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(54) **A safety system for preventing tool engagement in electric saws when the motor rotates**

Sicherheitssystem zum Verhindern von Werkzeugantrieb in elektrischen Sägen wenn der Motor dreht

Système de sécurité pour empêcher l'entraînement de l'outil dans des scies électriques lorsque le moteur tourne

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Description

[0001] The present application relates to an electric saw according to the preamble of claim 1. Such a saw is disclosed by DE 103 59 873 B3.

[0002] A common electric saw comprises a chain-tool which runs on a chain-guide solidly constrained to the casing of the saw, powered by an electric motor set in motion by closing a switch activated by a lever located below the gripping handle solidly constrained to the casing.

[0003] Drive to the shaft on which the pinion moving the chain is keyed is transmitted by a frontal mechanical engagement, the mobile part of which is associated to a plate, such as a disc, which when rotating runs on inclined guides such that the rotation is transduced into a translation about the rotation axis of the plate.

[0004] The rotation of the disc that determines the engagement occurs during movement of the electric saw starting lever.

[0005] The problem which obtains is that a further engagement is impossible, after a disengagement, if the shaft of the electric motor is still rotating, as this would cause a rapid deterioration of the engaging mechanism itself, with very loud noise emission.

[0006] The aim of the present invention is to create a disengagement system for electric saws which prevents the above-described drawbacks, in the context of a simple and inexpensive solution.

[0007] The aim is attained by the invention by means of an equipment having characteristics as recited in claim 1.

[0008] The dependent claims recite further characteristics of the equipment which improve the efficiency and functionality thereof.

[0009] The functional and constructional advantages and characteristics of the invention will better emerge from the detailed description that follows, with the aid of the accompanying figures of the drawings, of a preferred embodiment thereof, provided purely by way of non-limiting example, in which:

figure 1 is an internal lateral view of the electric saw illustrating the activating and disengaging organs, with the machine stationary;

figure 2 is section II-II of figure 1;

figure 3 is the view of figure 1, but with the activating and disengaging organs in the machine-on position, and with the starting lever completely raised; figure 4 is the view of figure 1, but with the activating and control organs in an intermediate position;

figure 5 is the view of figure 1, but with the activating and control organs in a final disengaged position, with the electric motor still turning by force of inertia.

[0010] The figures show a casing 1 comprising a handle 40, internally of which casing 1 a lever 2 is hinged to a pivot 3.

[0011] A con rod 4 is hinged at the central part of the lever 2, to which con rod 4 a tie rod 9 is connected.

[0012] The end of the con rod 4 opposite the hinge slides, by means of a cam follower wheel 7, on a cam 8 which is solidly constrained to the handle.

[0013] The cam follower wheel 7 of the con rod 4 is kept pressed against the cam 8 by a traction spring 22 constrained at an end thereof to the con rod 4 and at the other end thereof to the housing 23 of the lever 2.

[0014] At the end of the con rod 4 which is close to the cam, a tie rod 9 connects the con rod 4 to a lug 14 of a disc 16.

[0015] The lug 14 exhibits a specially-shaped slot 13 provided with a tooth 12 to which the hooked end 11 of the tie rod 9 is hooked.

[0016] The tie rod 9 exhibits a projection 10 at about the median line thereof. Wings 15 project from the edge of the disc 16.

[0017] An appendage 19 is fashioned on the lower part of the disc 16, to which appendage 19 a traction spring 20 is engaged, which traction spring 20 is fixed to a pivot 21 solidly constrained to the casing 1.

[0018] The wings 15 of the disc 16 rest on inclined surfaces 17 such that rotations of the disc 16 are transformed into axial translations to which the activation of the frontal engagement corresponds.

[0019] By activating the lever 2 in an upwards direction, the lever 2 performs a clockwise rotating motion which determines an anticlockwise rotation of the con rod 4, and by means of the tie rod 9 an anticlockwise rotation of the lug 14 and the disc 16.

[0020] The inclined surfaces of the wings 15 and the surfaces 17, running on one another, cause an axial movement of the hub to which they are constrained. The axial movement causes mechanical engagement of the shaft moved by the motor to the shaft activating the pinion moving the tool chain.

[0021] The final tract of the lever 2 movement activates an electric switch 24 which sets the motor in motion.

[0022] A small plate 25 is fixed to the casing 1 at about the position of the projection 10, and below the tie rod 9. The small plate 25 is freely rotatable about an axis thereof, and a small eccentric pivot 26 is fixed to the external end thereof, which small eccentric pivot 26 is kept pressed against the tie rod 9 by a coil spring 27 which is coaxial to the plate 25 axis.

[0023] The spring 27, as it acts on the tooth 29 forces it against the stop 28 solidly constrained to the casing 1 such that the plate 25 can rotate only in an anticlockwise direction when it comes into contact with the projection 10 of the tie rod 9.

[0024] In this way, when the tie rod 9 displaces towards the left, it is not raised by the projection 10, while when it is moved towards the right it is raised in order to pass over the pivot 26 and at the same time it disengages from the tooth 12 of the slot 13.

[0025] The lower part of the lever 2 exhibits a striker 30 at an end thereof.

[0026] Close to the striker 30 the casing 1 bears a mobile appendage 31 fixed to the end of an axis 32 which is rotatably supported by the casing 1.

[0027] At the opposite end of the axis 32 a blade 34, facing the cooling fan blades 35 of the electric motor, is kept in a proximal position to the fan, illustrated in figure 1, by elastic means (not illustrated).

[0028] In this condition the fan is stationary, and the mobile appendage 31 does not prevent the lever 2 from being displaced upwards to activate the front engagement of the electric motor.

[0029] When the electric motor is functioning, it sets the fan 35 in rotation too, which fan 35 creates a flow of air that strikes the blade 34, causing it to rotate in a clockwise direction such that the appendage 31 is arranged in front of the striker 30, thus preventing the lever 2 from being displaced upwards to activate the frontal engagement mechanism of the electric motor.

[0030] The invention functions as follows. Starting from the rest position illustrated in figure 1, the operator displaces the lever 2 upwards, up until it causes the switch 24 to close and the electric motor to start up.

[0031] During the upwards displacing of the lever 2 the tie rod 9 rotates the disc 16 towards the left, activating the frontal engagement which transmits motion to the chain.

[0032] This is the situation illustrated in figure 3.

[0033] If the operator even partially releases the lever 2, the disc 16, by action of the spring 20, rotates in a clockwise direction up until the projection 10, in order to overcome the pivot 26, raises the tie rod 9, causing the unhooking of the end thereof from the tooth 12.

[0034] In this way the disc 16 can rotate completely in a clockwise direction, deactivating the frontal engagement between the electric motor and the chain.

[0035] A subsequent activation upwards of the lever 2 is not transmitted to the engagement, as the disc 16 stays in position and the end of the rod 9 moves in the slot 13.

[0036] The end of the rod 9 will not re-hook with the tooth 12, and the engagement cannot be restored, until the lever 2 is returned to the fully-lowered position thereof.

[0037] If, at the moment of full release downwards of the lever 2, the electric motor is still rotating through inertia, the striker 30 is kept in front of the appendage 31, preventing the lever 2 from being activated upwards to re-start the motor. This situation persists such until the motor has completely stopped.

[0038] This gives the certainty that once the lever 2 has been released downwards, any restarting of the motor can occur only with the frontal engagement between the motor and the saw completely disengaged, or with the motor completely stationary.

Claims

1. An electric saw comprising a safety system for pre-

venting engagement of a tool in electric saws if the shaft of the electric motor of the saw is still rotating, in which engagement of the tool is achieved by axially displacing a first part of an engagement mechanism towards a second part of the engagement mechanism, the axial movement of the first part of the engagement mechanism being achieved by rotation of a plate (16) mounted on inclined guides (17), in contrast with elastic means (20), the rotation being imposed on the plate (16) by an activating lever (2) via a tie rod (9) hooked to a circumferential slot (13) of the plate (16), wherein a stop device (31-34) of the displacement of the activating lever (2) from a rest position thereof is provided, which stop device (31-34) is maintained in a blocking position of the activating lever (2) by means (34,35) which are sensitive to rotation of the motor, which means act in contrast with elastic means which maintain the stop device (31-34) in a position thereof enabling activation of the lever (2) when the electric motor is not rotating

characterised in that

the circumferential slot (13) of the plate (16) comprises a tooth (12) to which the tie rod (9) is hooked, means (10,25-29) being provided for unhooking the tie rod (9) from the tooth (12) of the plate (16) if the activating lever (2) is activated before its rest position is reached.

2. The electric saw of claim 1, **characterised in that** the means (10,25-24) for unhooking the tie rod (9) comprise a projection (10) fashioned on the tie rod (9), and a striker plate (25) kept elastically pressed against the tie rod (9), which striker plate (25) lowers when passed over by the projection (10) of the tie rod (9) in a direction causing engagement of the tool, and raises the tie rod (9) when the projection (10) passes over in an opposite direction, the raising of the tie rod (9) causing unhooking of the tie rod (9) from the tooth (12) of the plate (16).
3. The electric saw of claim 2, **characterised in that** the projection (10) is a V-shaped bend fashioned in the tie rod (9).

Patentansprüche

1. Eine elektrische Säge einschließlich eines Sicherheitssystems zum Verhindern des Werkzeugantriebs in der elektrischen Säge, wenn die Welle des elektrischen Motors der Säge noch dreht. Der Werkzeugantrieb erfolgt durch axiale Verschiebung eines ersten Teils in einem Einkopplungsmechanismus hin zu einem zweiten Teil in dem Einkopplungsmechanismus und die axiale Bewegung des ersten Teils in dem Einkopplungsmechanismus wird durch Rotation einer auf geneigten Führungsschienen (17)

montierten Platte (16) erreicht, der elastische Mittel (20) gegenüberstehen, wobei die Rotation der Platte (16) durch einen Betriebshebel (2) über einen Verbindungsstab (9) erreicht wird, welcher in einem Umfangsschlitz (13) auf der Platte (16) eingehakt ist, und in dem eine Stoppvorrichtung (31-34) für die Verschiebung des Betriebshebels (2) aus der Ruheposition zur Verfügung steht, wobei die Stoppvorrichtung (31-34) durch Mittel (34, 35) in einer Sperrstellung des Betriebshebels (2) gehalten wird, die auf die Rotation des Motors reagieren, wobei die Mittel elastischen Mitteln entgegenwirken, welche die Stoppvorrichtung (31-34) in einer Stellung halten, die die Aktivierung des Hebels (2) ermöglicht, wenn der elektrische Motor nicht dreht.

Dadurch gekennzeichnet, dass

Der Umfangsschlitz (13) der Platte (16) eine Verzahnung (12) beinhaltet, in welcher der Verbindungsstab (9) eingehakt ist, und Mittel (10, 25-29) zum Lösen des Verbindungsstabes (9) aus der Verzahnung (12) der Platte (16), wenn der Betriebshebel (2) aktiviert wird, bevor die Ruheposition erreicht wird.

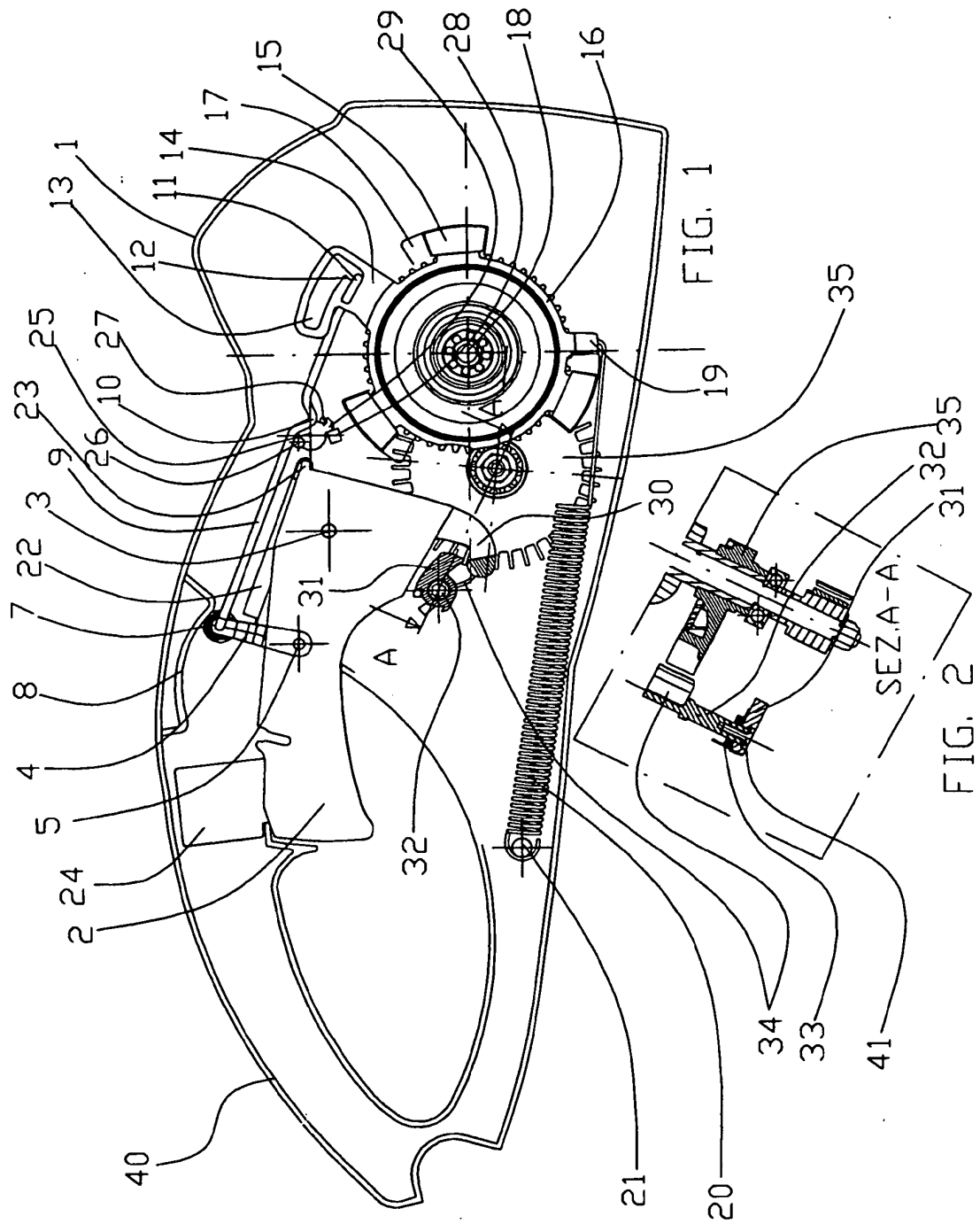
2. Die elektrische Säge nach Patentanspruch 1, **dadurch gekennzeichnet, dass** die Mittel (10, 25-29) zum Lösen des Verbindungsstabes (9) einen Vorsprung (10) auf dem Verbindungsstab (9) beinhalten und ein Schließblech (25), das elastisch gegen den Verbindungsstab (9) gepresst gehalten wird, wobei das Schließblech (25) absinkt, wenn der Vorsprung (10) des Verbindungsstabes (9) über ihm vorbeizieht und so den Antrieb des Werkzeuges bewirkt, und den Verbindungsstab (9) anhebt, wenn der Vorsprung (10) in entgegengesetzter Richtung vorbeizieht, wobei das Anheben des Verbindungsstabes (9) das Lösen des Verbindungsstabes (9) aus der Verzahnung (12) der Platte (16) bewirkt.
3. Die elektrische Säge nach Patentanspruch 2, **dadurch gekennzeichnet, dass** der Vorsprung (10) ein V-förmiger Bogen auf dem Verbindungsstab (9) ist.

tation étant imposée à la plaque (16) par un levier d'activation (2) par l'intermédiaire d'un tirant (9) accroché à une fente circonférentielle (13) de la plaque (16) où un dispositif de butée (31-34) du déplacement du levier d'activation (2) à partir d'une position de repos de ce dernier est prévu, ledit dispositif de butée (31-34) étant maintenu dans une position de blocage du levier d'activation (2) par des dispositifs (34, 35) qui sont sensibles à la rotation du moteur, lesdits dispositifs agissent en opposition à un dispositif élastique qui maintient le dispositif de butée (31-34) dans une position permettant l'activation du levier (2) lorsque le moteur électrique ne tourne pas **caractérisée par le fait que** la fente circonférentielle (13) de la plaque (16) comprend une dent (12) à laquelle le tirant (9) est accroché, des dispositifs (10, 25-29) étant prévus pour décrocher le tirant (9) de la dent (12) de la plaque (16) si le levier d'activation (2) est actionné avant qu'il n'atteigne sa position de repos.

2. La scie électrique selon la revendication 1, **caractérisée par le fait que** les dispositifs (10, 25-29) pour décrocher le tirant (9) comprennent une projection (10) façonnée sur le tirant (9) et une gâche (25) conservée appuyée de manière élastique contre le tirant (9), ladite gâche (25) s'abaissant lorsque la projection (10) du tirant passe par dessus celle-ci (9) dans une direction entraînant l'entraînement de l'outil, et élevant le tirant (9) lorsque la projection (10) passe par dessus la gâche dans la direction opposée, le soulèvement du tirant (9) entraînant le décrochage du tirant (9) de la dent (12) de la plaque (16).
3. La scie électrique selon la revendication 2, **caractérisée par le fait que** la projection (10) est une courbe en V façonnée dans le tirant (9).

Revendications

1. Une scie électrique comprenant un système de sécurité pour empêcher l'entraînement d'un outil dans les scies électriques si l'arbre du moteur électrique de la scie tourne encore, dans lequel l'entraînement de l'outil s'effectue par le déplacement axial d'une première partie d'un mécanisme d'engrènement vers une deuxième partie du mécanisme d'engrènement, le mouvement axial de la première partie du mécanisme d'engrènement étant obtenu par rotation d'une plaque (16) montée sur un guide incliné (17) en opposition avec un dispositif élastique (20), la ro-



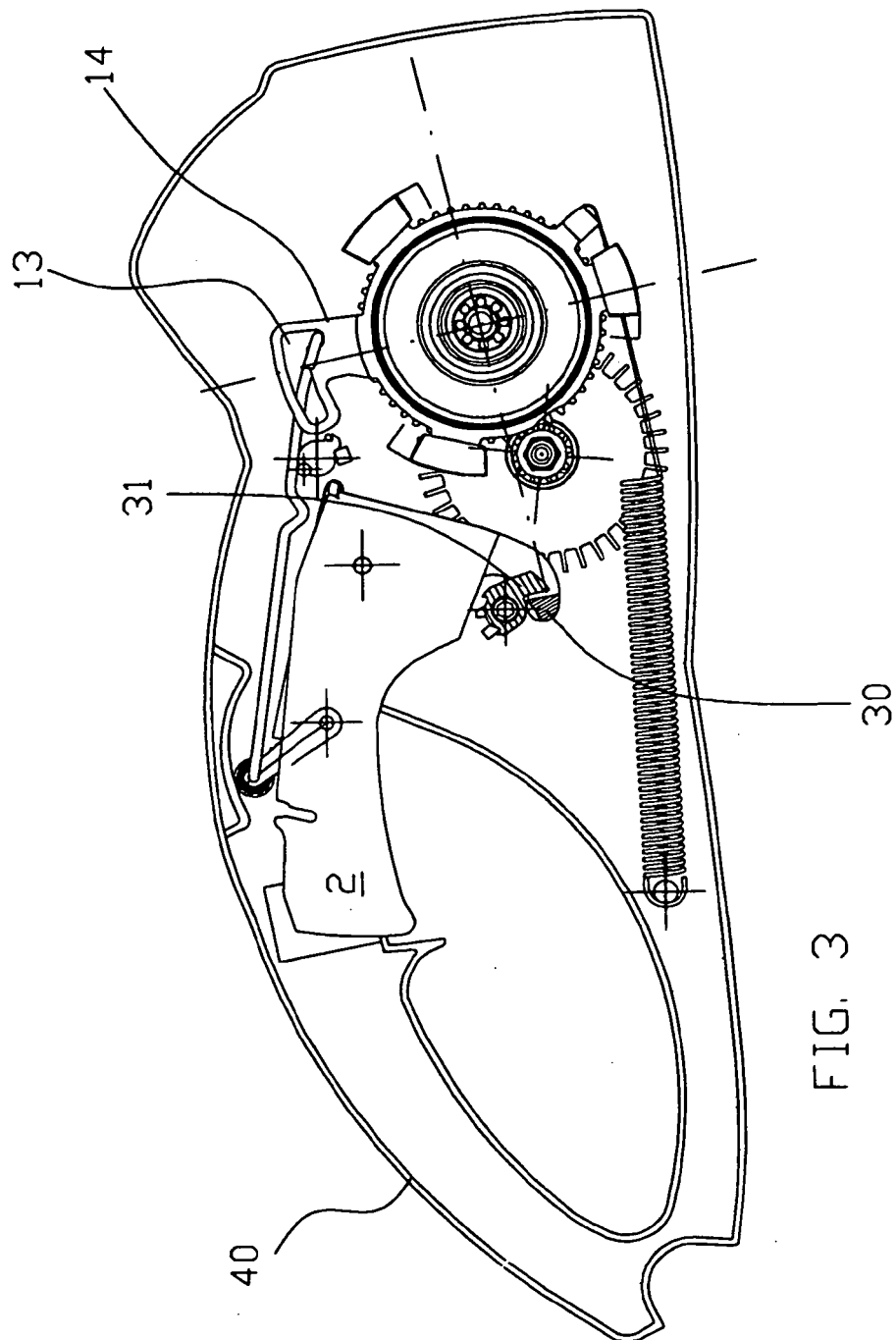


FIG. 3

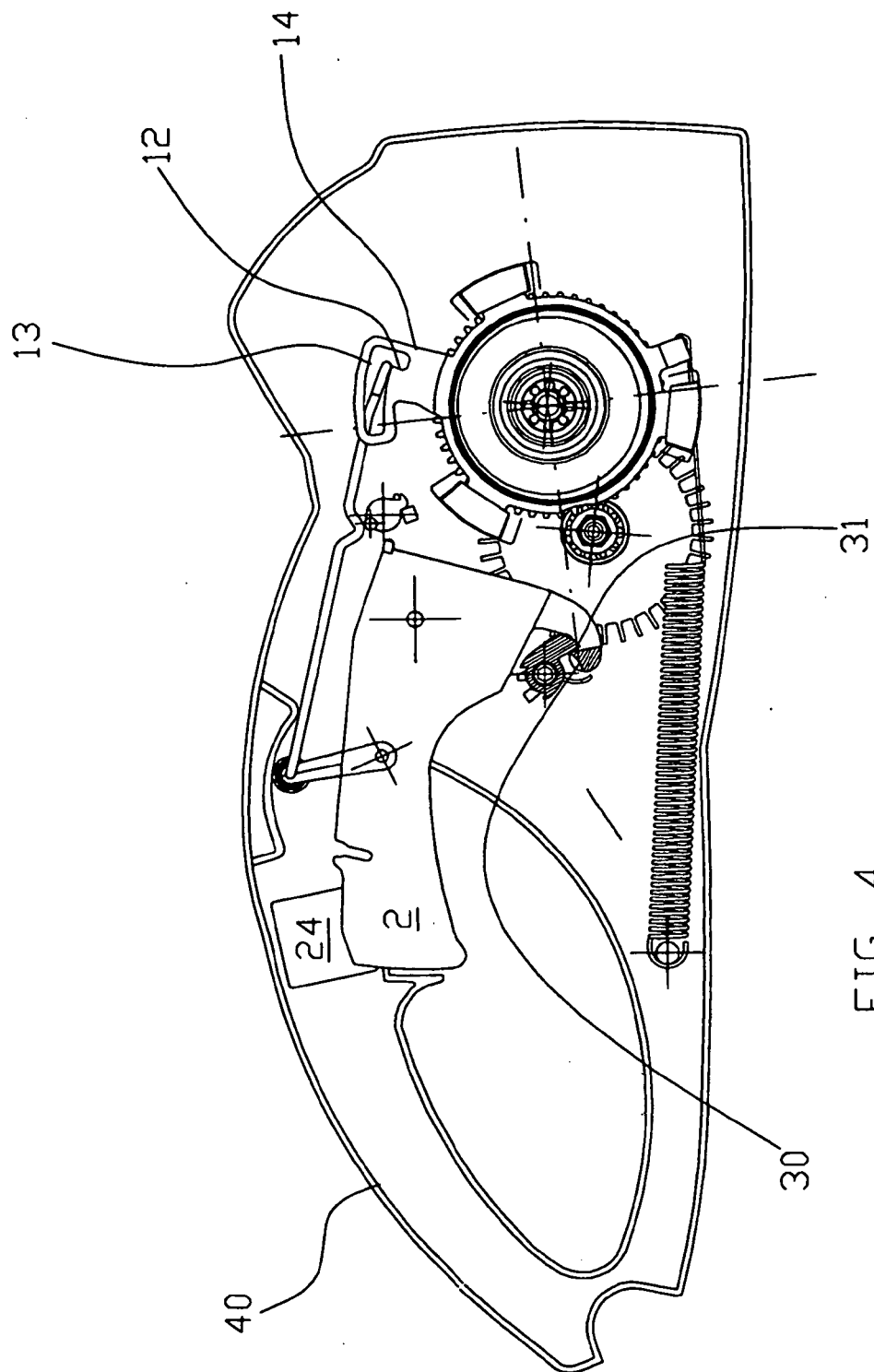


FIG. 4

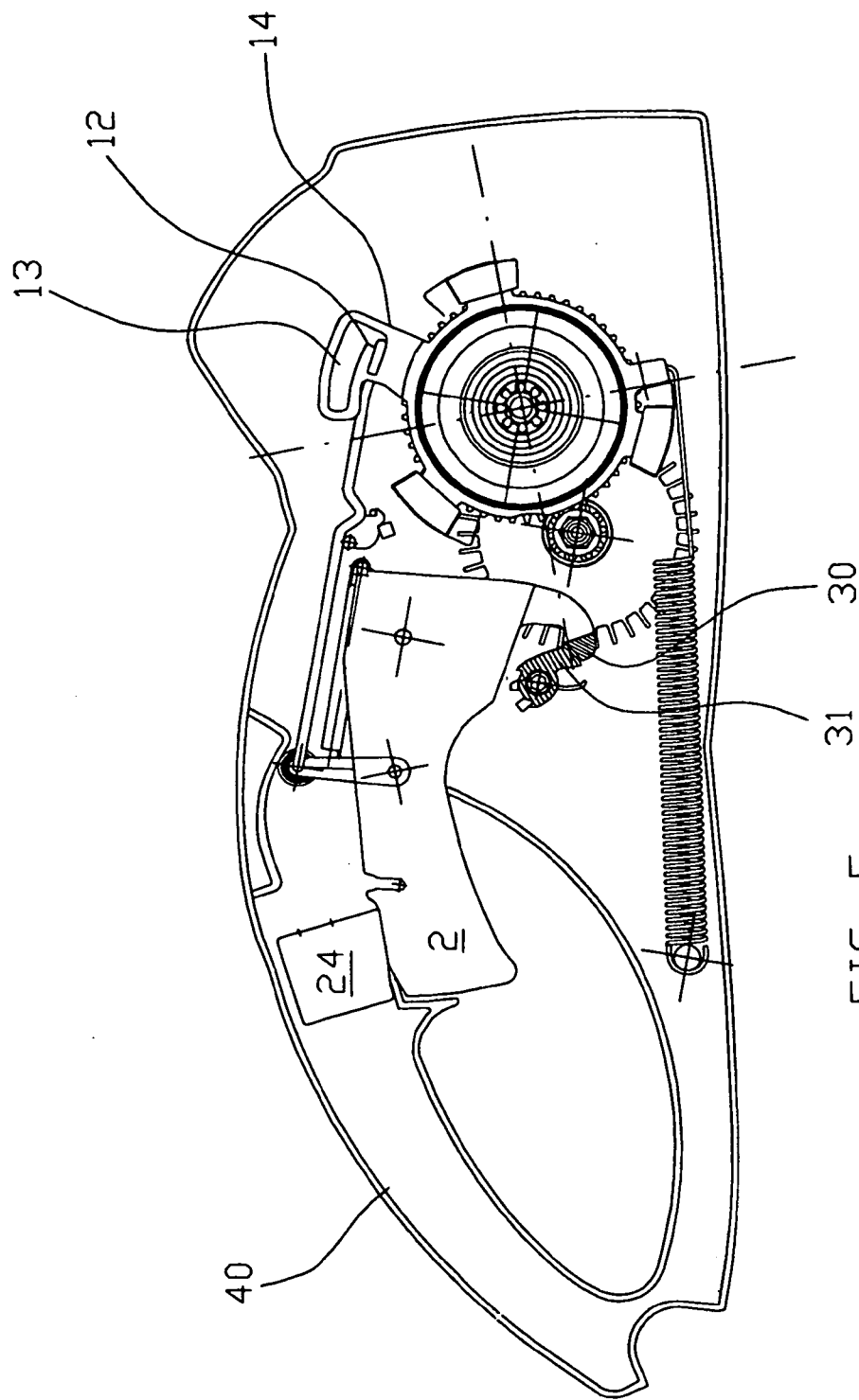


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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