment, there is the metal fitting 237 attached to the outside of the end member 235, and the throttle lever 215 is attached to the hollow shaft 205 via this metal fitting 237. In the sixth embodiment, the metal fitting 237 is inserted from the inside of the end member 235, thus it is impossible to detach the metal fitting 237 from the outside.

[0170] Therefore, in the seventeenth embodiment, the metal fitting 237 may be detached from the outside. As illustrated in Fig. 53, grooves 1001, 1001 are formed on the surface of the end member 235 facing the outside. The metal fitting 237 has a flange 237a at the end thereof, and the flange 237a is inserted from the outside via the grooves 1001, 1001. There are further grooves 1003, 1003 formed below the grooves 1001, 1001 in Fig. 53. The grooves 1003, 1003 are not exposed to the outside.

[0171] As illustrated in Fig. 54, the flange 237a of the metal fitting 237 is first inserted from the grooves 1001, 1001, and then moved in the inside toward the grooves 1003, 1003, so that the flange 237a is engaged with the grooves 1003, 1003. Accordingly, the metal fitting 237 is attached to the end member 235. When the metal fitting 237 is detached, the procedures in the reverse order may be applied.

[0172] As above discussed, since the attachment and detachment of the metal fitting 237 can be carried out from the outside of the end member 235, the attachment and detachment of the throttle lever 215 (for example, change of attachment position, change of angle, etc.)

can be made easily.

Eighteenth Embodiment

[0173] An eighteenth embodiment of the present invention will now be described with reference to Fig. 55. The eighteenth embodiment relates to an example that the idle mechanism as discussed in the eighth and ninth embodiments is incorporated in the throttle lever. As illustrated in Fig. 55, there is a protrusion 1005 protruding from the main body switch element 233.

[0174] When the lever member 229 is rotated, the lever member 229 goes over this protrusion 1005. At that time, the resistance force occurs, thereby the operator 203 may confirm that the present position of the lever member 229 is just before the engine stop position. When the operator 203 further rotates the lever member 229, the engine stop switch 223 is actuated, and the engine 209 is stopped.

[0175] According to this type of idle mechanism, the structure outside the throttle lever 215 may be simplified.

Nineteenth Embodiment

[0176] A nineteenth embodiment of the present invention will now be described with reference to Figs. 56 through 58. The nineteenth embodiment relates to an example of structure of attachment of the throttle lever to the hollow shaft 205. There is a metal fitting 1007, and engagement hollows 1009, 1009 are formed in the upper part of the metal fitting 1007 in Fig. 56. On the other hand, there are engagement protrusions 1011, 1011 protruding from the throttle lever. With this structure, the metal fitting 1007 is placed over the hollow shaft 205, in a manner that the engagement hollows 1009, 1009 are respectively engaged with the engagement protrusions 1011, 1011. Then, by maintaining such an engagement state, a screw member 1013 is inserted from the outside of the metal fitting 1007 into the throttle lever, so that the metal fitting 1007 may be attached to and fixed on the throttle lever.

[0177] In the nineteenth embodiment, the attachment and detachment of the metal fitting 1007 in regard to the throttle lever from the outside can also be made easily, the attachment and detachment of the throttle lever can be carried out easily.

[0178] Further, as illustrated in Fig. 58, there may be an engagement protrusion 1015 provided at the top of the metal fitting 1007, and there may also be an engagement hollow 1017 provided on the throttle lever.

Twentieth Embodiment

[0179] A twentieth embodiment of the present invention will now be described with reference to Figs. 59 and 60. The twentieth embodiment relates to a different type of throttle lever from that in the first through nineteenth

embodiments discussed above, to which the present invention is applied. The throttle lever according to the present embodiment is attached to the lower part of the hollow shaft 205, in a state that the throttle lever may be detached. There is a lever member 1023 attached to a main body case 1021, in a state that the lever member 1023 may be rotated in directions of arrows L and H in Figs. 59 and 60.

[0180] With reference to Figs. 59 and 60, there is an engine positioned on the right side, and there is an unillustrated cutter blade attached to the left side.

[0181] There is a wire 216 of which one end is connected to the lever member 1023. The other end of this wire 216 is connected to the engine (not shown) positioned on the right side of Figs. 59 and 60. The lever member 1023 has a coil spring 1025 attached thereto, and this coil spring 1025 always applies force to the lever member 1023 in the direction of L in Figs. 59 and 60 (that is, the direction of reducing the fuel supply in order to decelerate the engine revolution speed). When the lever member 1023 is rotated in the direction of H in Figs. 59 and 60 (that is, the direction of increasing the fuel supply in order to accelerate the engine revolution speed) against the force applied by the coil spring 1025, the engine revolution speed may be accelerated.

[0182] There is an engine stop switch 1027 provided at the space between the main body case 1021 and the lever member 1023. That is, there is a lever member switch element 1029 at the end of the lever member 1023, and there are also main body switch elements 1031, 1033 on the main body case 1021. Further, an idle plate 1035 is attached to the main body switch element 1031, and another idle plate 1037 is also attached to the main body switch element 1033.

[0183] In regard to the lever member 1023, an operation part thereof is in a forked shape, and an operation tip 1023a and an operation tip 1023b are provided. During operation, the four fingers of an operator other than the thumb are inserted in the space between the operation tip 1023a and the operation tip 1023b, and the thumb of the operator is placed on the hollow shaft 205.

[0184] In the normal operation, as above discussed, the four fingers of the operator other than the thumb are inserted in the space between the operation tip 1023a and the operation tip 1023b, and the thumb is placed on the hollow shaft 205. In such a state, the lever member 1023 is rotated in an appropriated direction, thereby the engine revolution speed is controlled and the working is carried out. In particular, since the coil spring 1025 always applies force to the lever member 1023 in the direction of L, when the operator loosens the grip force applied to the lever member 1023, the engine revolution speed is automatically decelerated. On the other hand, when the operator grips the lever member 1023 against the force applied to the lever member 1023 by the coil spring 1025, the lever member 1023 is rotated in the direction of H, thus the engine revolution speed may be accelerated.

[0185] Then, when the engine should be stopped immediately, the grip force applied to the lever member 1023 is loosened. Consequently, the lever member 1023 is rotated in the direction of L due to the force applied thereto by the coil spring 1025, and a state as shown in Fig. 59 will be obtained. However, under this operation, the engine revolution speed is merely decelerated, since the top of the lever member switch element 1029 becomes merely in contact with the idle plate 1035. Then, the lever member 1023 is further rotated in the direction of L. This can be performed by pressing down the operation tip 1023b by the back of the four fingers of the operator other than the thumb. Consequently, the top of the lever member switch element 1029 goes over the idle plate 1035, and becomes in contact with the main body switch element 1031. Accordingly, the electric circuit is short-circuited, and the engine is stopped.

[0186] It is noted that the above operations, that is, the operation of the release of grip force applied to the lever member 1023, and the operation of pressing down of the operation tip 1023b, are to be carried out sequentially.

[0187] The engine may also be stopped when the lever member 1023 is rotated in the opposite direction, that is, in the direction of H. That is, the top of the lever member switch element 1029 first becomes in contact with the idle plate 1037, and when the lever member 1023 is further rotated, the top of the lever member switch element 1029 goes over the idle plate 103, and then becomes in contact with the main body switch element 1033. Accordingly, the electric circuit is short-circuited, and the engine is stopped.

[0188] The present embodiment is not limited to the first through twentieth embodiments described above.

[0189] Although the above embodiments have been described by using the mower, tiller, atomizer or pump as an example of working machine, it is clear that the embodiments can also be applied to other working machines. For example, the present invention may be applied to a cargo carrier, rice planting machine, harvester, binder, combine harvester, slow plow, tea leaf picker, etc.

[0190] According to the first embodiment, the engine 3 may be stopped by rotating the throttle lever 15 in any one of the directions. However, the engine 3 may also be stopped only when the throttle lever 15 is rotated in one direction.

[0191] According to every embodiment, the lever member switch element and the main body switch element are prepared as the separate parts from the main body or the end members, so that these switch elements may be incorporated therein during assembly. However, it is also possible to integrally form the lever member switch element and the main body switch element in advance by so-called "insertion method", when the main body and end members made of resin are manufactured.

[0192] Further, when the engine should be stopped by operation of the throttle lever, the fuel supply may also be cut at the same time. Consequently, as compared with the case of mere short-circuiting of the electric circuit, the engine 9 may be stopped without fail. In particular, according to the first embodiment, the engine 9 can be stopped immediately by rotating the lever member 29 by more than the predetermined amount in the direction of decelerating the revolution speed of the engine 9. In this connection, at the immediate engine stop, the fuel may be supplied as little as possible, so that the engine may be restarted promptly. Further, at the immediate engine stop, the fuel supply may be cut. The cut of fuel supply can be made by adjusting the connection of the wire 19 to the engine 9, that is, by shutting a fuel supply control valve of a carburetor of the engine 9 in order to cut the fuel supply. The adjustment thereof can be carried out by adjusting an idling adjustment member of the fuel supply control valve of the carburetor.

[0193] Further, the part of the engine stop switch may be covered by waterproofing means. For example, there may be provided a waterproofing cap 701 shown by virtual line in Fig. 28, or there may be also provided a waterproofing cap 705 shown by virtual line in Fig. 47.

Claims

1. A working machine throttle lever to be attached to and detached from a working machine, comprising:

a main body (25, 35);
 a lever member (29) rotatively attached to said main body (25, 35) and connected to a wire (21) elongated from an engine (3) of said working machine; and
 an engine stop switch (23), wherein,
 when said lever member (29) is rotated in one direction, a revolution speed of said engine (3) of said working machine is accelerated, and
 when said lever member (29) is rotated in another direction, said revolution speed of said engine (3) of said working machine is decelerated, and
 when said lever member (29) is rotated by more than a predetermined amount in any of said one and another directions, said engine stop switch (23) is actuated and said engine (3) is stopped.

2. The working machine throttle lever as claimed in claim 1, wherein said throttle lever is attached to a handle bar (15) elongated from a main unit (1) of said working machine in a state that said throttle lever may be attached to and detached from said handle bar (15).

3. The working machine throttle lever as claimed in

claim 1, wherein said throttle lever is attached to a main unit (1) of said working machine in a state that said throttle lever may be attached to and detached from said main unit (1).

4. The working machine throttle lever as claimed in claim 1, wherein said engine stop switch (23) is incorporated inside said throttle lever.

5. The working machine throttle lever as claimed in claim 1, wherein said engine stop switch (23) is provided outside said throttle lever.

6. The working machine throttle lever as claimed in claim 4, further comprising a main body switch element (33) incorporated in said main body (25, 35) and a lever member switch element (31) incorporated in said lever member (29), wherein, when said lever member (29) is rotated by more than a predetermined amount in said one or another direction, said engine (3) is stopped by short-circuiting both of said switch elements (31, 33).

7. The working machine throttle lever as claimed in claim 4, in which said engine stop switch (23) comprising, a main body switch element (33) of which position on said main body (25, 35) has been determined and is fit into said main body (25, 35), and a lever member switch element (31) of which position on said lever member (29) has been determined and is fit into said lever member (29),

wherein, when said lever member (29) is rotated by more than a predetermined amount in said one or another direction, said main body switch element (33) and said lever member switch element (31) of said engine stop switch (23) become a predetermined position relation so that said engine stop switch (23) is actuated and said engine (3) is stopped.

8. The working machine throttle lever as claimed in claim 7, further comprising protrusion (230a, 230b) provided on any one of said main body switch element (233) and said main body (235) and hollow (235a, 235b) provided on the other of said main body switch element (233) and said main body (235) so that a position of said main body switch element (233) is determined by engagement of said protrusion (230a, 230b) with said hollow (235a, 235b), and protrusion (231c, 231d) provided on any one of said lever member switch element (231) and said lever member (229) and hollow (229a, 229b) provided on the other of said lever member switch element (231) and said lever member (229) so that a position of said lever member switch element (231) is determined by engagement of said protrusion (231c, 231d) with said hollow (229a, 229b).

9. The working machine throttle lever as claimed in claim 4, wherein said main body switch element (233) is integrally incorporated in said main body (225, 235) by insertion method during manufacturing of said main body (225, 235), and said lever member switch element (231) is integrally incorporated in said lever member (229) by insertion method during manufacturing of said lever member (229). 5
10. The working machine throttle lever as claimed in claim 5, further comprising a lever member switch element (200a) provided outside said lever element (29) and other switch element (200b) provided outside a main unit of said working machine or a handle bar, wherein, when said lever member (29) is rotated by more than a predetermined amount in said one or another direction, said engine (3) is stopped by short-circuiting both of said switch elements (200a, 200b). 10
11. The working machine throttle lever as claimed in claim 5, wherein said engine stop switch (801) is attached on said lever member (29), and engine is stopped when said lever member (29) is rotated by more than a predetermined amount as said engine stop switch (801) becomes in contact with a main unit of said working machine. 15
12. The working machine throttle lever as claimed in claim 1, further comprising an idle mechanism (301) attached to said throttle lever, wherein an operator may confirm by feeling of resistance whether or not said lever member (229) reaches just before a position at which said engine (209) can be stopped, then said operator may further rotate said lever member (229) in order to stop said engine (209). 20
13. The working machine throttle lever as claimed in claim 12, wherein said idle mechanism (301) is incorporated in a space between said lever member (229) and said main body (225, 235), and when an operator actuates said engine stop switch (223) by rotating said lever member (229), a resistance force is given to said operator just before said engine stop switch (223) is actuated, then said operator may further rotate said lever member (229) in order to actuate said engine stop switch (223). 25
14. The working machine throttle lever as claimed in claim 1, wherein, when said lever member (229) is rotated by more than a predetermined amount in one direction, or when said lever member (229) is rotated by more than said predetermined amount in another direction, said engine (209) is stopped regardless of direction of rotation. 30
15. The working machine throttle lever as claimed in claim 1, wherein an attachment position of said lever member switch element (231) or said main body switch element (233) is adjustable, thereby a timing of engine stop (209) is adjusted. 35
16. The working machine throttle lever as claimed in claim 1, wherein an operation part of said lever member (229) is formed in a forked shape (229a, 229b). 40
17. The working machine throttle lever as claimed in claim 1, wherein fuel supply is cut when said lever member (229) is rotated by more than a predetermined amount, and an engine electric power circuit is short-circuited at the same time. 45
18. The working machine throttle lever as claimed in claim 1, further comprising a waterproofing means (903) covering said engine stop switch (223). 50
19. The working machine throttle lever as claimed in claim 1, wherein a metal fitting (237) in order to attach said throttle lever to said working machine is attached to or detached from said throttle lever from the outside of said throttle lever. 55
20. The working machine throttle lever as claimed in claim 1, wherein a force is always applied by an elastic member (1025) to said throttle lever (1023) in a direction of decelerating a revolution speed of said engine.

FIG. 1

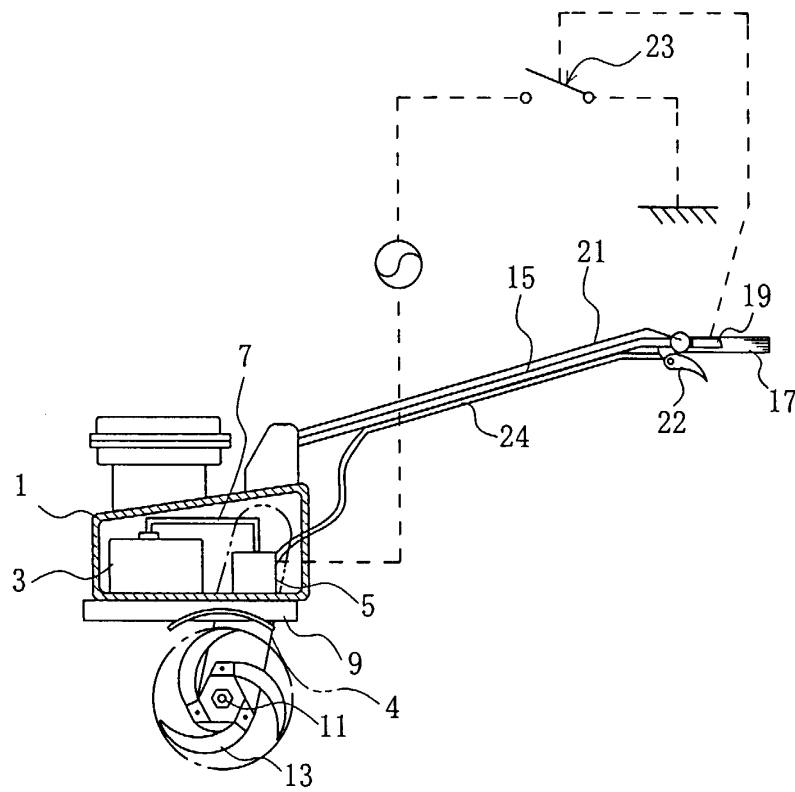


FIG. 2

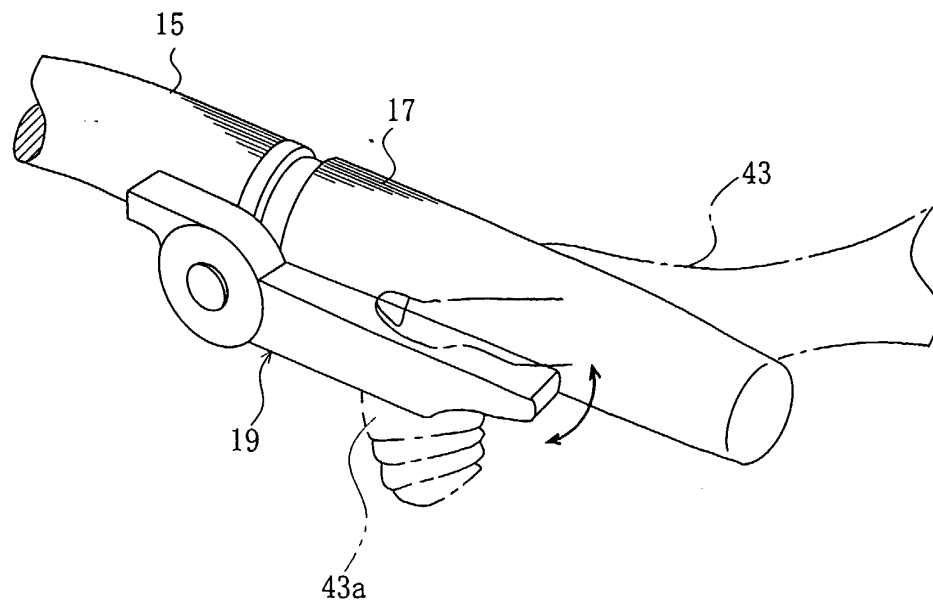


FIG. 3

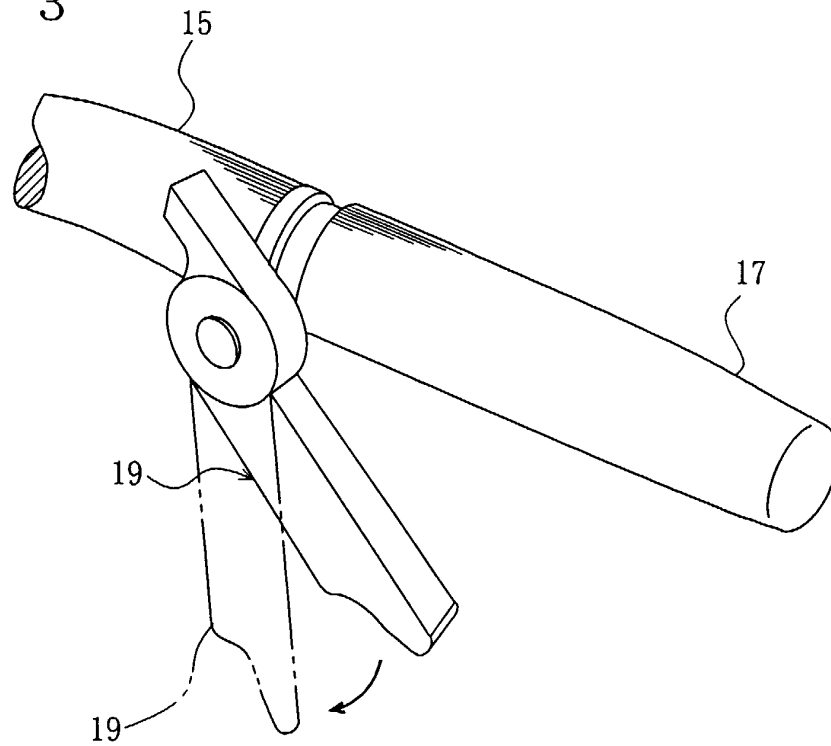


FIG. 4

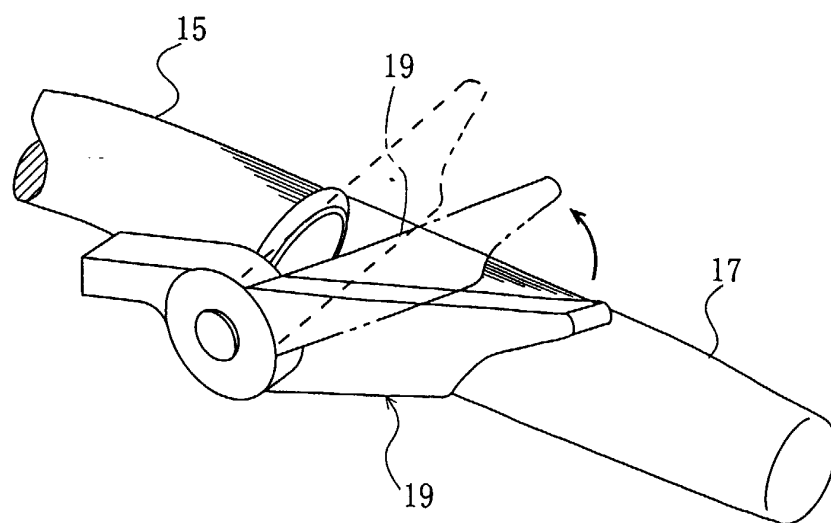


FIG. 5

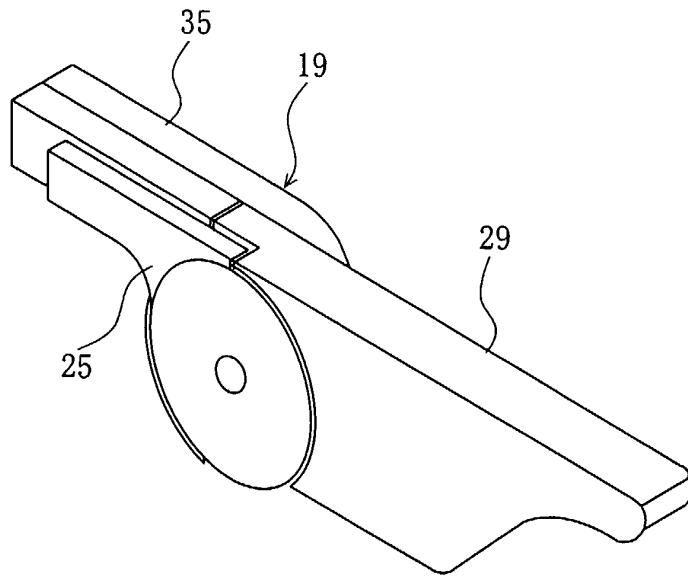


FIG. 6

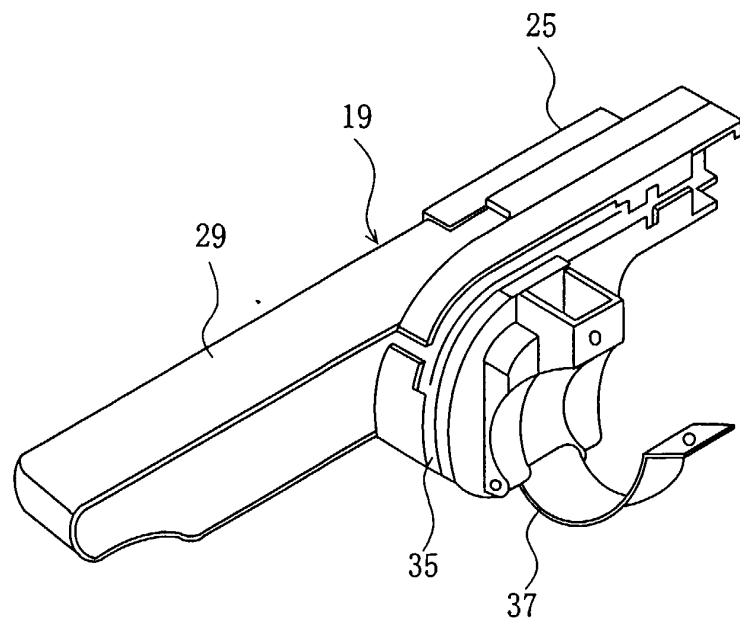


FIG. 7

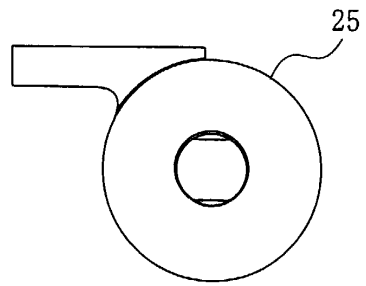


FIG. 8

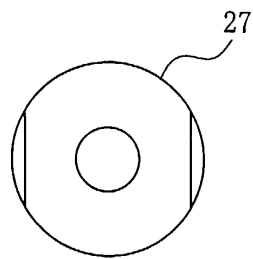


FIG. 9

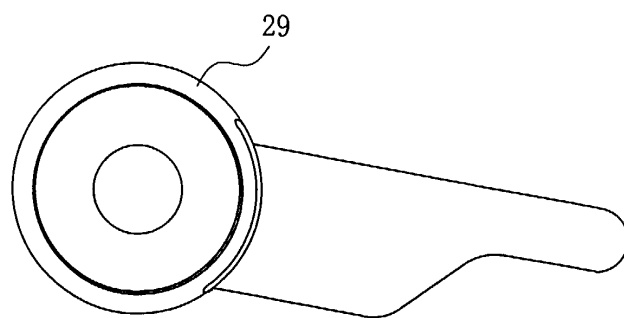


FIG. 10

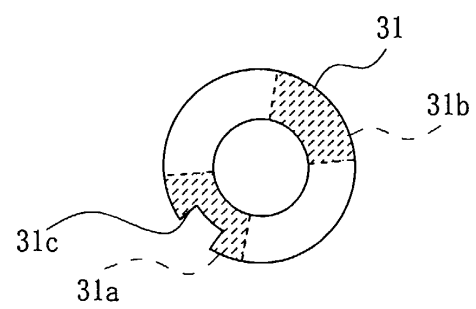


FIG. 11

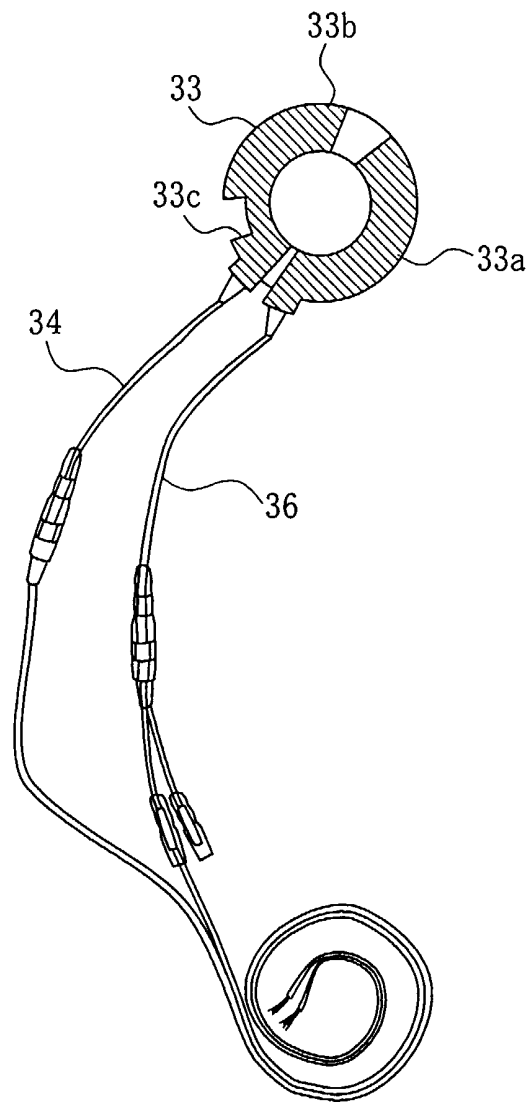


FIG. 12

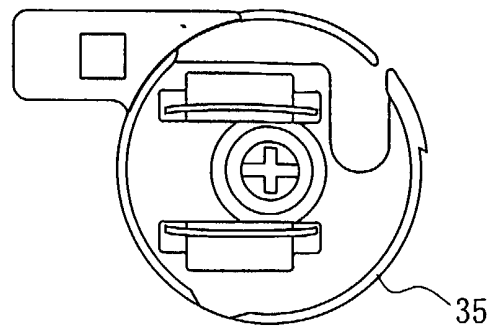


FIG. 13

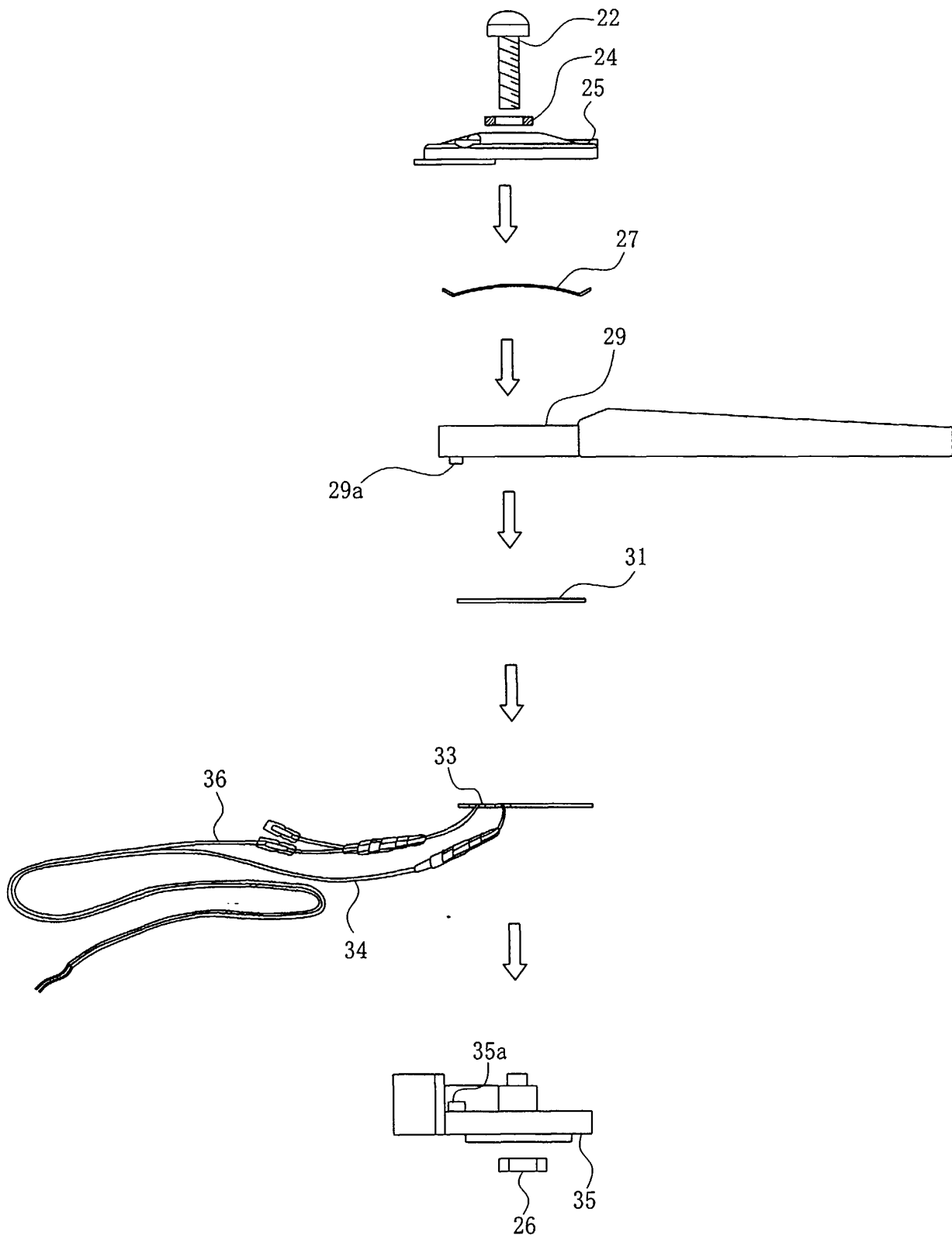


FIG. 14

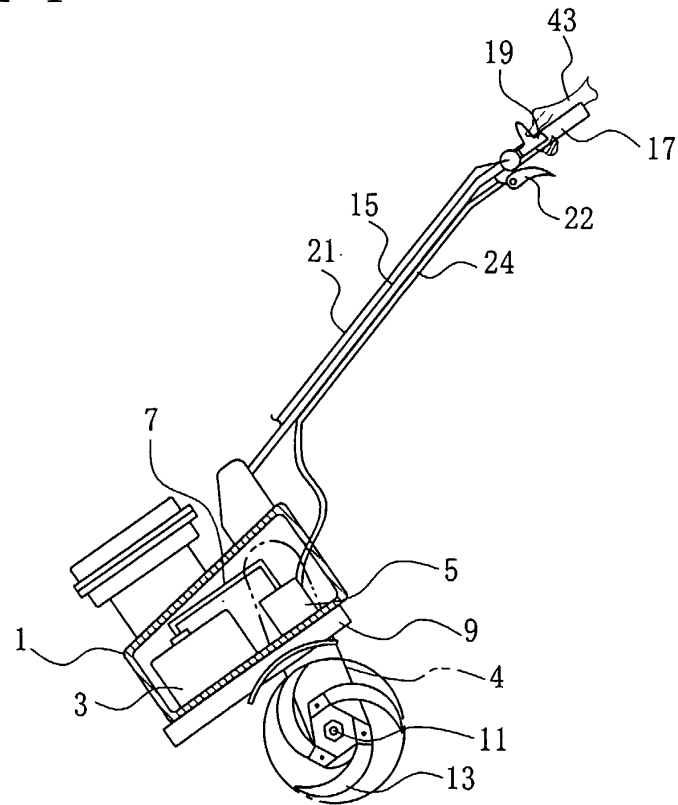


FIG. 15

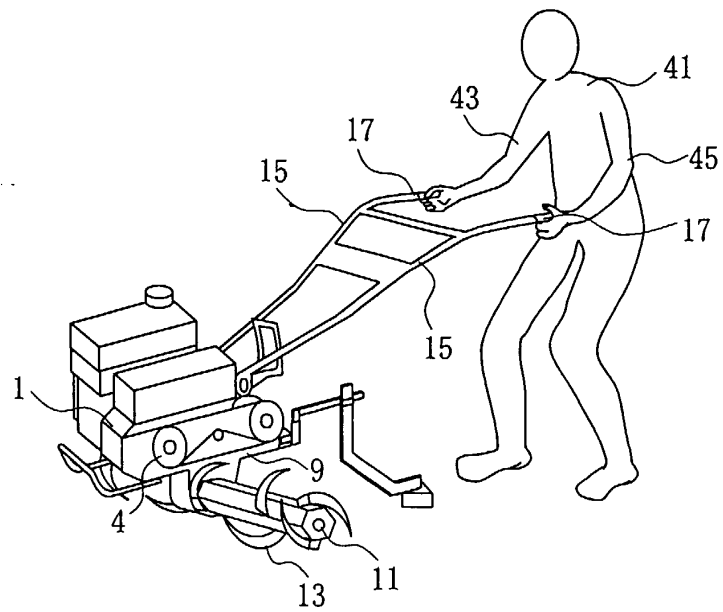


FIG. 16

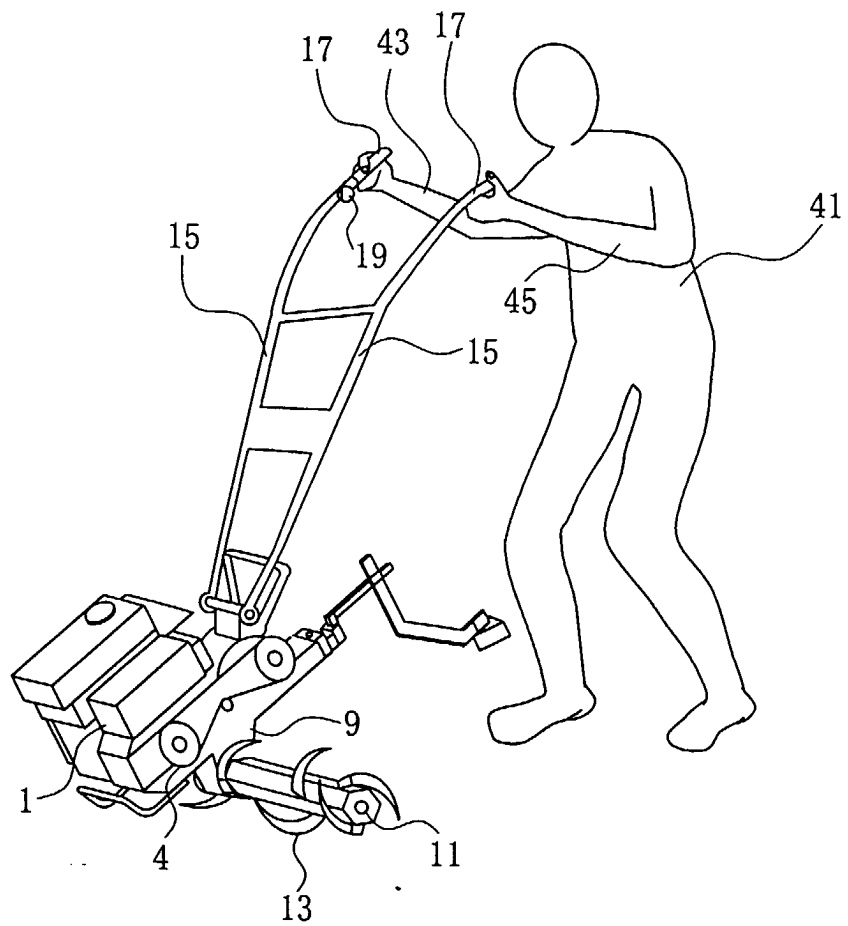


FIG. 17

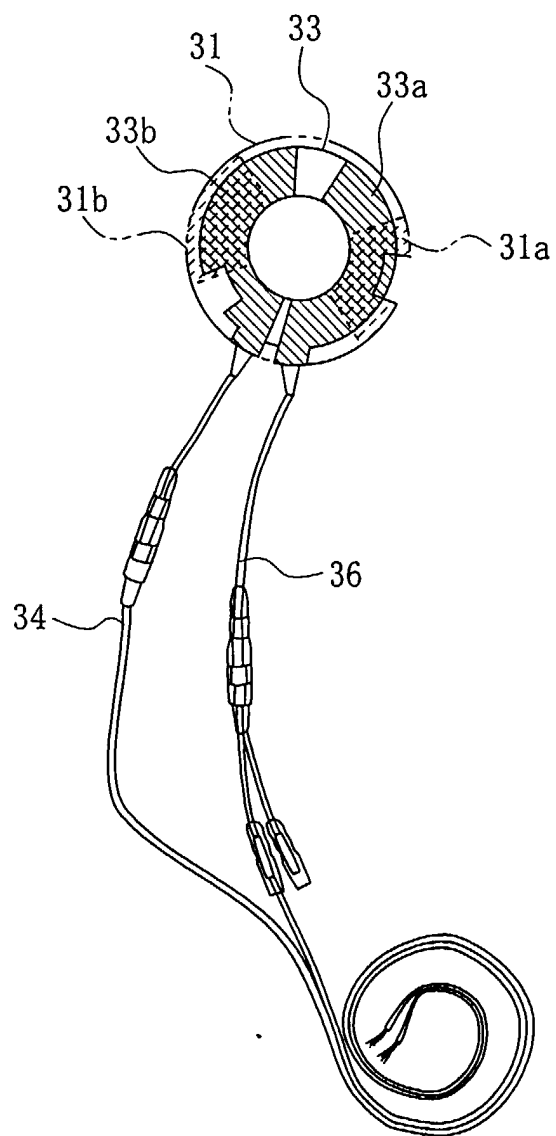


FIG. 18

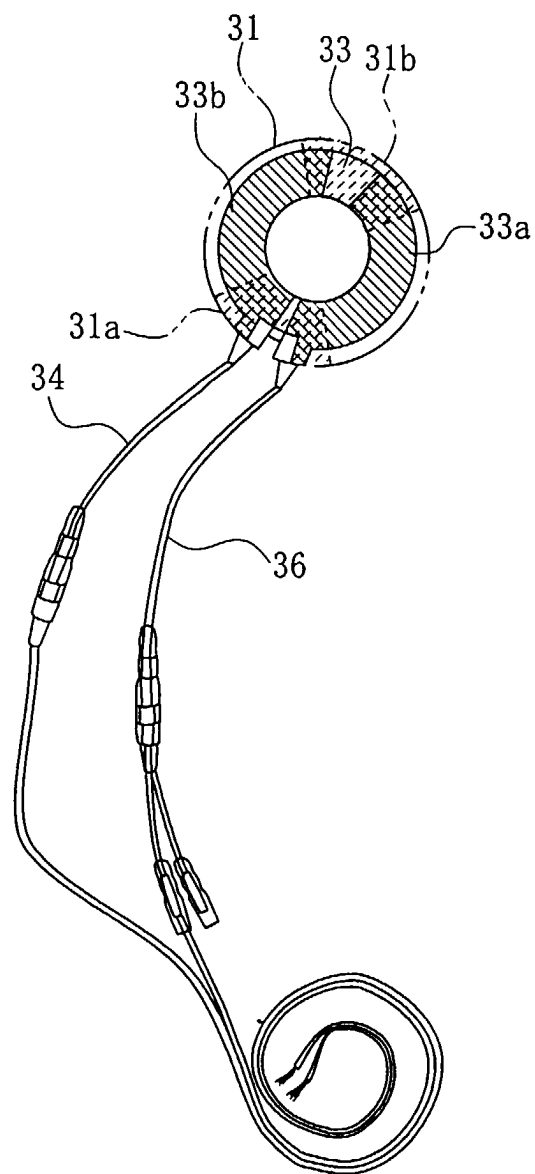


FIG. 19

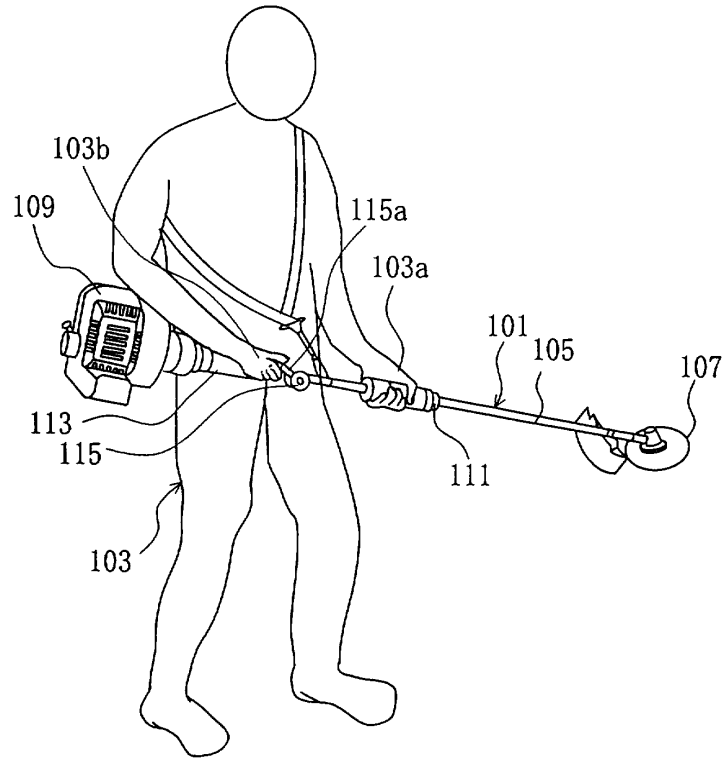


FIG. 20

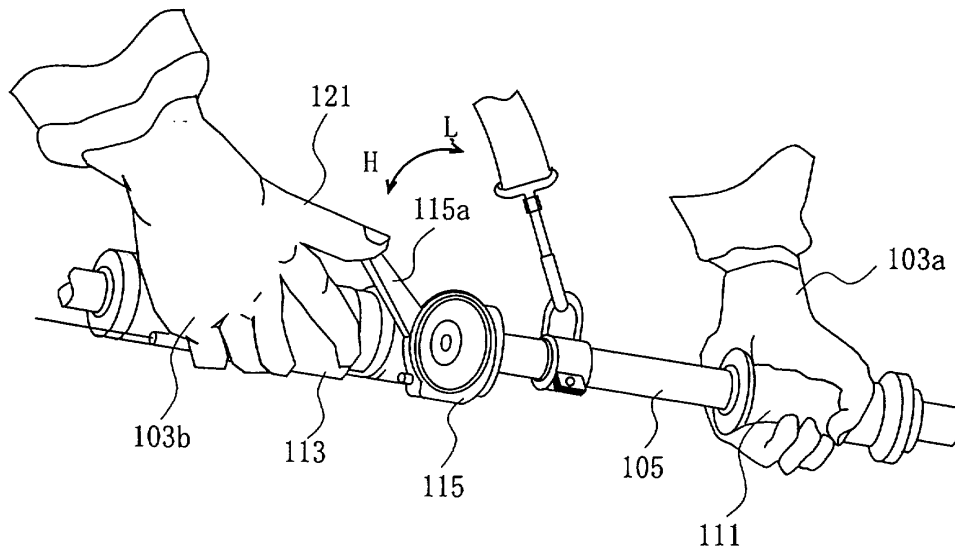


FIG. 21

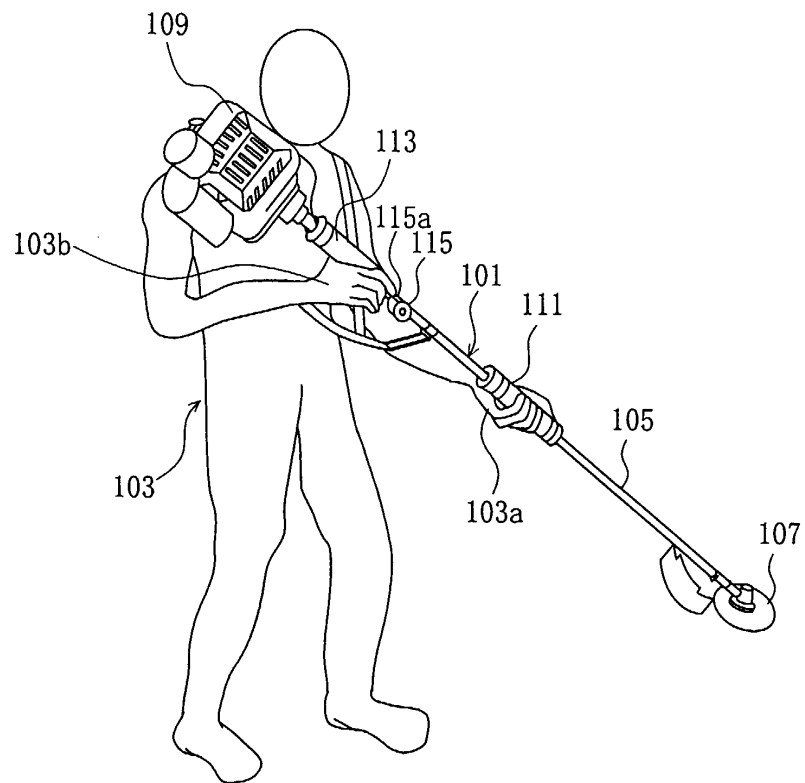


FIG. 22

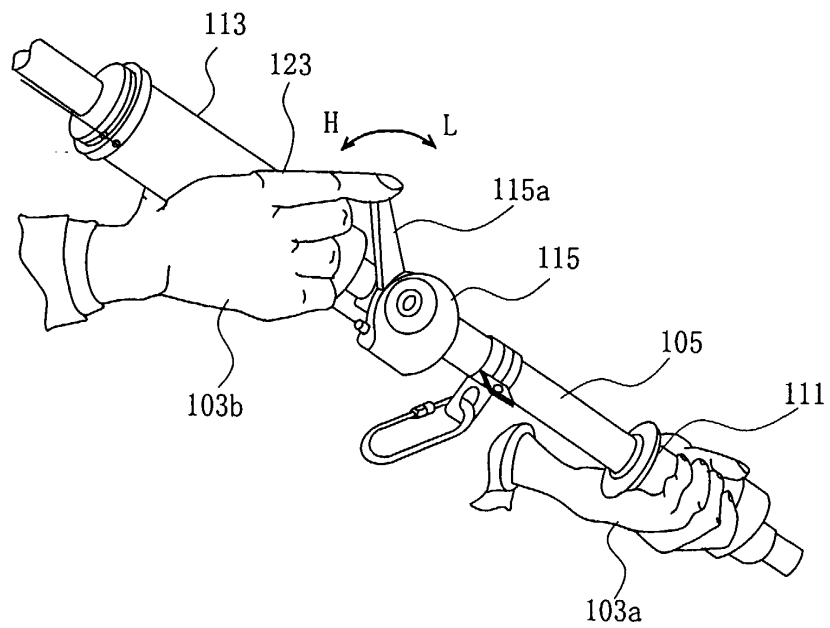


FIG. 23

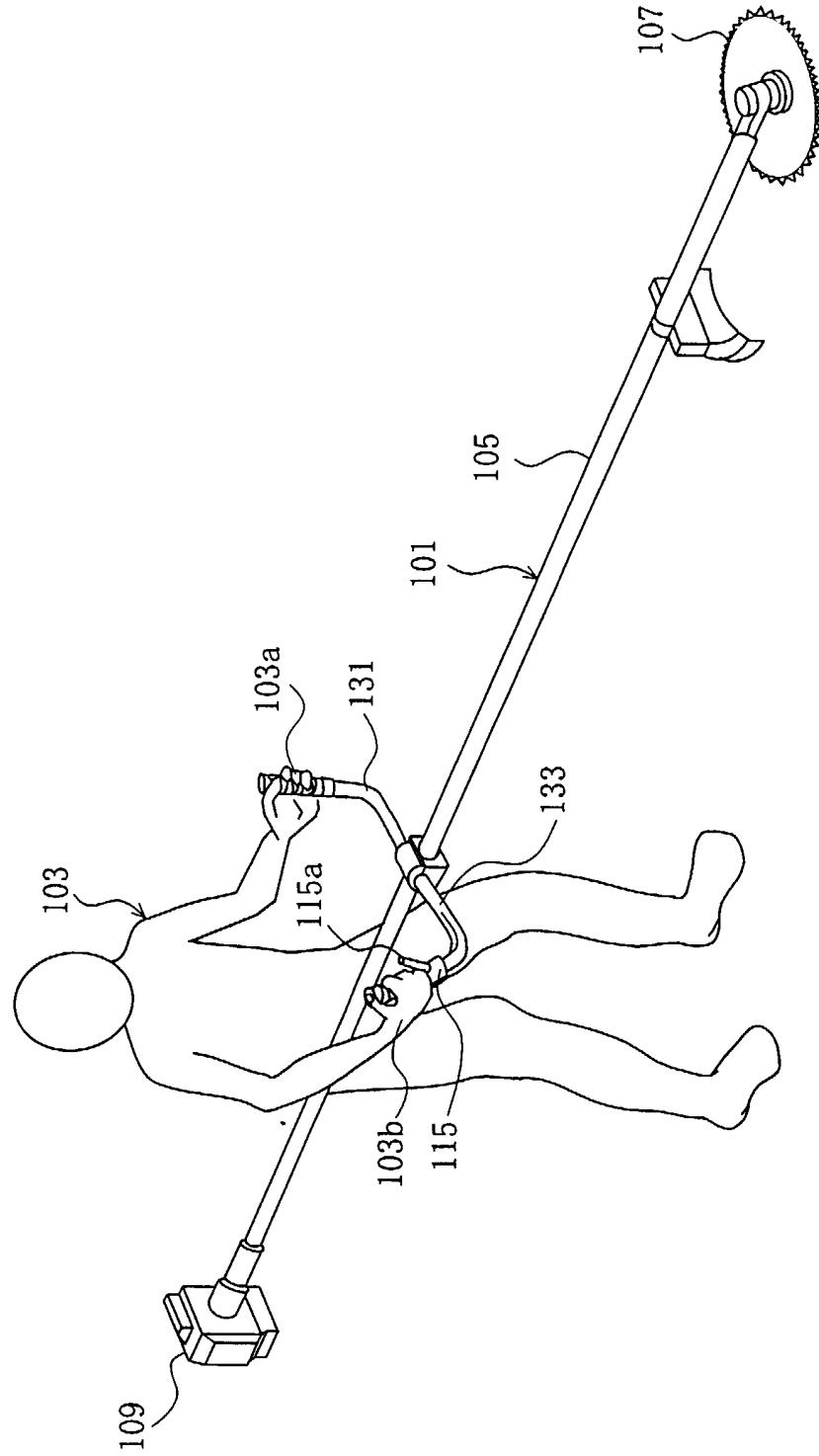


FIG. 24

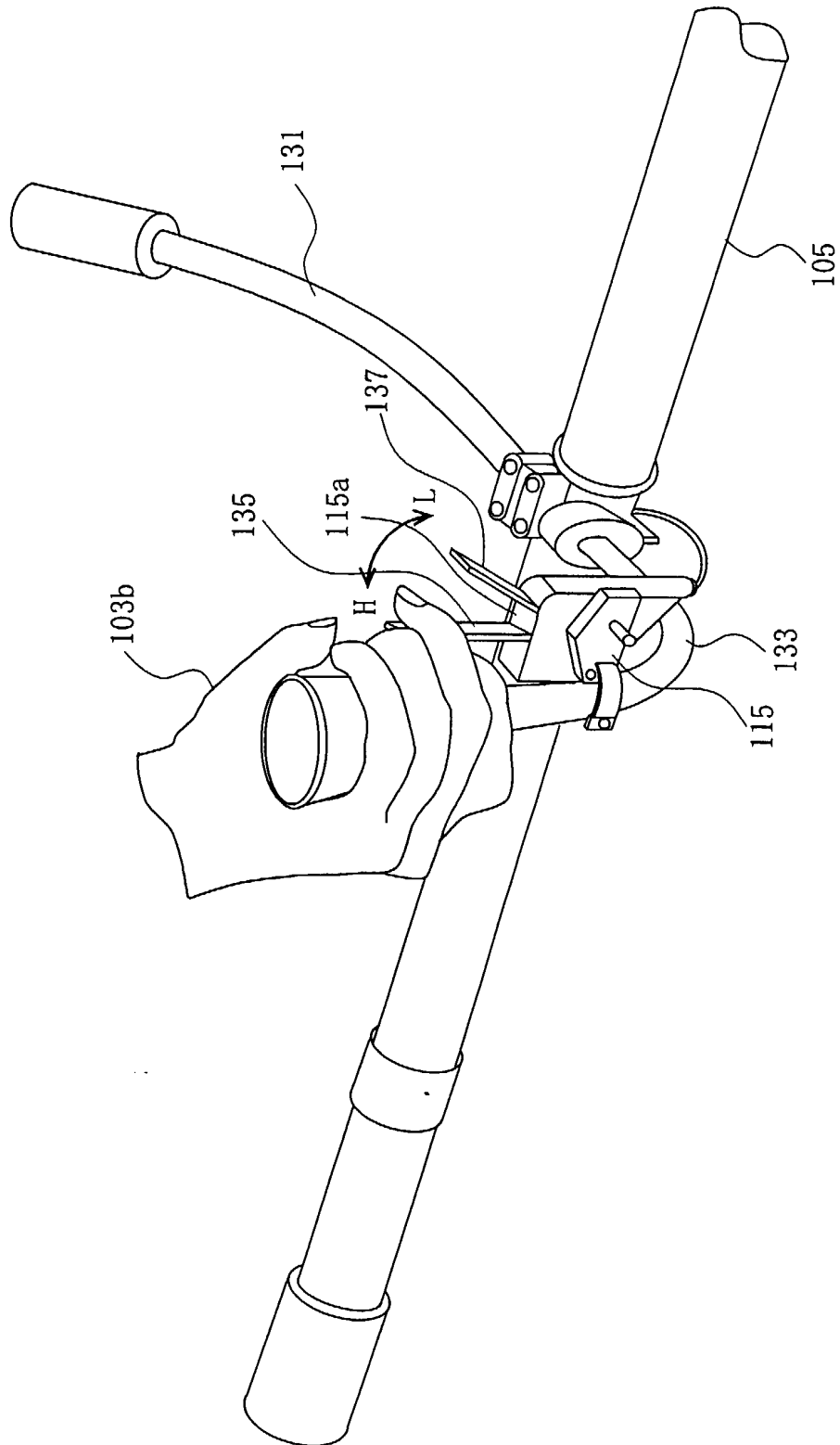


FIG. 25

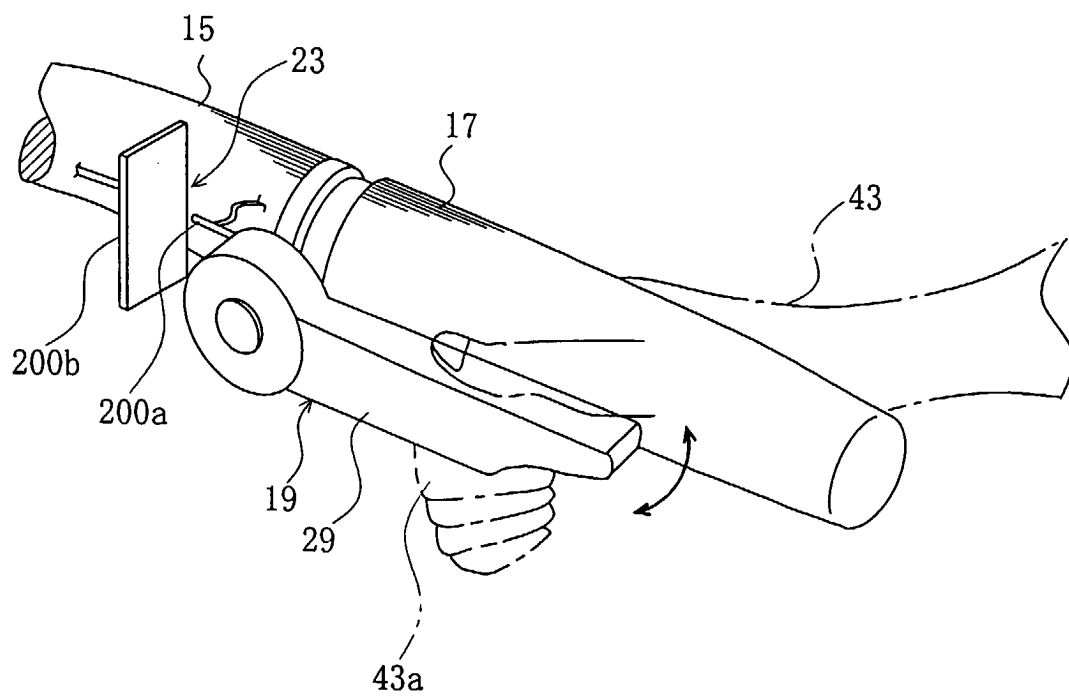


FIG. 26

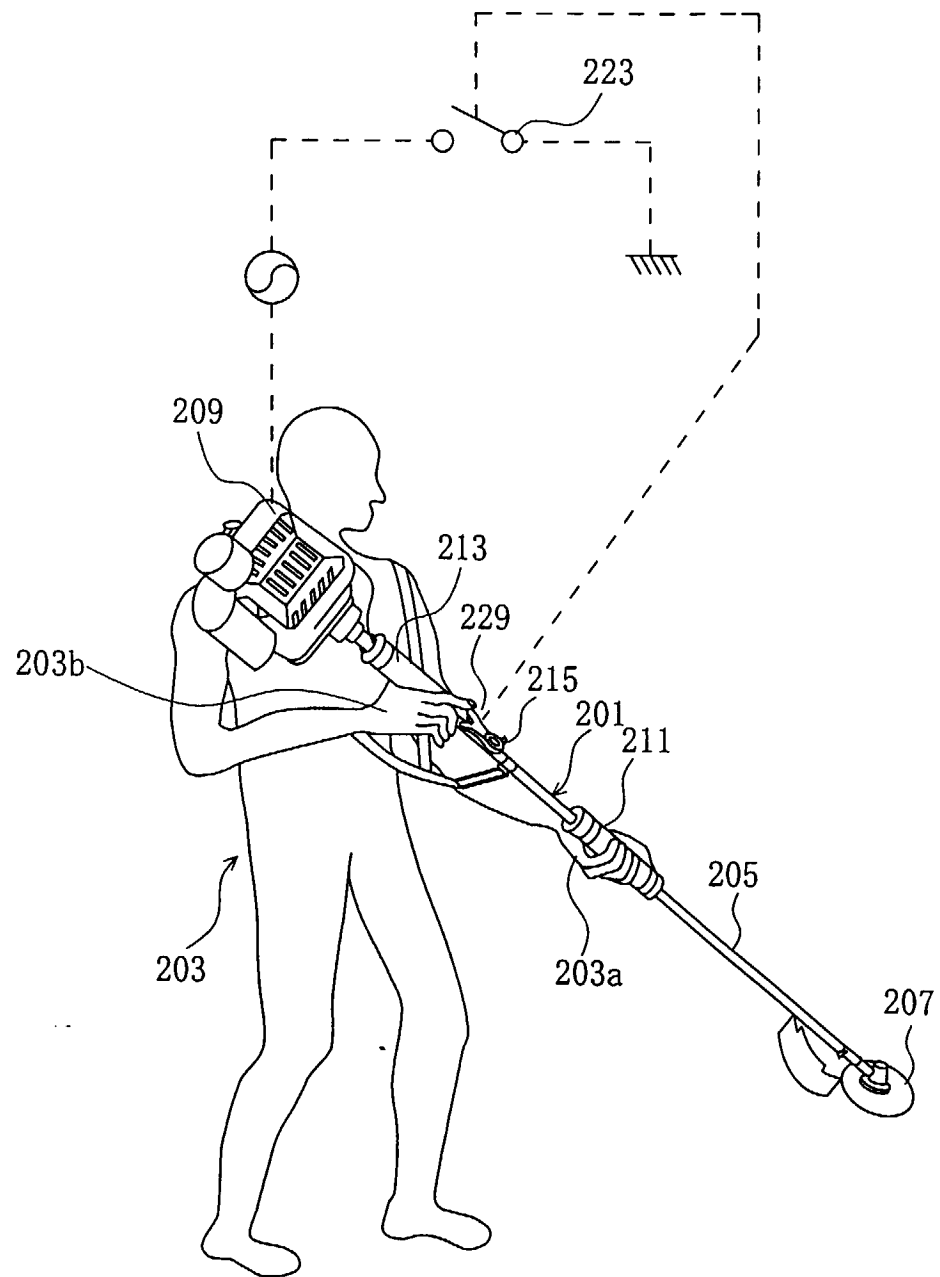


FIG. 27

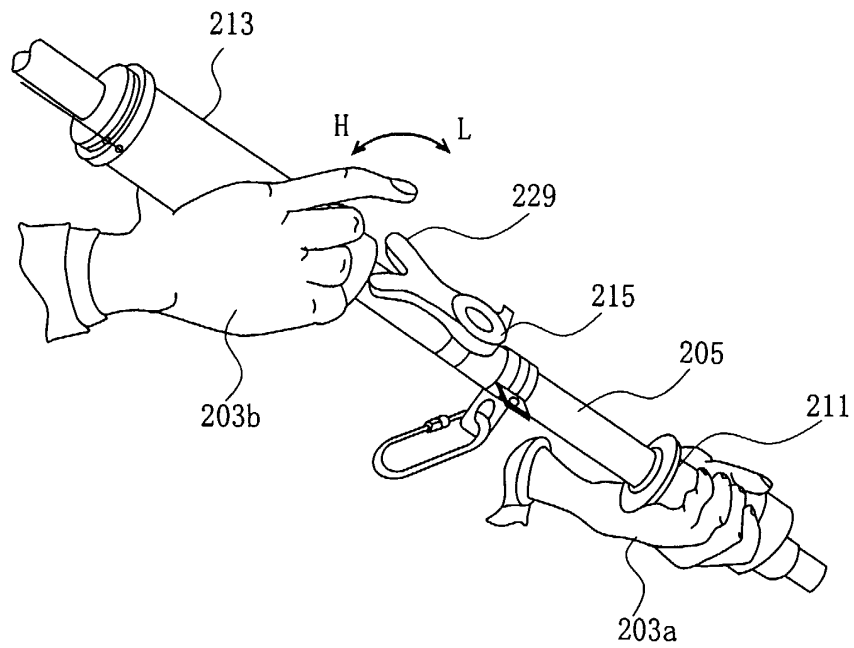


FIG. 28

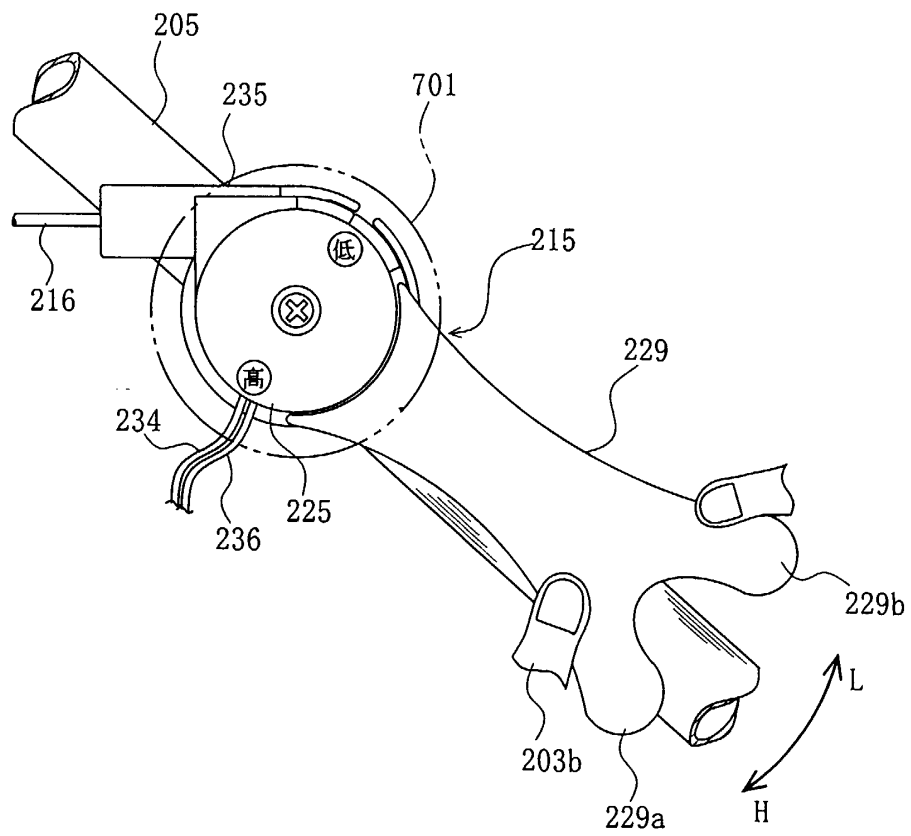


FIG. 29

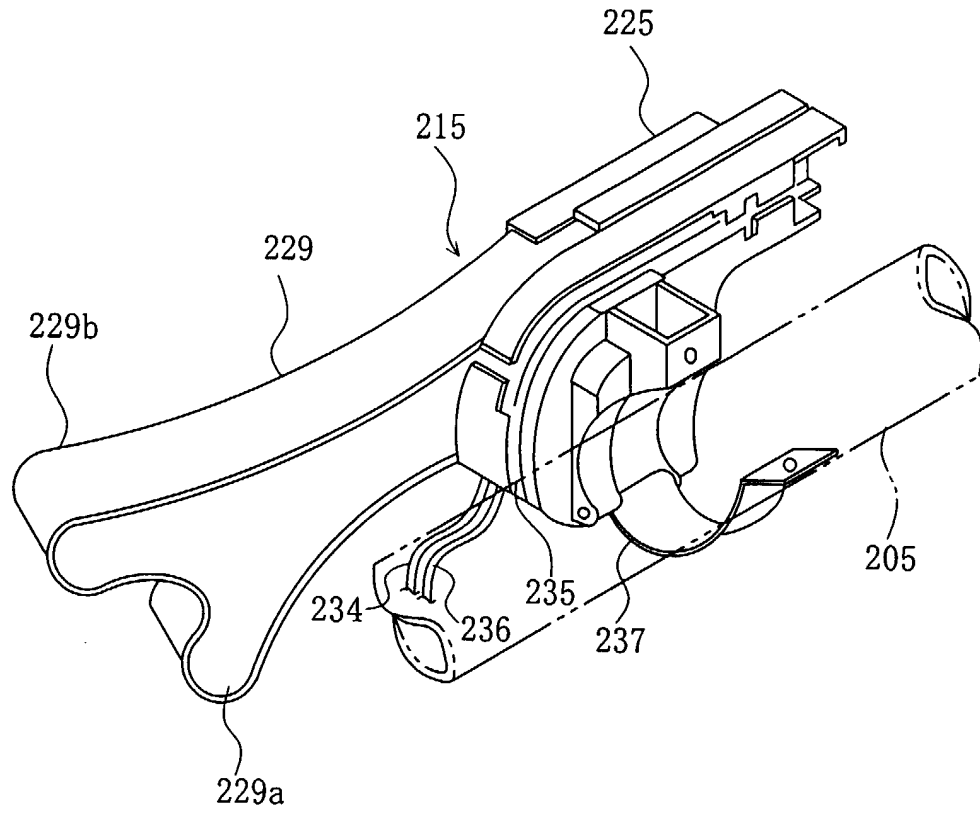


FIG. 30

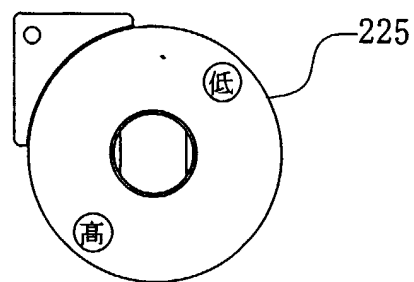


FIG. 31

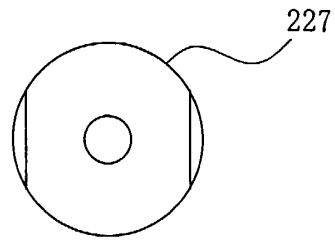


FIG. 32

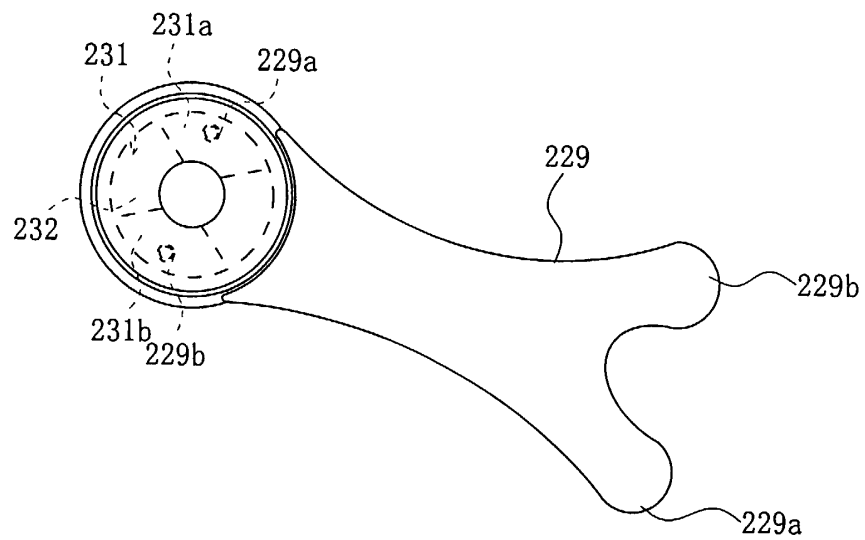


FIG. 33

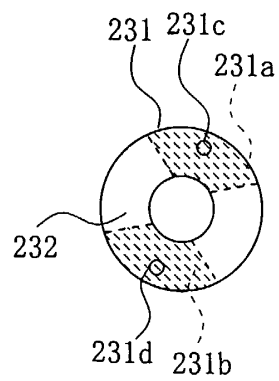


FIG. 34

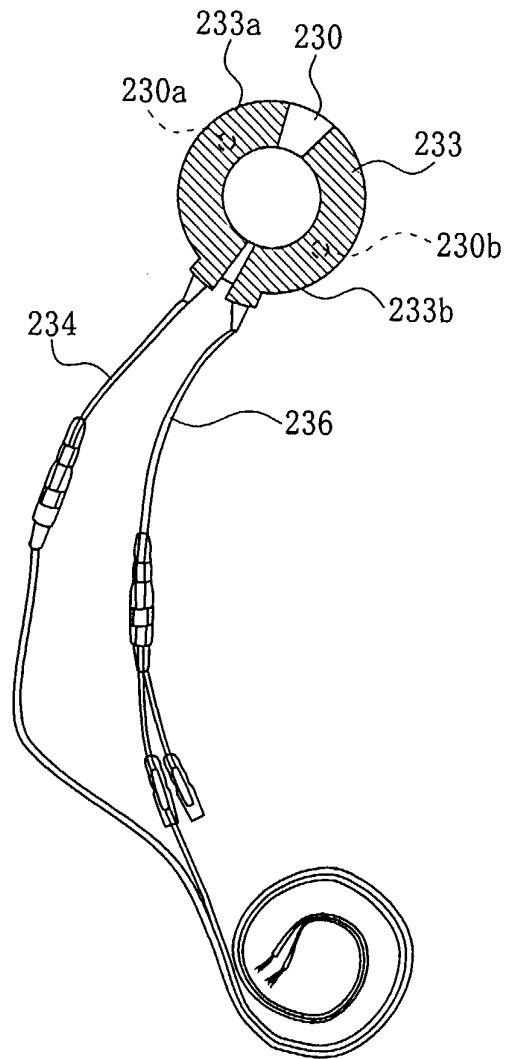


FIG. 35

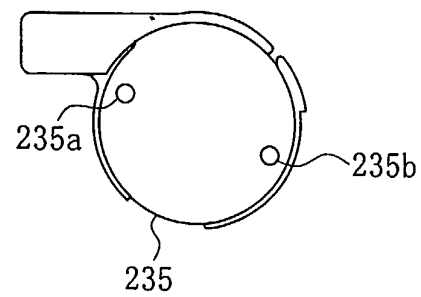


FIG. 36

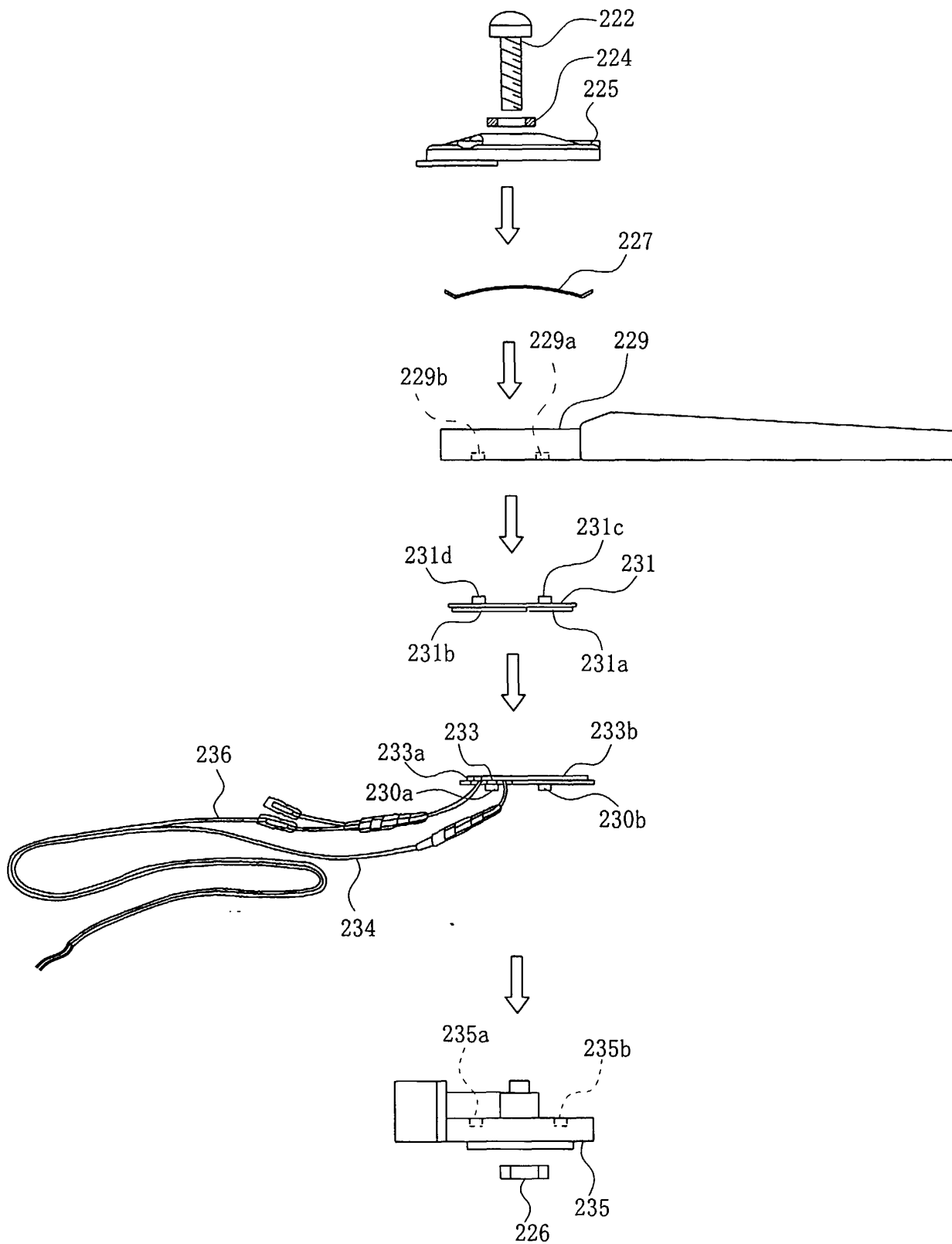


FIG. 37

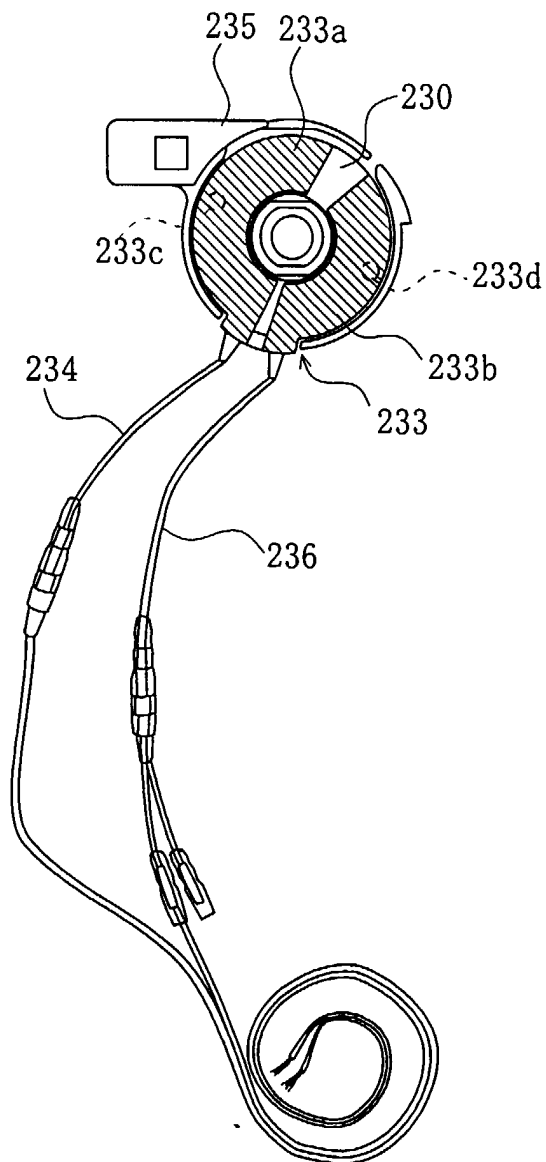


FIG. 38

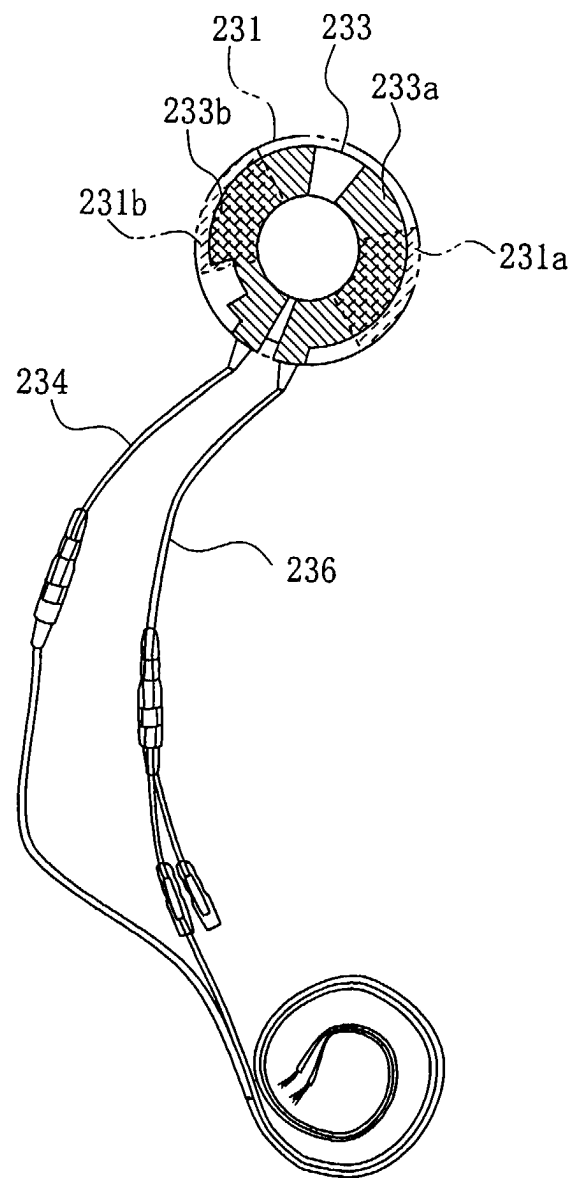


FIG. 39

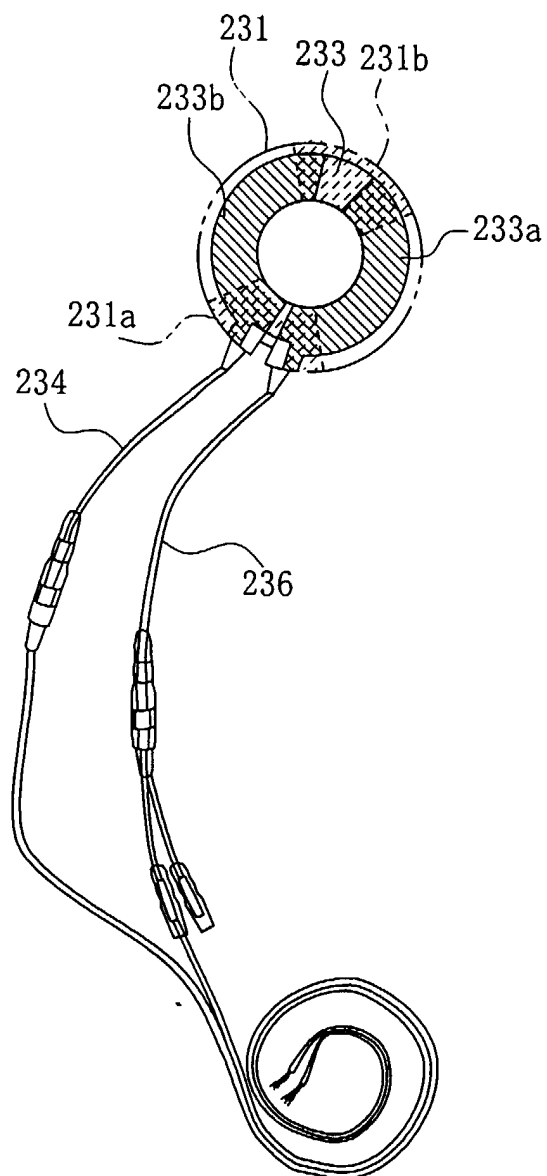


FIG. 40

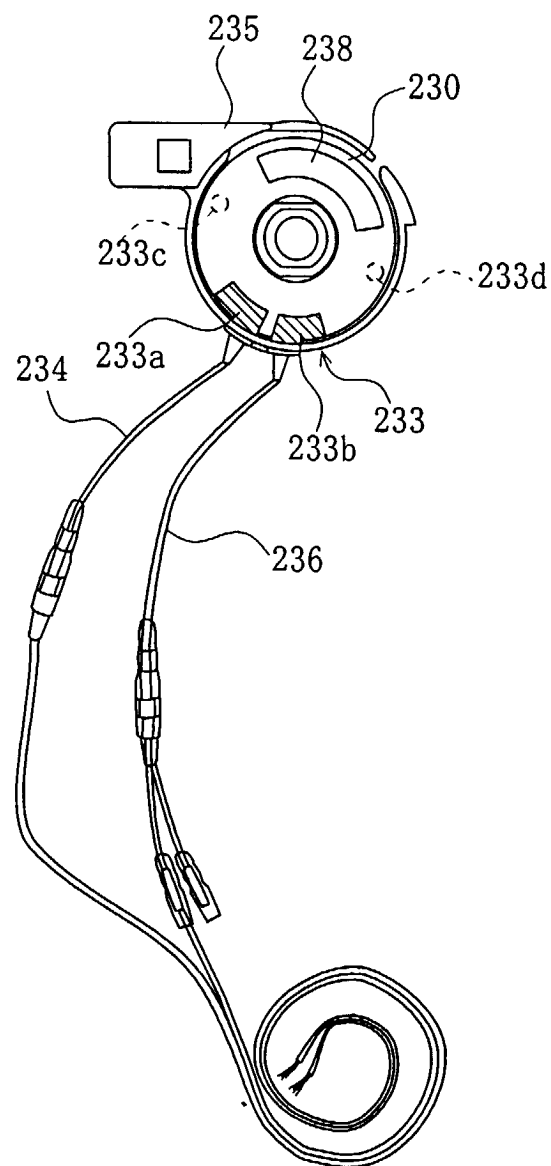


FIG. 41

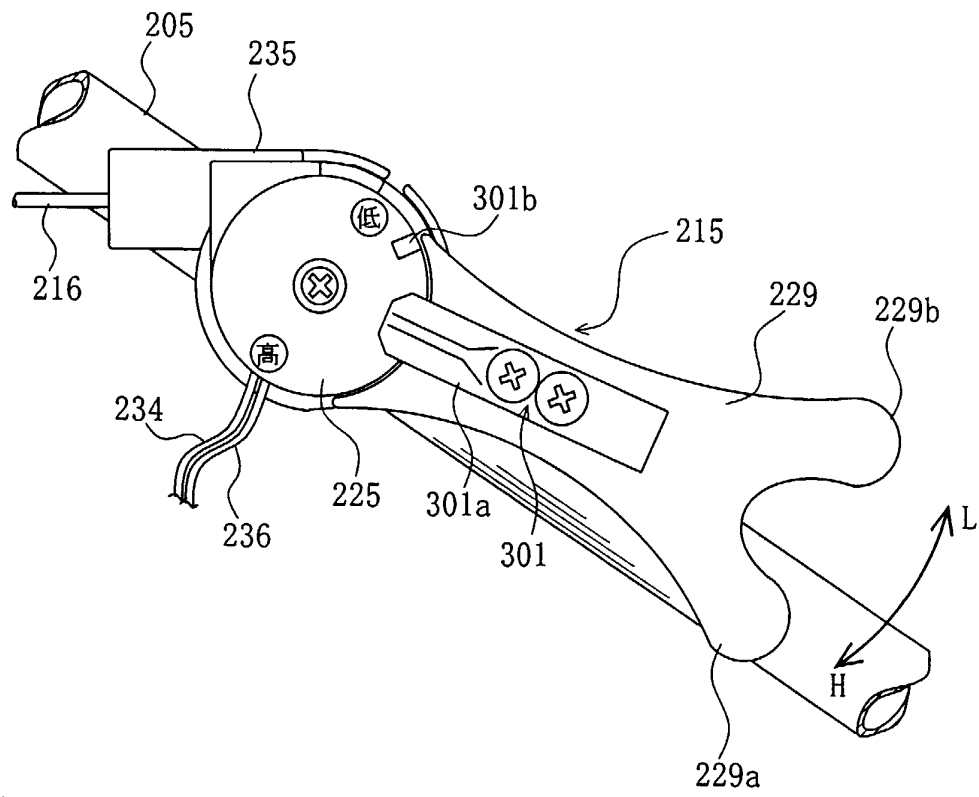


FIG. 42

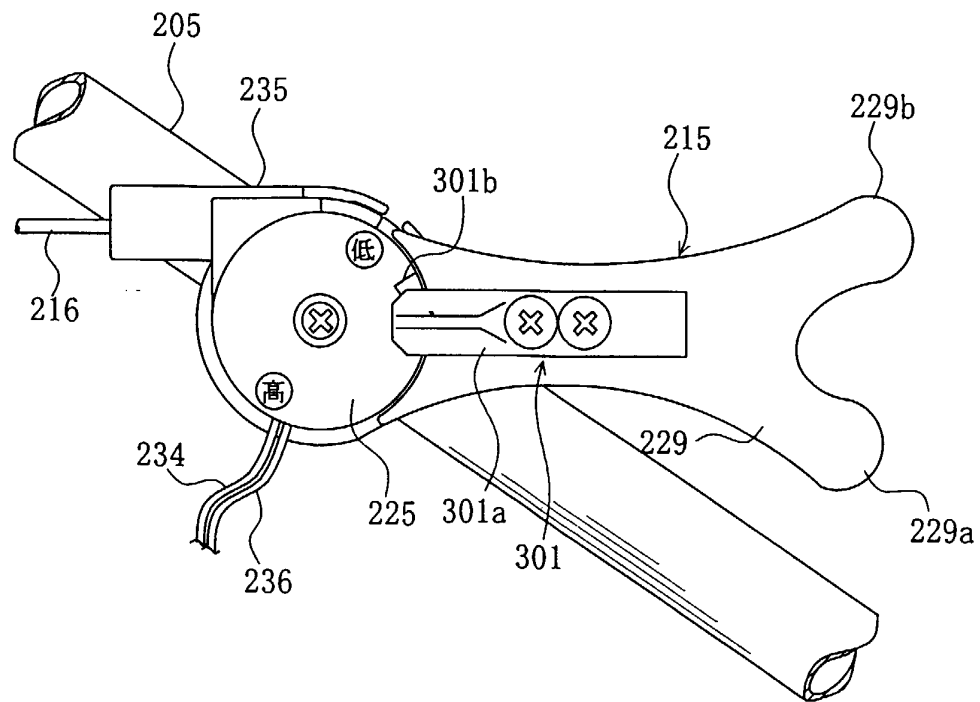


FIG. 43

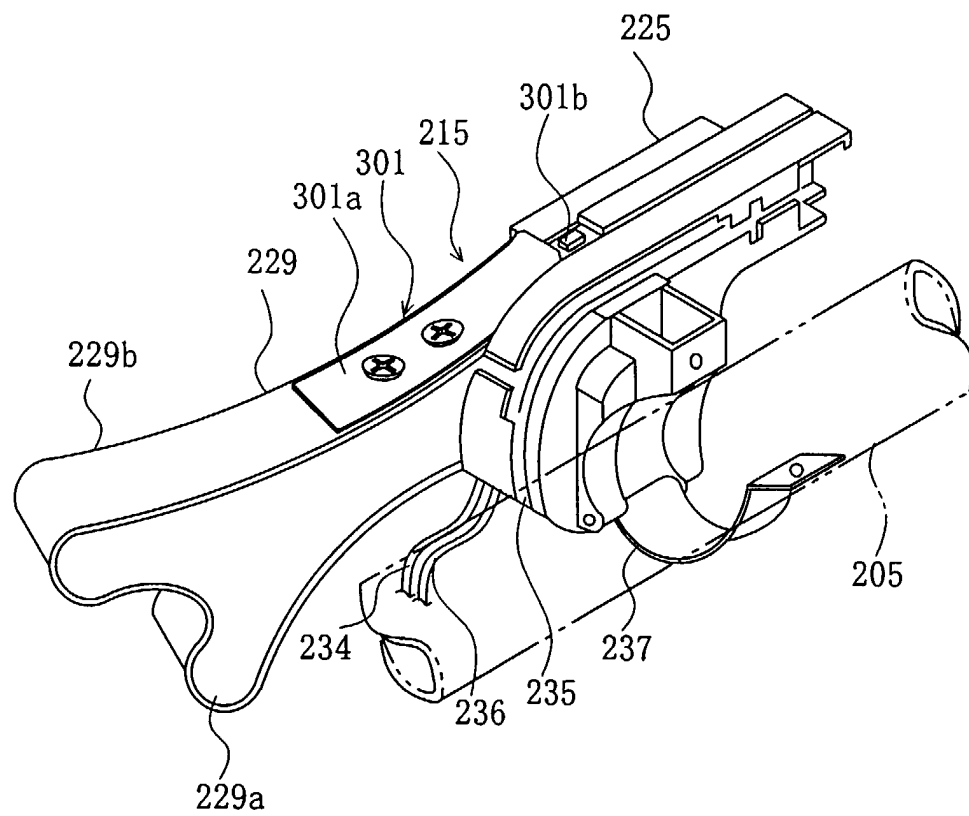


FIG. 44

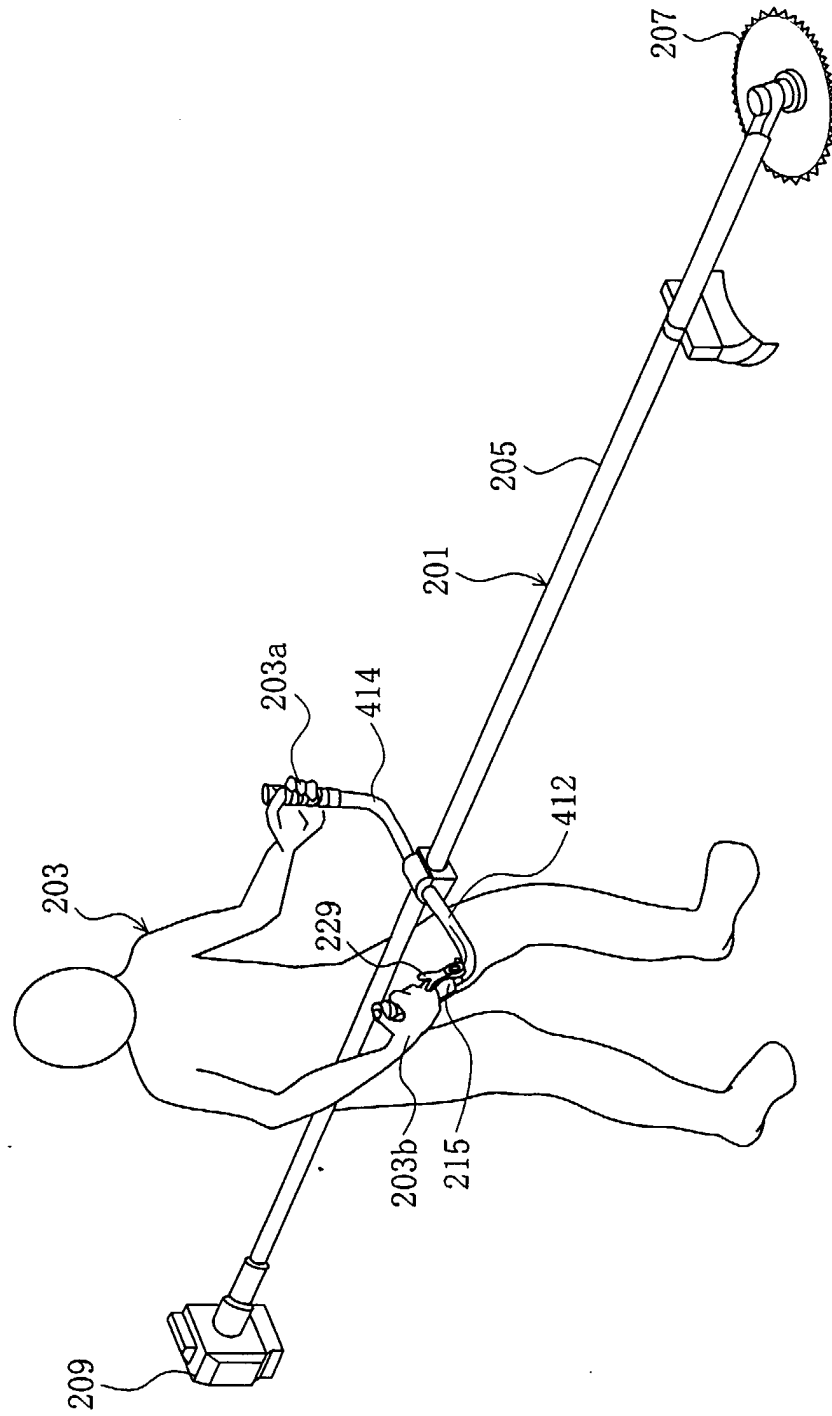


FIG. 45

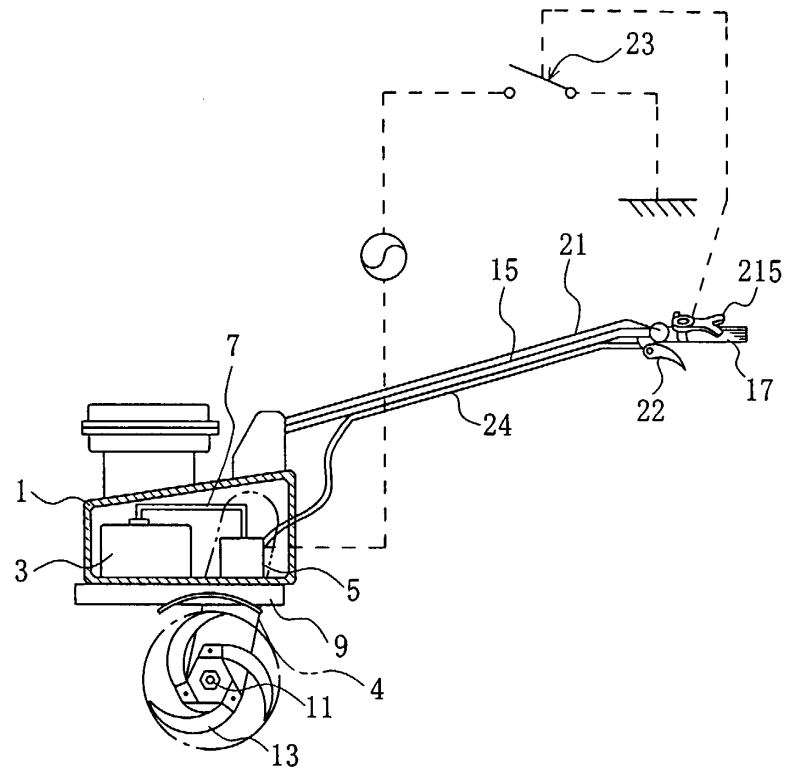


FIG. 46

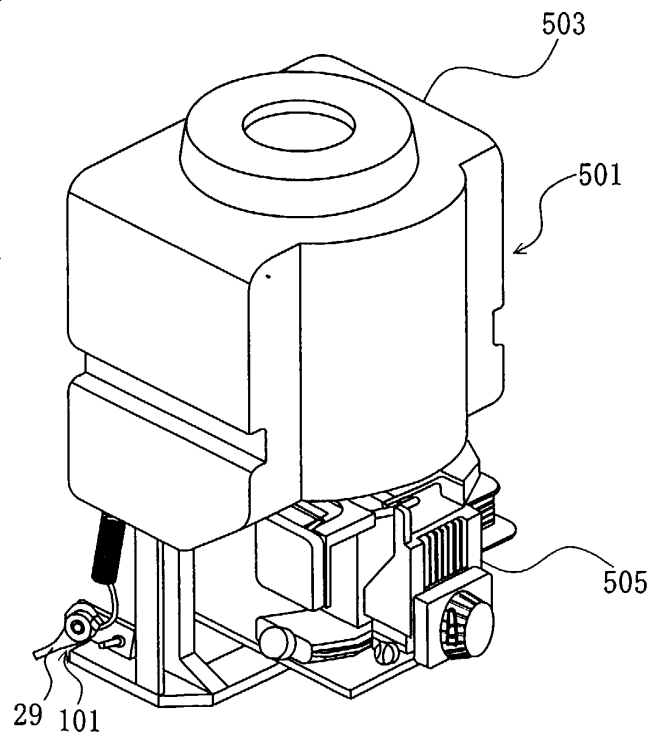


FIG. 47

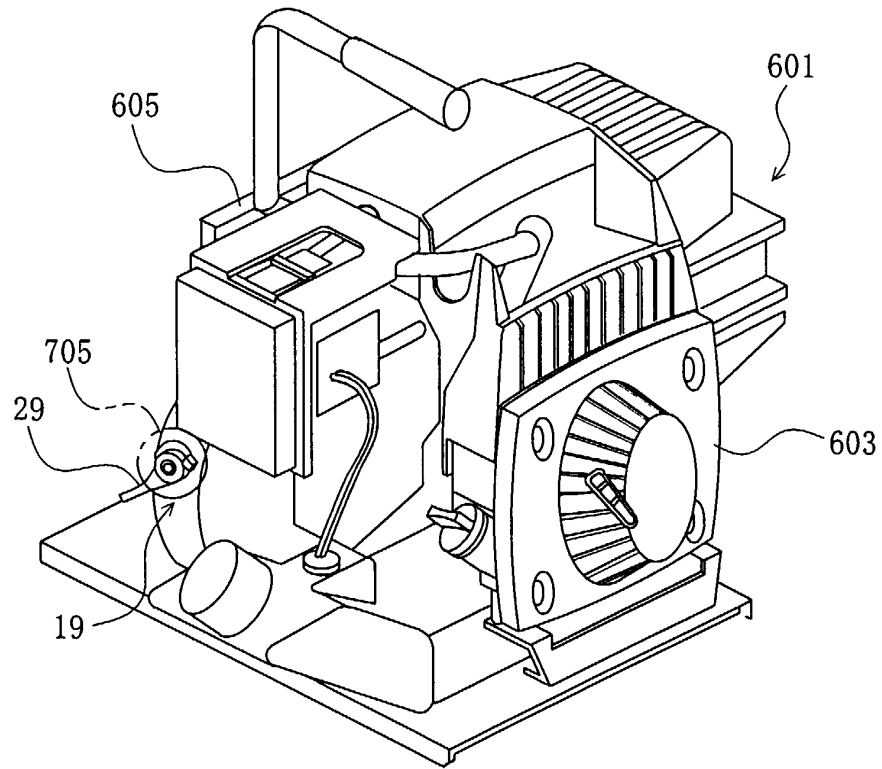


FIG. 48

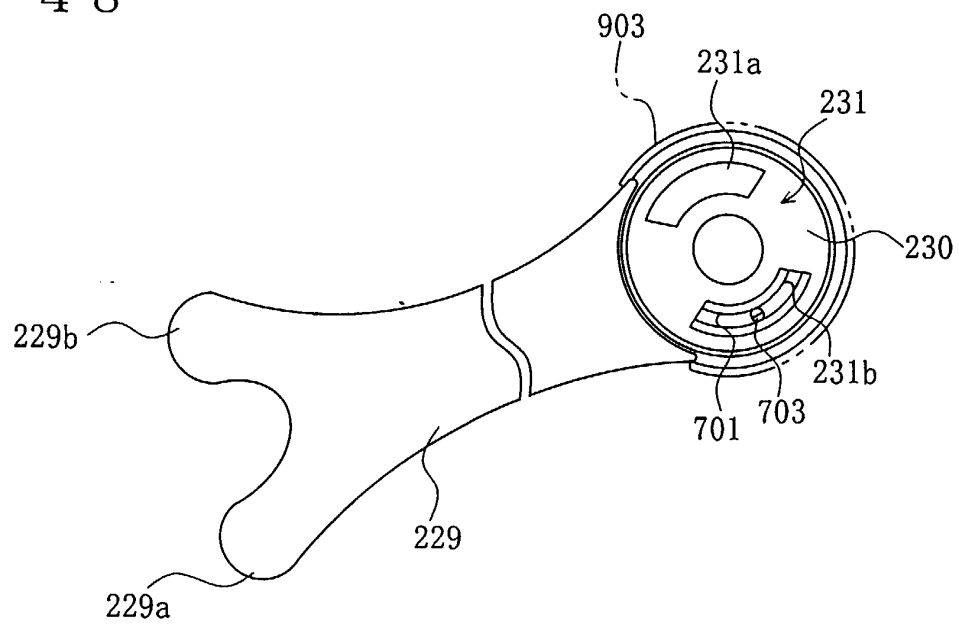


FIG. 49

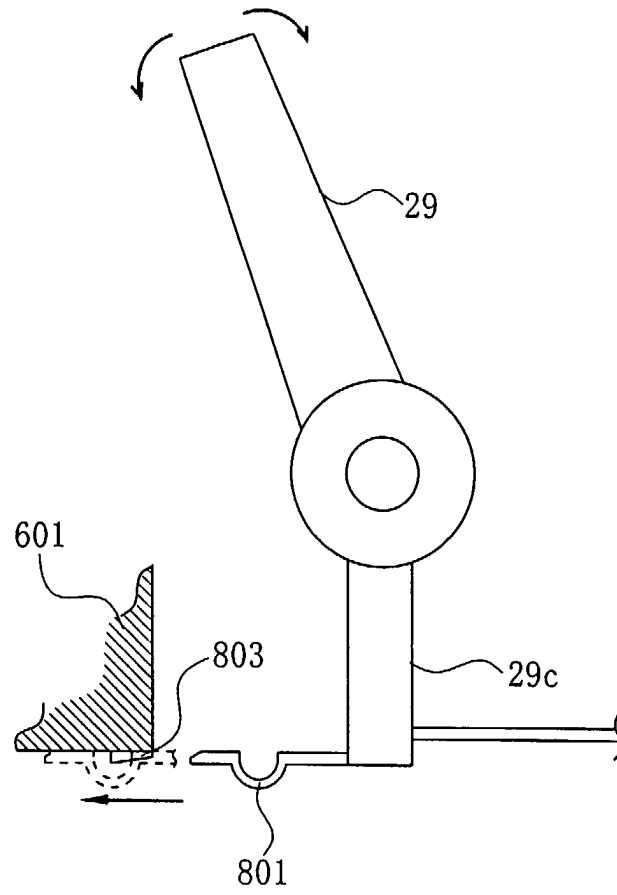


FIG. 50

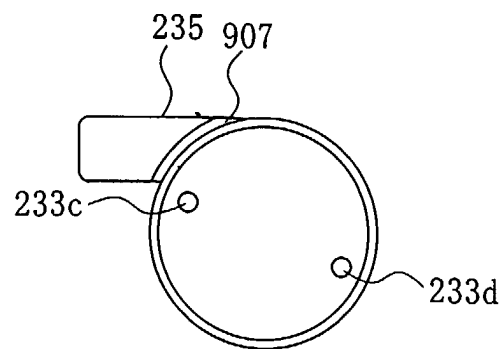


FIG. 51

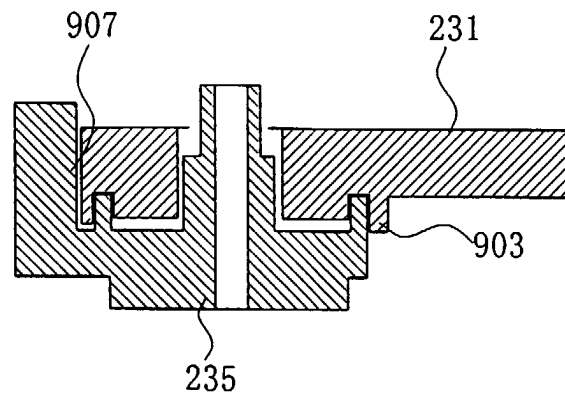


FIG. 52

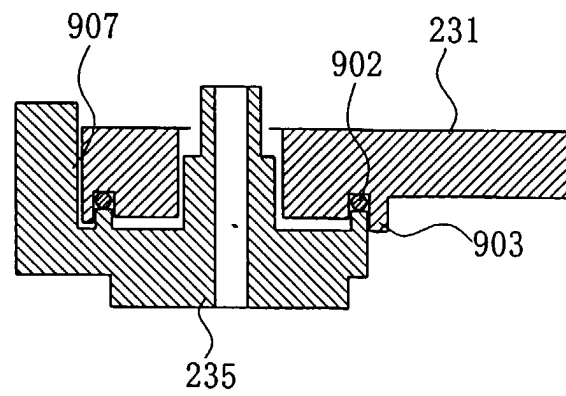


FIG. 53

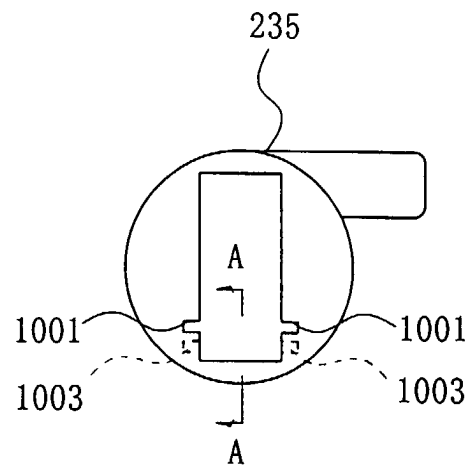


FIG. 54

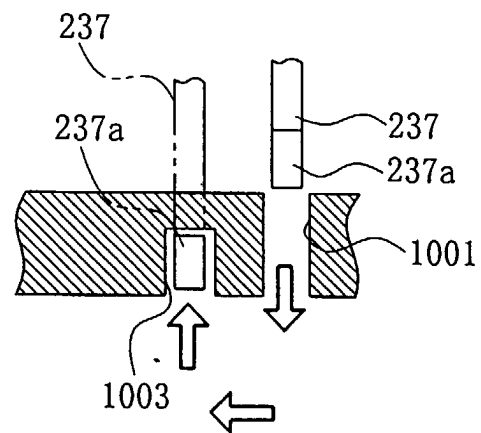


FIG. 55

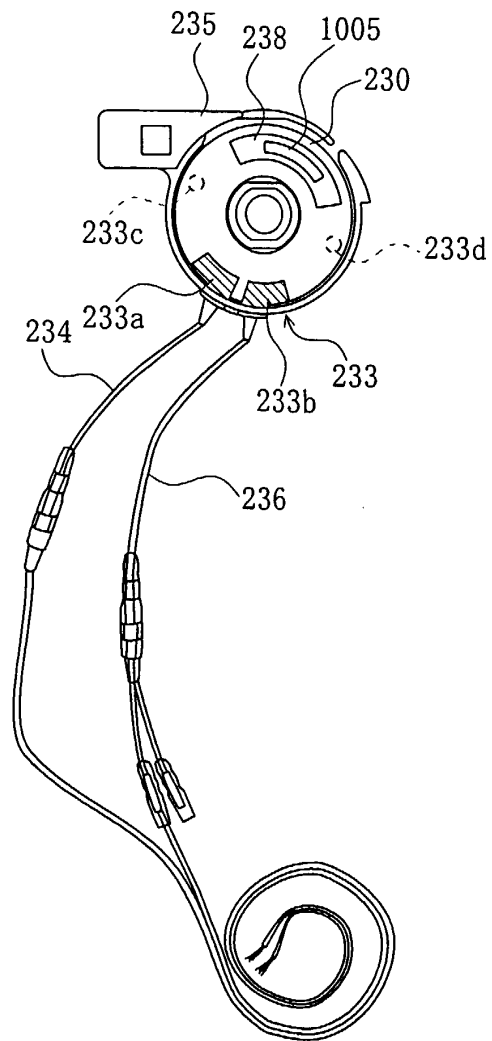


FIG. 56

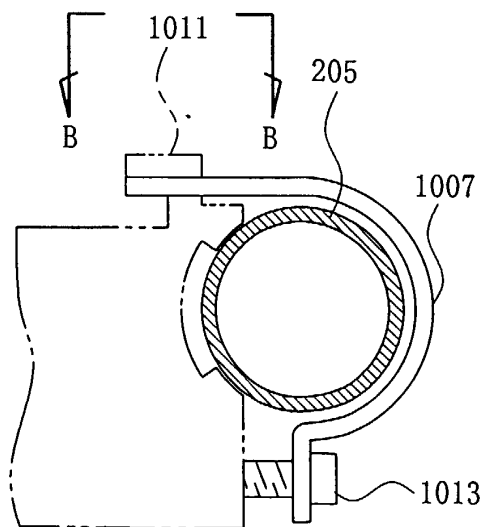


FIG. 57

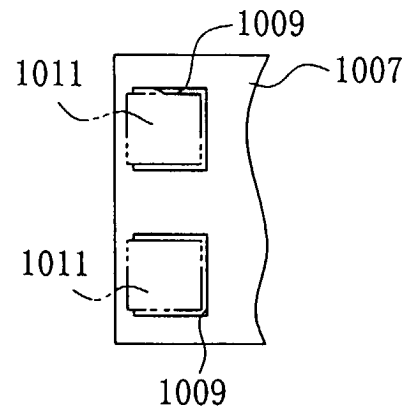


FIG. 58

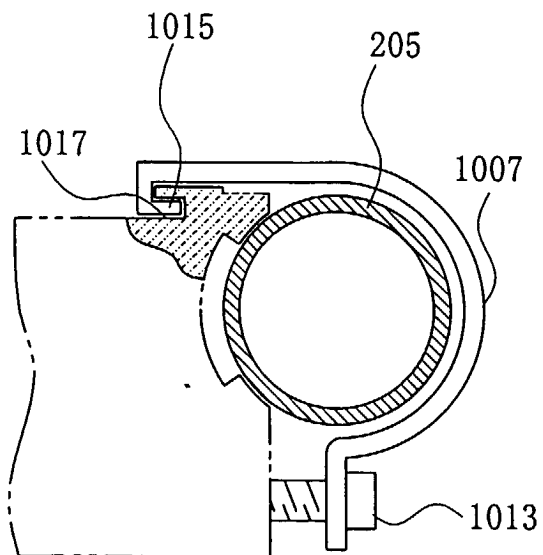


FIG. 59

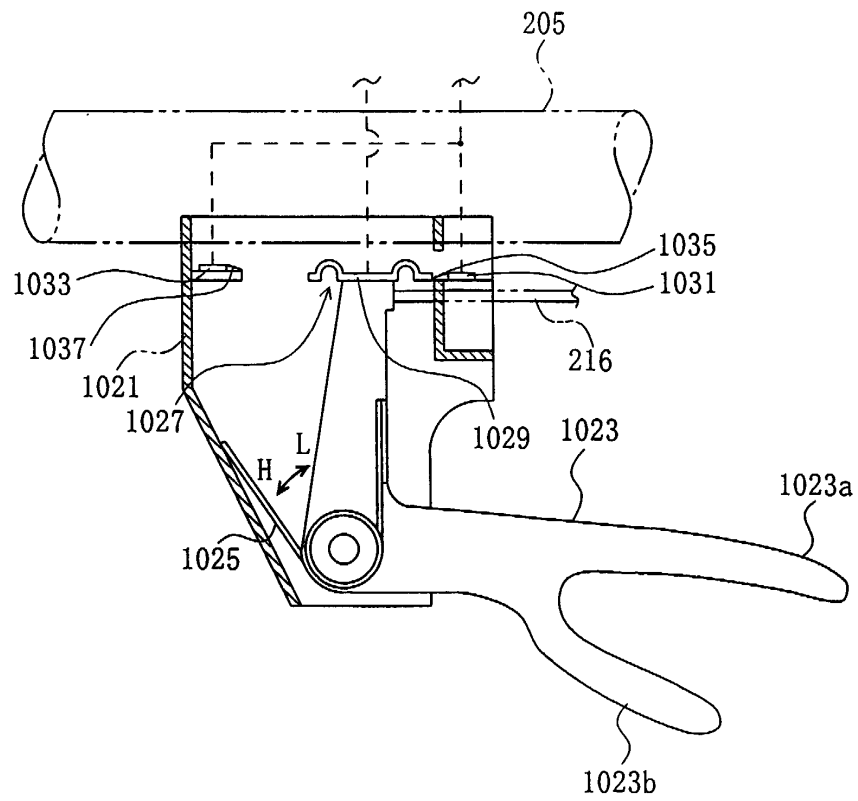
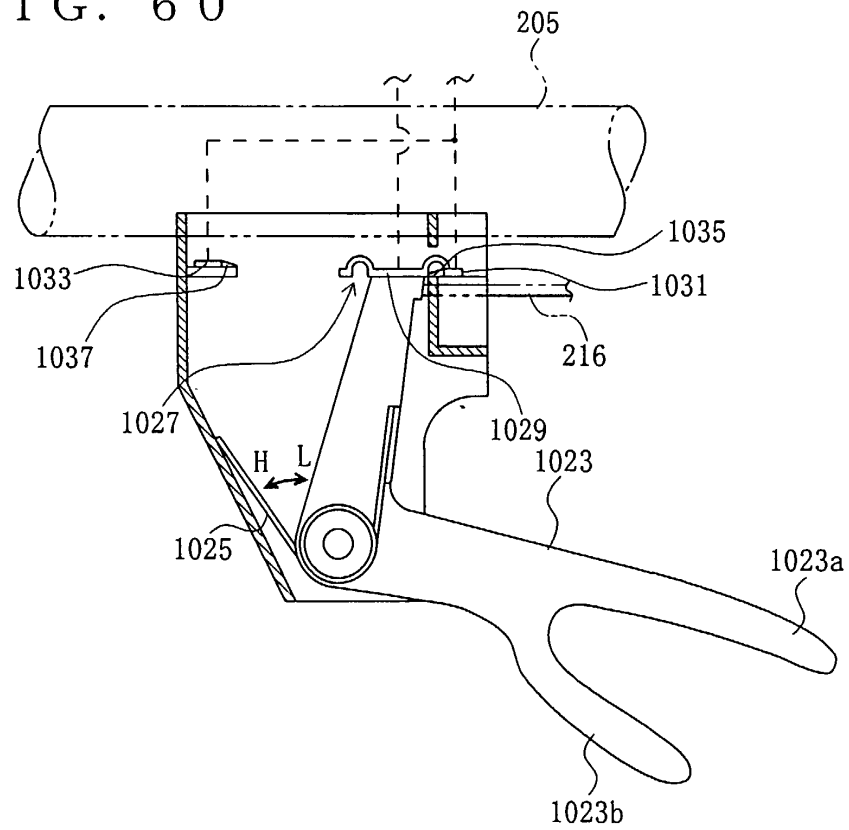


FIG. 60





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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 1 March 2000	Examiner Wassenaar, G
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			

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Application Number
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The present search report has been drawn up for all claims			
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