(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 717 001 B1

(12) EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
09.12.1998 Bulletin 1998/50

(51) Int. Cl.[6]: **B65H 69/00**, B65H 54/22

(21) Application number: **95203194.6**

(22) Date of filing: **21.11.1995**

(54) Process for carrying out a flexible and modulating winding cycle, and equipment suitable for the purpose

Verfahren und Vorrichtung zur Durchführung eines flexiblen und modulierenden Wickelzyklus

Procédé et dispositif pour la réalisation d'un cycle de bobinage flexible et à modulation

(84) Designated Contracting States:
BE CH DE ES FR GB GR IE LI PT SE

(30) Priority: **15.12.1994 IT MI942527**

(43) Date of publication of application:
19.06.1996 Bulletin 1996/25

(73) Proprietor:
SAVIO MACCHINE TESSILI S.p.A.
33170 Pordenone (IT)

(72) Inventors:
- **Badiali, Roberto**
  I-33170 Pordenone (IT)
- **Marangone, Nereo**
  I-33170 Pordenone (IT)
- **Bertoli, Luciano**
  I-33080 Fiume Veneto (Pordenone) (IT)

(74) Representative:
Fusina, Gerolamo et al
Ing. Barzanò & Zanardo Milano S.p.A,
Via Borgonuovo, 10
20121 Milano (IT)

(56) References cited:
EP-A- 0 484 601
DE-A- 3 213 631
DE-A- 3 644 433
DE-A- 3 923 333
DE-A- 4 139 892
US-A- 4 319 720

EP 0 717 001 B1

Description

The present invention relates to a process for activating, upon interruption of the thread, a flexible and modulating winding cycle which can be a preparation, recontinuation or finishing cycle; the invention also relates to suitable equipment for this process. More specifically, the present invention relates to a process for activating a winding cycle which detects the operating procedure of each subsequent phase of the whole thread-winding cycle, allowing continuation to the subsequent phase in the case of an acceptable result, or blocking the cycle when the result is not sufficient to proceed to the winding phases and in the latter case establishing a repetitive action and, if necessary, repositioning in retroaction to a previous phase.

DE-A-3 644 433 describes a process for activating a winding cycle which detects the operating procedure of each subsequent phase of the whole thread-winding cycle, allowing continuation to the subsequent phase in the case of an acceptable result, or blocking the cycle when the result is not sufficient to proceed to the winding phases.

A thread produced in a spinning machine, particularly in a ring spinning machine, is normally wound onto a tube to form a bobbin of wound thread. This bobbin is subsequently fed to an automatic winding station for a subsequent operation wherein the thread of the cop is wound in a preset quantity onto a bobbin having a preestablished shape, whereas any defect in the thread is removed therefrom.

In particular, in an automatic winder in which one or more winding units are adjacent, one after another in a close-fitting position, a thread is drawn from a cop, which is fed by various feeding devices to a preset position of each winding unit, and this thread is passed into tension devices, into an electronic slub catcher, or any other electronic yarn cleaning device, after which it is wound onto a bobbin which is made to rotate by means of a known grooved cylinder.

Owing to the mechanical limitations of a continuous ring spinning machine, the spinning cops have a relatively small quantity of wound thread, up to several hundreds of grams at the most.

Consequently, to obtain a single bobbin various tens of spinning cops are normally fed for the rewinding of the threads onto this. As a result, it is known to experts in the field, that the cops are unwound and the thread collected on bobbins in which the quantity of thread and the profile are suitable for use in a subsequent operation, i.e., for use on a weaving or knitting machine.

In an automatic winder which is used for this unwinding operation, if there is a thread defect during the winding, such as a slub or portion of reduced thickness, the following measures are normally taken whereby the undesired yarn defects are revealed by means of a slub catcher, such as an electronic yarn cleaning device, provided for each single winding station and the thread is then completely cut and the thread defect removed; the thread is subsequently knotted, or joined and the unwinding of the thread is then continued. In this specific productive case, both for the substitution of the feeding cops and for the frequent defects in the wound thread, the frequency of interruptions in the winding is obviously often great, and consequently it is necessary to increase the frequency of the winding cycle itself.

As a result, each time there is an accidental breakage of the thread, or a change of cop, or cutting owing to an undesired defect, the winding is stopped to allow for the subsequent joining of the thread: a winding cycle, for example a recontinuation cycle, will frequently considerably reduce the operating performance of the winding station.

Different devices suitable for effecting automatic recontinuation cycles have already been known for some time. These devices consist of a mechanical axle with several cams suitably positioned along the axle, and each cam has a driving element which activates the single phases of the thread-winding recontinuation cycle. This mechanical axle is, as is known to experts in the field, the cycle axle of the single winding station. The cycle axle is activated each time the winding is interrupted and it strictly follows all the recontinuation cycle phases regardless of the operating result of the single phases. This means that it starts operating and follows all the subsequent phases, even if, as often happens, one of the former phases has not been activated, or has been carried out with an unacceptable result. This reflects, as is well known to experts in the field, on the total performance of the single winding stations and also imposes manual interventions of the service operator to correct the functioning of the operating devices of the phase which had not been correctly carried out. The manual intervention of the service operator is certainly not the best way of ensuring the utmost reliability of a winding station.

It is understandable that with unprogrammed operational services which are therefore not regular interventions, there is a low work performance. To overcome the above disadvantages, and others, the applicant has experimented a process and equipment which is absolutely reliable to activate rapid and precise winding cycles. This equipment has proved to be able to be advantageously used in the winding station duly resolving the above and also other problems.

The present invention therefore not only has the object of considerably increasing the production of bobbins of wound thread, but also of ensuring the correct operational functioning of automatic winding.

In accordance with this, the present invention relates to a process for carrying out a winding cycle by the continuous automatic indication of data relating to the winding process in its operating sequences, thus activating the preset winding phases each time rewind-

ing is necessary at the single collecting station of an automatic winder, this process comprising the following phases:

- indicating, at each moment, the operational execution of each successive phase of the whole winding cycle of the thread onto the bobbin in formation;
- allowing continuation to any of the subsequent phases upon indication of the completion of a phase of the cycle activated in the case of an acceptable result;
- blocking the subsequent phase upon indication of the completion of an operating phase having a negative result, or not suitable for the acceptable result of a correct winding cycle;
- repeating, one or more times, if necessary, the non-effected operating phase, or effected with an unacceptable result;
- repositioning, with partial retroaction of the cycle, to a preceding phase to continue with the subsequent phases of the same winding cycle of the thread onto the bobbin in formation;
- repositioning, with partial retroaction of the cycle, to a preceding phase to activate the non-effected phase, or effected in a way which is not acceptable for the physical functional parameters, or kinetics, or other parameters suitably modified in accordance with a preset diagnostic program to facilitate and permit execution with an acceptable result;
- indicating with known means and methods the parameters which govern the various operating phases of the cycle which should be regularly carried out to obtain a correct sequence for the rewinding of the thread itself;
- automatically correcting and regulating the irregular values of said parameters of the cycle phases, according to programs preset on electronic cards or similar memory elements;
- diagnosing each single operating phase of the cycle by means of a governing unit, which controls the automatic winding, to intervene, with the known means, when the single operating phase is not regularly effected;
- retroactivating the successive operating phases with activating devices, or independent driving elements to repeat the single operating phase not regularly effected.

When it is necessary to repeat the single operating phase not regularly effected in the winding cycle, the process comprises the compulsory control of the operating parameter values which regulate the functioning of the operating phase itself to vary them and adapt them to the correct functioning of the repeated operating phase.

The invention also relates to the equipment for embodying the above process, this equipment comprising:

- driving elements activating the operational functioning devices of the phases of the whole winding cycle of the thread onto the bobbin in formation and these driving elements are in no way mechanically connected with each other;
- a control unit based on a miniprocessor in which the parameter values which control the operating phases of the cycle are first inserted, together with the general winding values, and these recontinuation cycle values are processed to indicate the functioning, blocking, or repetition, or positioning in any other phase of the winding cycle of the thread onto the bobbin in formation;
- a possible motorized probe disk to indicate the operative sequential position of the successive phases of the cycle, together with the position of the retroactive phases;
- known sensors such as electrostatic or optoelectric transducers, or similar known sensors to continuously control and measure the operative characteristics of the cycle.

A description follows, which illustrates but does not restrict the scope or meaning of the present invention, of an embodiment thereof, with reference to the particular case of a recontinuation cycle, with the help of the enclosed tables wherein:

- figure 1 is a schematic complete view of the equipment of the present invention relating to the single winding station and this view shows a general structural example with the control sensors, driving elements of the operating devices in the recontinuation cycle, the known devices along the course of the thread unwound from the underlying cop, the motor centre of the grooved cylinder and control board to insert the desired data, all operating and connected to the governing unit;
- figure 2 is a schematic representation of the whole operative sequences of a recontinuation cycle and this representation also shows repositioning in retroaction in correspondence with the significant suction phase of the upper end wound onto the bobbin in formation, when this phase is activated with a non-acceptable result;
- figure 3 is a side schematic view of the winding station in a normal winding phase of the thread unwound from the underlying cop and collected onto an upper bobbin in formation and this schematic view corresponds to position "a" of figure 2;
- figure 4 is a side schematic view of the winding station at the moment when the thread is interrupted owing to either accidental breakage, or cutting due to an undesired defect and this schematic view corresponds to position "b" of figure 2;
- figure 5 is a side schematic view of the winding station at the moment when the grooved drag-in cylinder and upper thread bobbin are again adherent

neither of them rotating and the upper and lower suction mouths are positioned in the operative phase and this schematic view corresponds to position "c" of figure 2;

- figure 6 is a side schematic view of the winding station at the moment when the grooved drag-in cylinder begins the first rotation inversion to invert the winding movement of the upper bobbin to enable the suction of the thread-end wound onto the bobbin by the upper mouth and this schematic view corresponds to position "d" of figure 2;
- figure 7 is a side schematic view of the winding station at the moment when the upper suction mouth has caught at its first attempt the upper thread-end wound onto the bobbin while the inverse rotation of the drag-in cylinder and upper bobbin remains and this schematic view corresponds to position "e" of figure 2;
- figure 8 is a side schematic view of the winding station at the moment when the suction mouth makes its second programmed and preset attempt at suction of the end wound onto the bobbin, which is subjected by the control cylinder at the second inversion of movement and this schematic view corresponds to position "f" of figure 2;
- figure 9 is a side schematic view of the winding station at the moment when the upper thread-end has been introduced into the slub catcher by the upper suction mouth and the slub catcher itself, as an optoelectric control device, confirms the presence of the thread before permitting the subsequent phase to proceed; and if the thread is not present in the slub catcher, the latter activates the governing unit which blocks the subsequent phase and repositions, with partial retroaction of the recontinuation cycle, into a previous phase, which is graphically indicated in position "d" of figure 2, also corresponding to figure 6 described above and said schematic view corresponds to position "g" of figure 2 and repositioning to position "l" again of figure 2;
- figure 10 is a side schematic view of the winding station at the moment when the two lower ends and the upper end are sent on to the joining device for the knotting of the thread and this schematic view corresponds to position "h" of figure 2;
- figure 11 is a side schematic view of the winding station at the moment of the knotting of the thread, re-establishing the continuity of the thread and this schematic view corresponds to position "l" of figure 2;
- figure 12 is a block scheme corresponding to the operative sequence of the recontinuation cycle illustrated in figure 2.

In the figures, equal elements or elements with equal or equivalent functions are indicated with the same reference letters for simplicity. The devices and mechanisms which operate in reciprocal co-ordination with the equipment of the present invention are not illustrated and their functioning is not described as they are already known and also because they do not relate to the embodiment of the present invention.

In the following tables:

1 is a positioning probe disk which indicates the operative sequential position of the successive phases of a recontinuation cycle and also indicates the retroactive repositioning phases; 2 is an inverter with varying frequencies which feeds and pilots the driving element 5 in its angular rotations; 3 is the driving element for the angular rotation of the upper suction mouth 27 and this angular driving centre is activated and piloted by an electronic device 4, which receives impulses programmed by the governing unit 20 through connecting cable 34; 6 is a driving element for the angular rotation of the lower suction mouth 29 and this angular driving centre is activated and piloted by an electronic device 10 known to the art, which receives impulses programmed by the governing unit 20 through connecting cable 36; 7 is the driving element, preferably a three-phase electric motor, which, by means of an inverter with varying frequencies 26, activates the rotation of the control cylinder 23, which provides both the transversal backwards and forwards movement of the thread unwound from the underlying cop 11, and also the rotating movement of the bobbin 21 in formation. This inverter 26 is activated by the governing unit 20 through cable 39; 9 is a driving element for activating the knotting 25 and this driving element 9 is activated and piloted by the electronic device 8, which receives impulses programmed by the governing unit 20 through connecting cable 35; 12 is the known electronic slub catcher operating as a device for the automatic control of the presence of the thread and also the active control of the cleaning function of an electronic yarn cleaner in the single winding station.

The electronic slub catcher 12 can be of the conventional type or may contain an electric sensor-transducer 18, or capacitive such as a thread-presence feeler or exploration device. It produces a feeler signal which is amplified in the preamplifier 22, according to a direct current, or alternating current, and is conveyed to the part of the governing unit 20 through connecting cable 41; 13 and 17 are optoelectric sensors for controlling the thread-presence and thread-tension and they generate electric signals which are passed to the governing unit through connecting cables 44 and 43; 24 is a disk probe which generates impulses in correspondence with the rotation of the control cylinder 23. This impulse generator 24 indicates the number of revs of the grooved cylinder 23 and continuously transmits, through connecting cable 40, these rotation impulses to the governing unit 20. In short this latter unit 20 uses

these rotation impulses for the regulation of the velocity of the cylinder 23 in its various operating phases, for the cross-tangling device, for controlling the winding onto cylinder 23 itself; 28 is a disk probe which generates impulses in correspondence with the rotation of the bobbin of wound thread 21.

The above generated impulses are sent, through the connecting cable 38, to the governing unit 20, which processes them for calculating the diameter of the bobbin, for measuring the length of wound thread and for controlling the free rotation in the recontinuation cycle and in the final free run before changing the bobbin; 15 is the guide shoe device, or thread tension washers with a breaking action elastically regulated by means of an electromagnetic activator 16, which receives control and piloting impulses from the governing unit 20 to vary the supporting pressure of the guide shoes on the thread being wound; 19 is a proximity sensor, known in the art, which continuously indicates the traverse motion of the thread being wound onto bobbin 21, and this traverse movement generates impulses which, through cable 42, are sent to the governing unit 20, which is informed of the regular winding in process; 14 is the thread balloon, which is rapidly unwound from cop 11; 20 is the governing unit, based on a miniprocessor suitable for memorizing the operator's instructions, introduced by means of the control board 30 and connecting cable 32, and it is able to transform these instructions into a program which can be carried out by its calculating and processing centre to give numerical and graphical results which are necessary during the recontinuation cycle.

These numerical and graphical results are in turn stored in the memory of the governing unit 20, which controls the whole operating equipment of the present invention. In short, the governing unit 20, according to its intern program, which controls the recontinuation cycle, sends, through cable 37, electric impulses which activate the inverter with varying frequencies 2, which feeds and pilots the driving element 5, in its angular rotations, the latter being indicated by the probe disk 1 which generates a series of electric impulses, which are sent to the governing unit 20, through connecting cable 33, to activate a control of the operating phases of the recontinuation closed-ring cycle; 31 is the cable which transmits the operator's instructions introduced along the winding front of an automatic winder.

The description of the embodiment which follows, with reference to the figures quoted, mainly refers to what is new and consequently relates only to the equipment of the present invention, which pilots and controls the means and devices which activate the operating sequences of the winding recontinuation cycle each time this is necessary at the single winding station.

Figure 1 shows an example scheme of a winding station.

The thread extracted from a spinning cop (hereafter referred to as cop 11) situated in a fixed position passes through a balloon-breakage element 14, thread-presence control sensors 13 and 17, a thread-tension guide-shoe device 15 with a regulated breaking action and a device for indicating thread defects of the photoelectric type, or with electric capacitance as a slub catcher 12 and is wound, as it is moved sideways, onto a bobbin 21, which is activated by a control cylinder 23. During the movement of the thread, if a portion of increased thickness, reduced thickness, a slub or similar defect is detected by the slub catcher 12, a signal is sent with a thread-cutting instruction whereby the cutting device (not shown) is activated and the compulsory cutting of the thread is effected. In reply to this thread-cutting, the thread-presence signals emitted by sensors 18, 17 and 13 stop and a signal is immediately sent out from the governing unit 20, which activates the operating sequences of the recontinuation cycle and, then the thread-joining instructions.

Similarly, when the thread layer on cop 2 finishes during winding, sensors 13, 17 and 18 indicate the absence of thread, whereupon the governing unit 20 sends out a cop-change signal. As a result, the empty cop is discharged from the winding station and a new cop 11 is provided, after which the governing unit 20 activates the operating sequences of the recontinuation cycle and, subsequently, the automatic thread-joining operation, after which the thread-winding is restarted. Similarly, if there is an accidental breakage of the thread mainly due to excessive tension, during the winding, the thread-presence signals emitted from sensors 18, 17 and 13 stop and a signal is immediately sent out from the governing unit 20, which activates the operating sequences of the winding recontinuation cycle.

When one of the above incidents occurs, the governing unit 20 emits a series of signals which activate in succession and/or temporary overlapping, instructions for starting the operating sequences of the winding recontinuation cycle. In fact, when the thread breaks, or is cut by the slub catcher, or when the cop finishes, the thread movement stops and sensors 13, 18 and 19 communicate the disappearance of the dynamic thread-run signal to the governing unit 20, and this unit 20 disactivates the motor 7 of the control cylinder 23 and at the same time activates both the electronic breaking of the motor 7 itself and the bracket lift for separating the bobbin 21 and cylinder 23.

The thread-guide cylinder 23 and bobbin 21 stop and this is indicated and communicated by the rotational probes 28 and 24. The upper suction mouth 27 contemporaneously rotates by means of the driving element 3, which is activated and piloted by the electronic device 4, which receives impulses programmed by the governing unit 20 (see figure 4 and position "b" of figure 2). The suction slot of the mouth 27 is positioned in correspondence with the contact generator between bobbin 21 and cylinder 23, which in the meantime are attached to each other in their state of rotational stop (see figure 5 and position "c" of figure 2). To enable the

mouth 27 to suck, draw and catch the thread-end on the bobbin, the governing unit 20 activates the motor 7, which inverts its rotation direction and makes the cylinder 23 and bobbin 21 slowly rotate backwards for at least one or more suction attempts depending on the instructions received and preset by the operator in unit 20, through board 30. In short the backward rotation automatically adapts itself to the diameter of the bobbin 21, and is lesser for large diameters. In the specific case in question there are two consecutive attempts at withdrawing the thread-end wound onto the bobbin 21 (see figures 6, 7 and 8 and position: "d", "e" and "f" in figure 2), and one or more attempts at thread suction can be made.

After the second attempt, the governing unit 20 activates the descent of the suction mouth 27, which inserts the caught thread-end into the slub catcher 12.

The slub catcher verifies with sensor 18 the presence of the thread itself and sends an amplified thread-presence signal to unit 20, which immediately activates the driving elements 3 and 6 to send the two thread-ends, lower and upper, into the joining device 25, to effect the joining of the thread (see figure 10 and position "h" of figure 2).

The governing unit 20 activates in succession, by means of the electronic device 8, the driving element 9 responsible for activating the knotter 25.

The continuity of the thread is re-established and the recontinuation cycle finishes with the restarting of the rewinding of the thread unwound from cop 11 and collected onto bobbin 21 (see figure 11 and positions "i" and "a" of figure 2).

If the thread is not present in the slub catcher 12 the governing unit 20 blocks the activation of the driving elements 9 of the knotter 25 and repositions the recontinuation cycle, with retroaction, into the suction phase of the thread-end in position "d" of figure 2 (see also figure 6). The governing unit 20 when retroactivating the subsequent operating phases changes the functional and operative parameters of the phase which has not been effected or effected with a non-acceptable result, according to a preset diagnostic program, to allow the non-effected phase to be regularly carried out with an acceptable result to successfully complete the winding recontinuation cycle in the shortest time possible. The process and equipment of the present invention consequently permit operation with such a control as to avoid blocking the winding station, thus eliminating alarm signals and interventions on the part of the operator.

When the joining of the thread has been completed, either directly in succession, or with repositioning into partial retroaction, the motor 7 starts and by means of the thread-guide cylinder 23 the bobbin progressively accelerates its rotation until it reaches, without slipping, the standard rotation velocity.

Claims

1. Process for carrying out a winding cycle by means of the continuous automatic indication of data relating to the winding process in the operating sequences of the cycle, which activates the winding phases of interest each time the cycle is necessary at the single collecting station of an automatic winder, said process comprising the following phases:

   - indicating, at each moment, the operational execution of each successive phase of the whole winding cycle of the thread onto the bobbin in formation;
   - allowing continuation to any of the subsequent phases upon indication of the completion of a phase of the cycle activated in the case of an acceptable result;
   - blocking the subsequent phase upon indication of the completion of an operating phase having a negative result, or not suitable for the acceptable result of a correct winding cycle;
   - repeating, one or more times, if necessary, the non-effected operating phase, or effected with an unacceptable result;
   - repositioning, with partial retroaction of the cycle, to a preceding phase to continue with the subsequent phases of the same winding cycle of the thread onto the bobbin in formation;
   - repositioning, with partial retroaction of the cycle, to a preceding phase to activate the non-effected phase, or effected in a way which is not acceptable for the physical functional parameters, or kinetics, or other parameters suitably modified in accordance with a preset diagnostic program to facilitate and permit execution with an acceptable result.

2. Process for the automatic indication of the operative sequences for a winding cycle according to claim 1, comprising also the following phases:

   - indicating with known means and methods the parameters which govern the various operating phases of the cycle which should be regularly carried out to obtain a correct sequence for the rewinding of the thread itself;
   - automatically correcting and regulating the irregular values of said parameters of the cycle phases, according to programs preset on electronic cards or similar elements;
   - diagnosing each single operating phase of the cycle by means of a governing unit, which controls the automatic winding, to intervene, with the known means, when the single operating phase is not regularly effected;
   - retroactivating the successive operating

phases with activating devices, or independent driving elements to repeat the single operating phase not regularly effected.

3. Process for the recontinuation of the operating sequences of a winding cycle according to claim 1, whereby the necessity to repeat the single operating phase not regularly effected in said cycle, imposes a control of the operative parameter values, which regulate the execution of the operating phase itself to change them to make them appropriate for the correct execution of the repeated operating phase.

4. Equipment for the embodiment of the process according to claims 1 and 3, said equipment comprising:

- driving elements activating the operational functioning devices of the phases of the whole winding cycle of the thread onto the bobbin in formation;
- a control unit based on a miniprocessor in which the parameter values which control the operating phases of the cycle are first inserted, together with the general winding values, and these cycle parameter values are processed to indicate the functioning, blocking, or repetition, or positioning in any other phase of the winding cycle of the thread onto the bobbin in formation;
- a possible motorized probe disk to indicate the operative sequential position of the successive phases of the cycle, together with the position of the retroactive phases;
- known sensors such as electrostatic or optoelectric transducers, or similar known sensors to continuously control and measure the operating characteristics of the cycle.

5. Equipment according to claim 4, whereby the driving elements which activate the operating means for carrying out the subsequent phases of the whole winding cycle are in no way mechanically connected to each other.

Patentansprüche

1. Verfahren zur Durchführung eines Wickelzyklus mittels der kontinuierlichen, automatischen Anzeige von Daten, die das Wickelverfahren betreffen, in den Betriebssequenzen des Zyklus, welcher die Wickelphasen, die von Interesse sind, jedesmal aktiviert, wenn der Zyklus an der einzigen Sammelstation eines automatischen Wicklers benötigt wird, wobei das Verfahren die folgenden Phasen aufweist:

- Anzeigen der Betriebstätigkeit jeder abfolgenden Phase des gesamten Zyklus zum Wickeln des Fadens auf die in Ausbildung befindliche Spule, zu jedem Zeitpunkt;
- Gestatten der Fortführung einer jedweden der abfolgenden Phasen auf die Anzeige hin, daß eine Phase des aktivierten Zyklus abgeschlossen wurde im Falle eines akzeptablen Resultats;
- Blockieren der nachfolgenden Phase auf die Anzeige hin, daß eine Betriebsphase mit einem negativen Resultat abgeschlossen wurde, oder für das akzeptable Resultat eines korrekten Wickelzyklus nicht geeignet ist;
- Falls notwendig, ein oder mehrmaliges Wiederholen der nicht durchgeführten Betriebsphase, oder derjenigen, die mit einem unakzeptablen Resultat durchgeführt wurde;
- Repositionieren, mit teilweiser Nachaktivierung des Zyklus zu einer vorhergehenden Phase, um mit den abfolgenden Phasen desselben Zyklus zum Wickeln des Fadens auf die Spule in Ausbildung fortzufahren;
- Repositionieren, mit teilweiser Nachaktivierung des Zyklus, zu einer vorhergehenden Phase, zur Aktivierung der nicht durchgeführten Phase oder derjenigen, die in einer Weise durchgeführt wurde, welche nicht für die physikalischen Funktionsparameter oder die Kinetik akzeptabel ist, oder für andere Parameter, die geeignet in Übereinstimmung mit einem voreingestellten Diagnoseprogramm modifiziert wurden, um die Durchführung mit einem akzeptablen Resultat zu vereinfachen und zu gestatten.

2. Verfahren zur automatischen Anzeige der Betriebssequenzen für einen Wickelzyklus gemäß Anspruch 1, das ebenfalls die folgenden Phasen umfaßt:

- Anzeigen der Parameter mit bekannten Mitteln und Methoden, welche die verschiedenen Betriebsphasen des Zyklus regeln, die regulär durchgeführt werden sollten, um eine korrekte Abfolge zum Wiederaufwickeln des Fadens selbst zu erzielen;
- Automatisches Korrigieren und Einregeln der irregulären Werte der Parameter der Zyklusphasen gemäß Programmen, die auf elektronischen Karten oder ähnlichen Elementen voreingestellt sind;
- Diagnostizieren jeder einzelnen Betriebsphase des Zyklus mittels einer Regelungseinheit, welche das automatische Wickeln steuert, um mit den bekannten Mitteln einzugreifen, weg die einzelne Betriebsphase nicht regulär durchgeführt wird;
- Nachaktivierung der abfolgenden Betriebspha-

sen mit Aktivierungsvolrichtungen oder unabhängigen Antriebselementen, um die einzelne Operationsphase zu wiederholen, die nicht regulär durchgeführt wurde.

3. Verfahren zur Wiederfortführung der Betriebssequenzen eines Wickelzyklus gemäß Anspruch 1, bei dem die Notwendigkeit, die einzelne Betriebsphase, die in diesem Zyklus nicht regulär durchgeführt wurde zu wiederholen, eine Steuerung der Betriebsparameterwerte auferlegt, welche die Durchführung der Betriebsphase selbst einregeln, um diese zu verändern und zur korrekten Durchführung der wiederholten Betriebsphase geeignet zu machen.

4. Einrichtung zur Ausführung des Verfahrens nach den Ansprüchen 1 und 3, wobei die Einrichtung umfaßt:

- Antriebselemente, welche die Betriebs-Funktionsvorrichtungen der Phase des gesamten Zyklus zum Wickeln des Fadens auf die in Ausbildung befindliche Spule aktivieren;
- eine Steuerungseinheit, die auf einem Miniprozessor basiert, in welche die Parameterwerte, welche die Betriebsphasen des Zyklus steuern, zuerst eingebracht werden, zusammen mit den allgemeinen Wickelwerten, und in welcher diese Zyklusparameterwerte verarbeitet werden, um das Funktionieren, das Blockieren, die Wiederholung oder das Positionieren in einer anderen Phase des Zyklus zum Wickeln des Fadens auf die in Ausbildung befindliche Spule anzuzeigen;
- eine möglicherweise motorunterstützte Testscheibe zum Anzeigen der Betriebssequenz-Position der abfolgenden Phasen des Zyklus zusammen mit der Position der Nachaktivierungsphasen;
- bekannte Sensoren wie z.B. elektrostatische oder optoelektrische Wandler oder ähnliche bekannte Sensoren zum kontinuierlichen Steuern und Messen der Betriebseigenschaften des Zyklus.

5. Einrichtung nach Anspruch 4, bei der die Antriebselemente, welche die Betriebseinrichtungen zum Durchführen der abfolgenden Phasen des gesamten Wickelzyklus aktivieren, in keiner Weise mechanisch miteinander verbunden sind.

Revendications

1. Procédé pour la réalisation d'un cycle de bobinage au moyen de l'indication automatique continue de données concernant le procédé de bobinage dans les séquences opérationnelles du cycle, procédé qui active les phases de bobinage concerné chaque fois que le cycle est nécessaire au poste de recueil simple d'un enrouleur automatique et procédé comprenant les phases suivantes :

- indication, à chaque moment, de l'exécution opérationnelle de chaque phase successive de l'ensemble du cycle de bobinage du fil sur la bobine en formation;
- autorisation de la poursuite à l'une quelconque des phases suivantes moment de l'indication de l'achèvement d'une phase du cycle activé dans le cas d'un résultat acceptable;
- blocage de la phase consécutive lors de l'indication de l'achèvement d'une phase opérationnelle avec un résultat négatif ou n'étant pas approprié pour un résultat acceptable d'un cycle de bobinage correct;
- répétition, une ou plusieurs fois au besoin, de la phase opérationnelle non effectuée ou effectuée avec un résultat inacceptable;
- repositionnement, avec rétroaction partielle du cycle, sur une phase précédente pour poursuivre les phases consécutives du même cycle d'enroulement du fil sur la bobine en formation;
- repositionnement, avec rétroaction partielle du cycle, sur une phase précédente pour activer la phase non effectuée, ou effectuée d'une manière qui n'est pas acceptable pour les paramètres fonctionnels physiques ou cinétiques, ou autres paramètres modifiés de façon appropriée en fonction d'un programme de diagnostic préétabli pour faciliter et permettre l'exécution avec un résultat acceptable.

2. Procédé pour l'indication automatique des séquences opérationnelles pour un cycle de bobinage selon la revendication 1, comprenant également les phases suivantes

- indication avec des moyens et des procédés connus des paramètres qui contrôlent les différentes phases opérationnelles du cycle qui doivent être régulièrement réalisées pour obtenir une séquence correcte pour le rebobinage du fil lui-même;
- correction et régulation automatique des valeurs irrégulières des paramètres des phases de cycle selon, les programmes préétablis sur des cartes électroniques ou éléments similaires;
- diasgnostic de chaque phase opérationnelle simple du cycle moyen d'une unité de contrôle qui commande le bobinage automatique pour qu'elle intervienne, avec les moyens connus, lorsque la seule phase opérationnelle n'est pas effectuée régulièrement
- rétroactiver les phases opérationnelles succes-

sives avec des dispositifs d'activation ou des éléments d'entraînement indépendants pour répéter la phase opérationnelle simple qui n'a pas été effectuée normalement.

3. Procédé pour la remise en route des séquences opérationnelles d'un cycle de bobinage selon la revendication 1, de sorte que la nécessité de répéter la phase opérationnelle simple qui n'a pas été effectuée régulièrement dans ce cycle, exige un contrôle des valeurs de paramètres opérationnelles qui régulent l'exécution de la phase opérationnelle elle-même pour les modifier et les adapter à l'exécution correcte de la phase opérationnelle répété.

4. Appareils pour le mode de réalisation du procédé selon les revendications 1 et 3, cet équipement comprenant:

- des éléments d'entraînement activant les dispositifs de fonctionnement opérationnels des phases de l'ensemble du cycle de bobinage du fil sur la bobine en formation;
- une unité de commande basée sur un miniprocesseur dans lequel les valeurs de paramètres qui commandent les phases opérationnelles du cycle sont d'abord introduites, conjointement avec les valeurs de bobinage générales, et ces valeurs de paramètres de cycle sont traitées pour indiquer le fonctionnement, le blocage ou la répétition, ou le positionnement dans toute autre phase du cycle de bobinage du fil sur la bobine en formation;
- disque de sonde motorisé éventuel pour indiquer la position séquentielle opérationnelle des phases successives du cycle, conjointement avec la position des phases rétroactives;
- capteur connu tel que transducteur électrostatique ou optoélectrique ou capteur similaire connu pour commander en continu et mesurer les caractéristiques opérationnelles du cycle.

5. Appareils selon la revendication 4, dans lesquels les éléments d'entraînement qui activent les moyens opérationnels pour effectuer les phases ultérieures de l'ensemble du cycle d'enroulement ne sont nullement connectées mécaniquement entre elles.

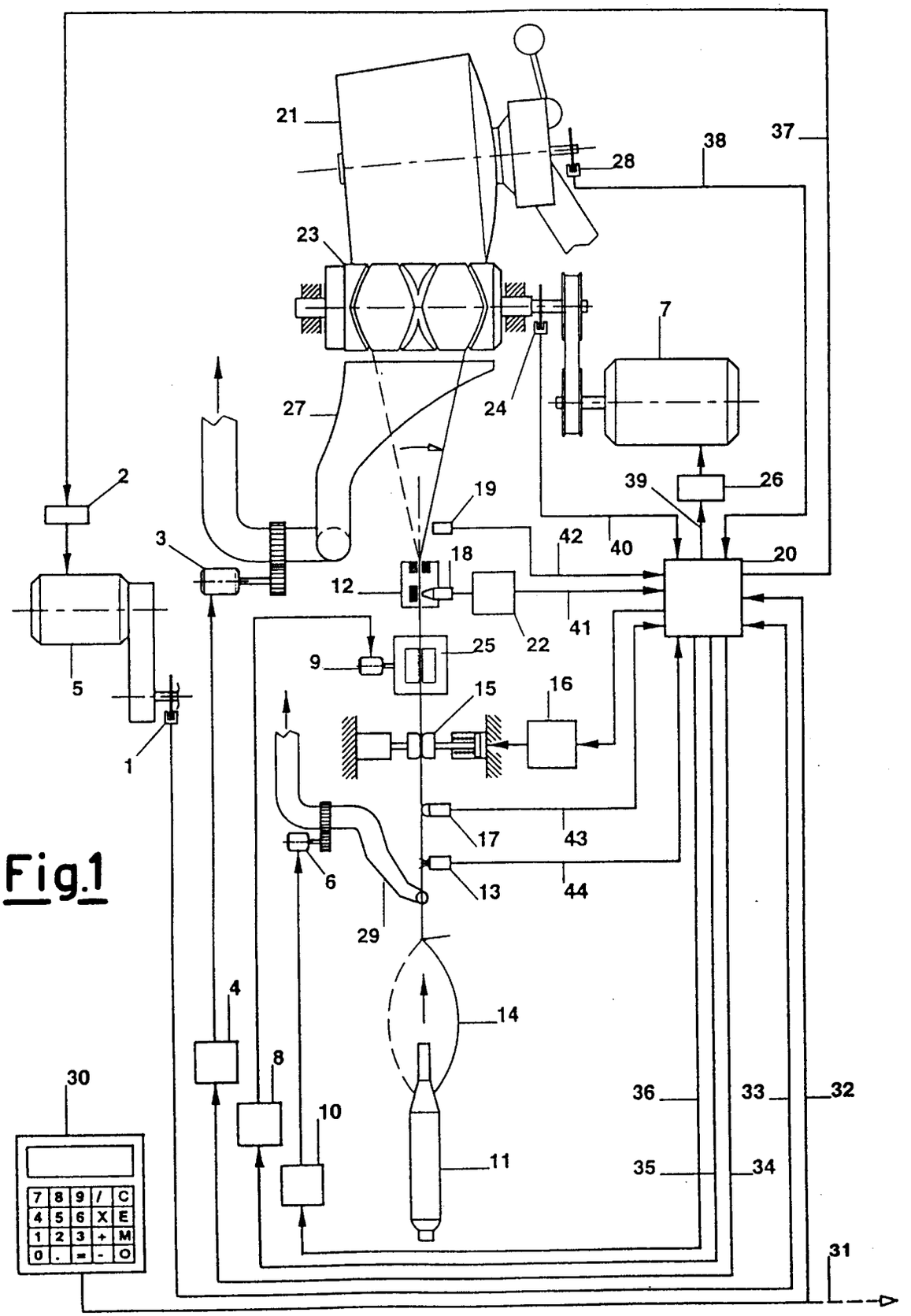

21
28
38
37
23
7
27
24
2
19
39
26
3
42
40
20
18
12
41
22
25
9
5
15
16
1
17
43
6
13
44
29
4
14
8
30
36
33
32
10
11
35
34
31
7 8 9 / C
4 5 6 X E
1 2 3 + M
0 . = - O

Fig.1

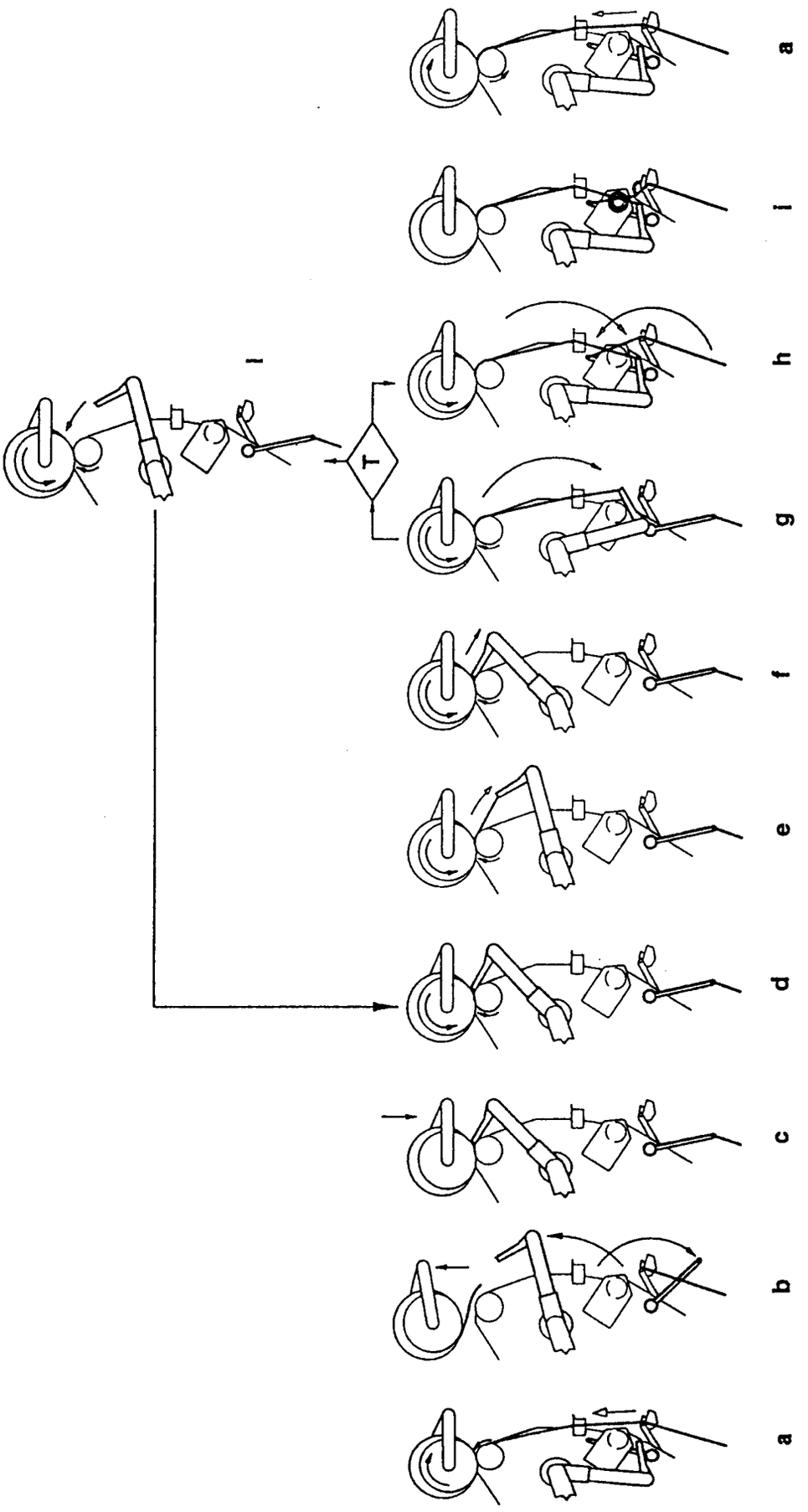


Fig.2

Fig.3

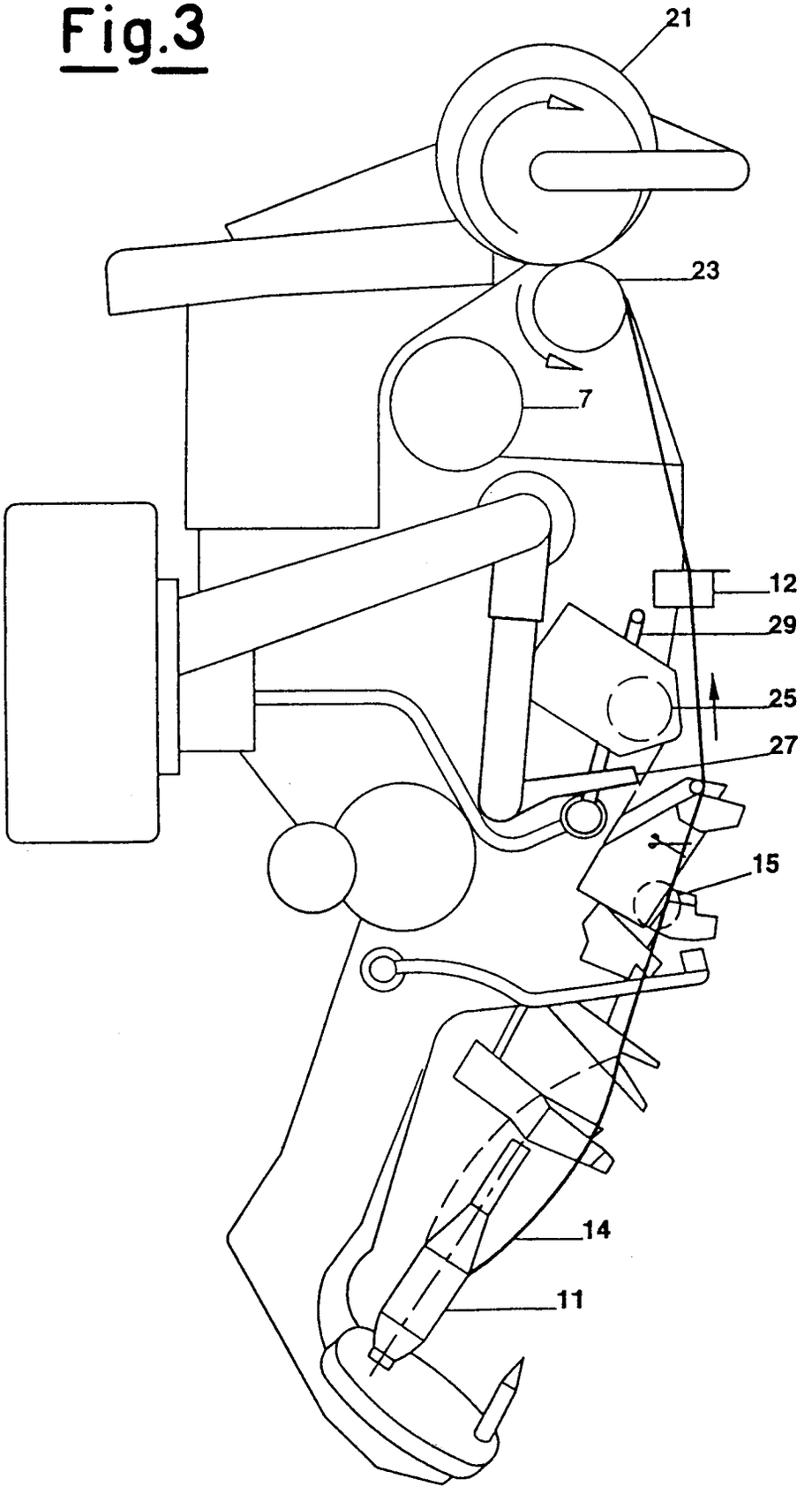


Fig.4

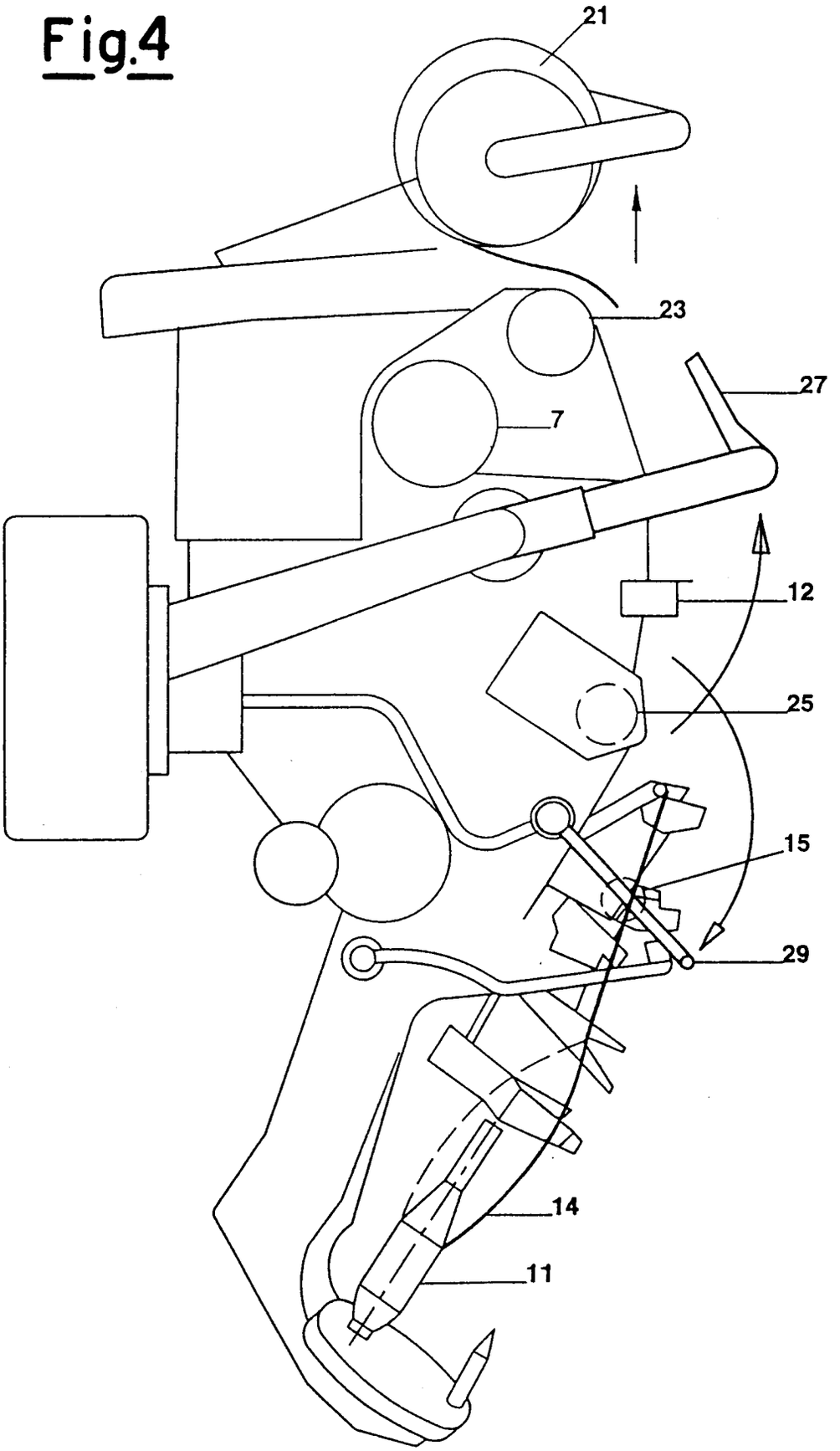


Fig.5

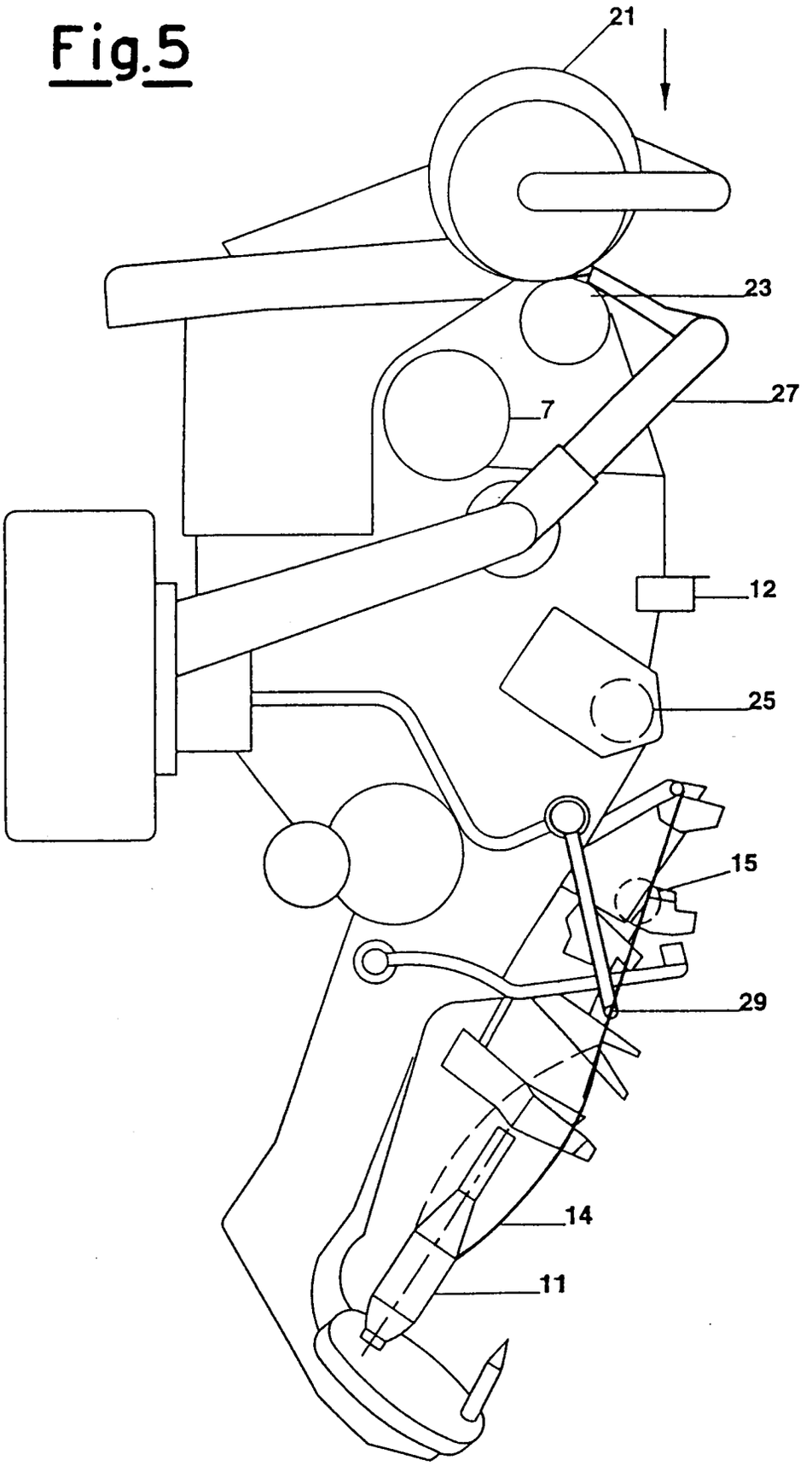


Fig.6

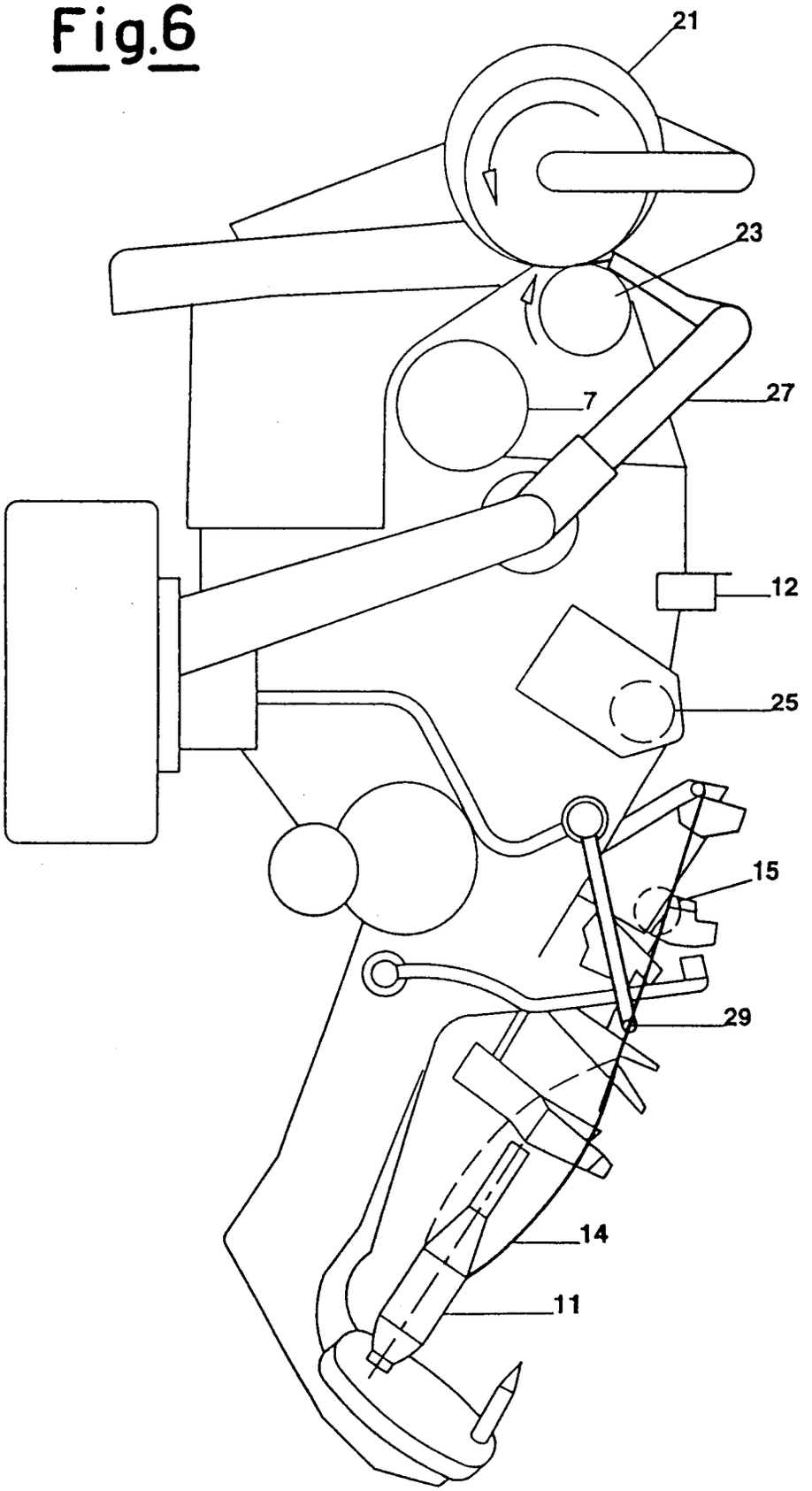


Fig.7

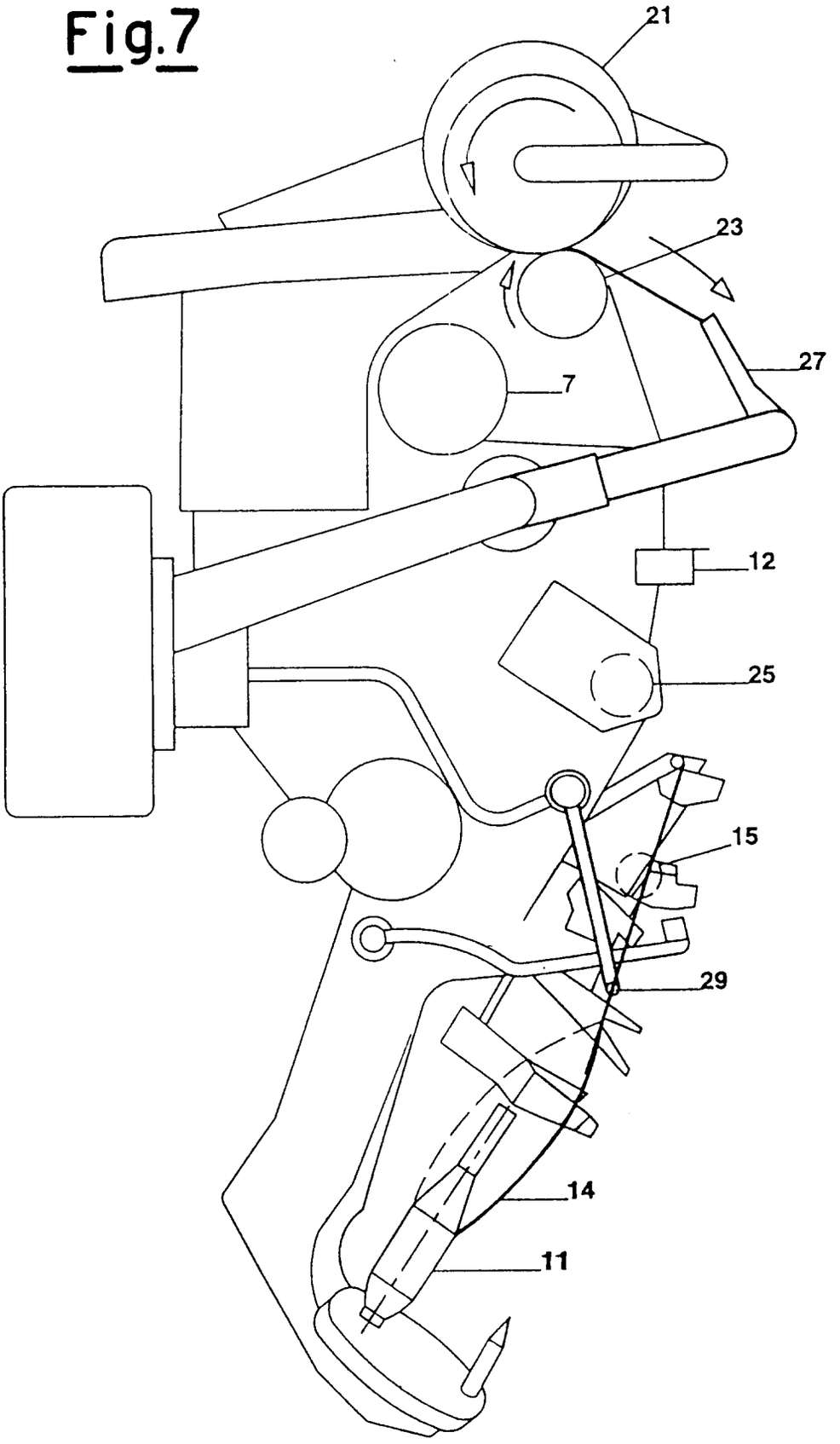


Fig.8

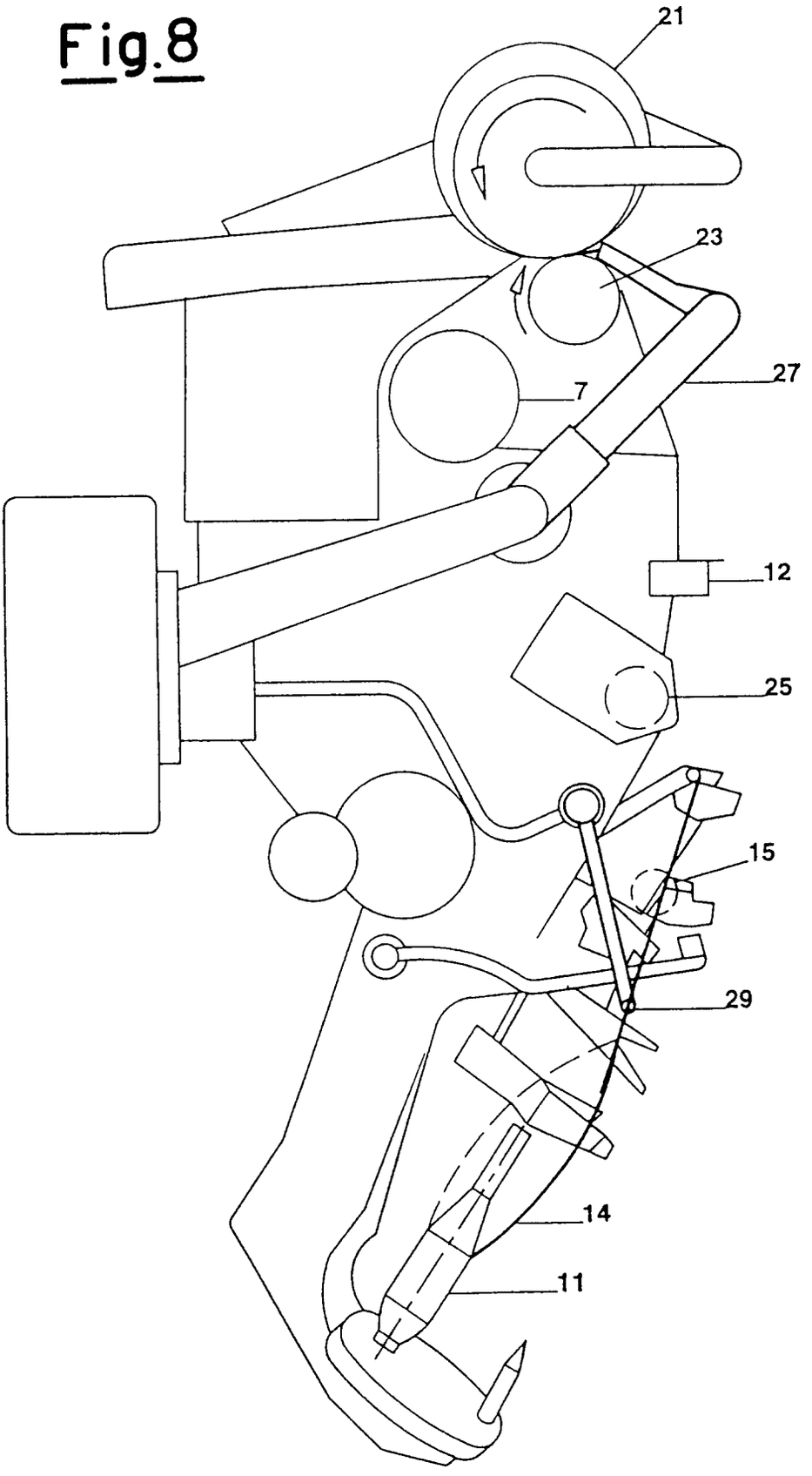


Fig.9

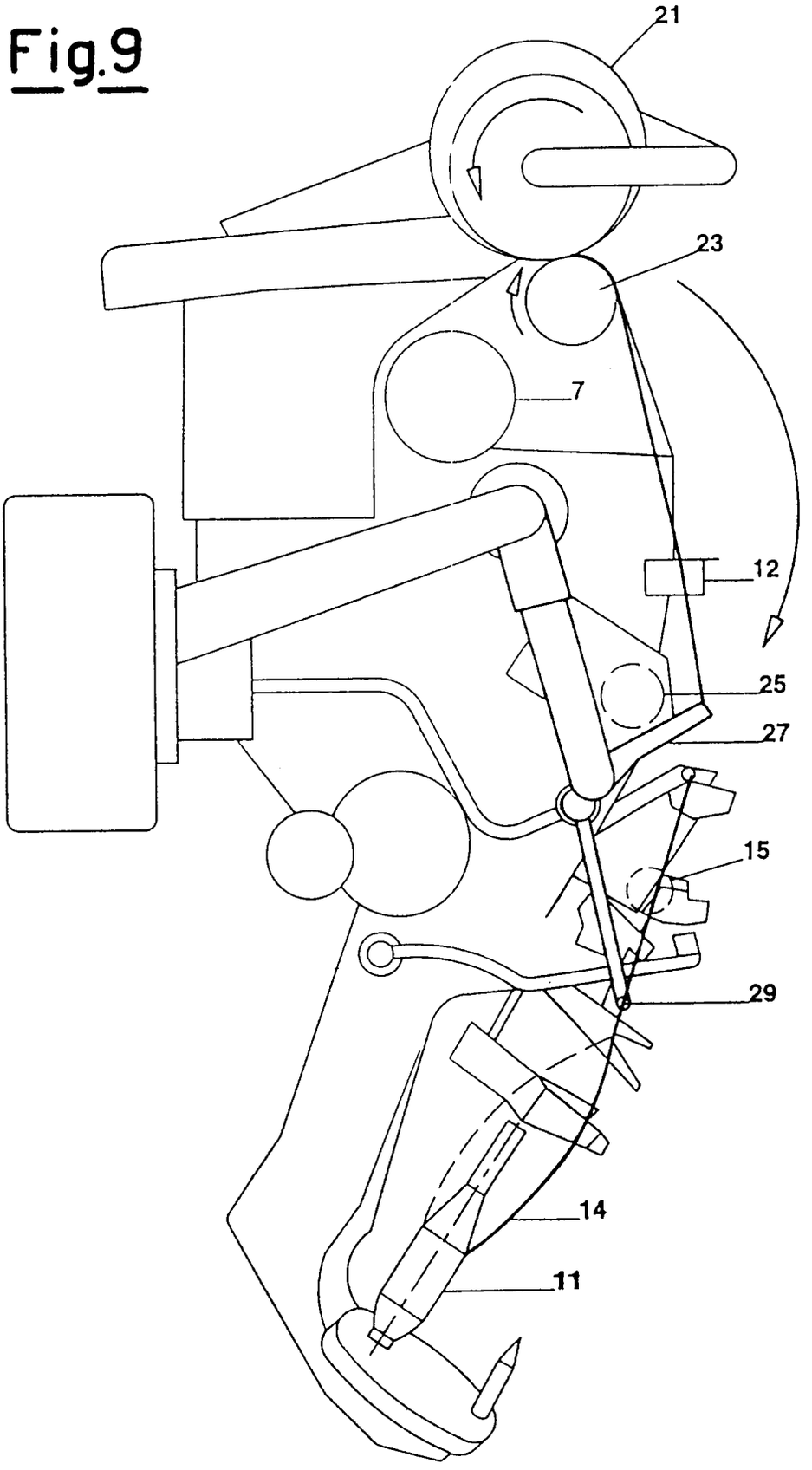


Fig.10

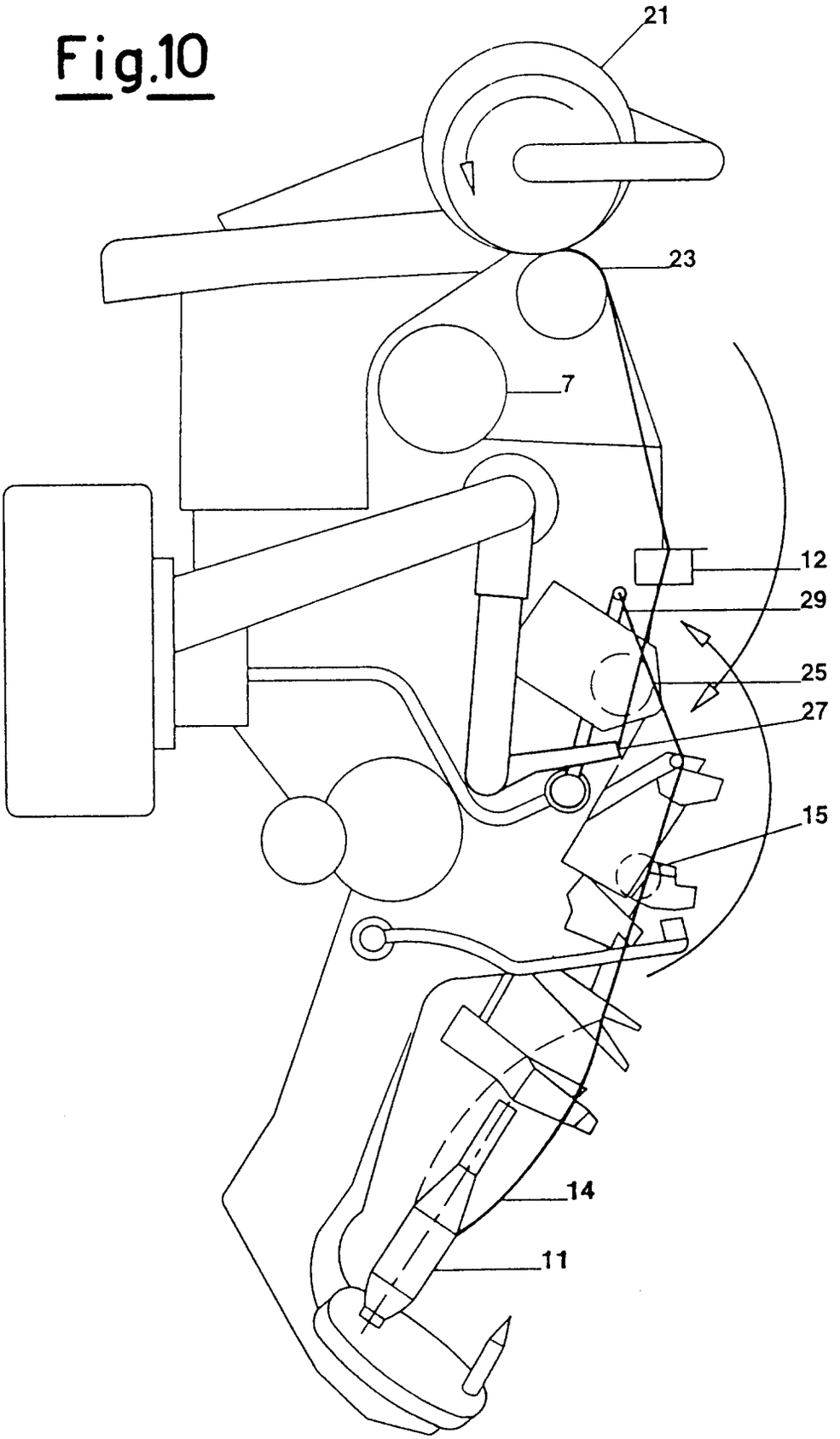
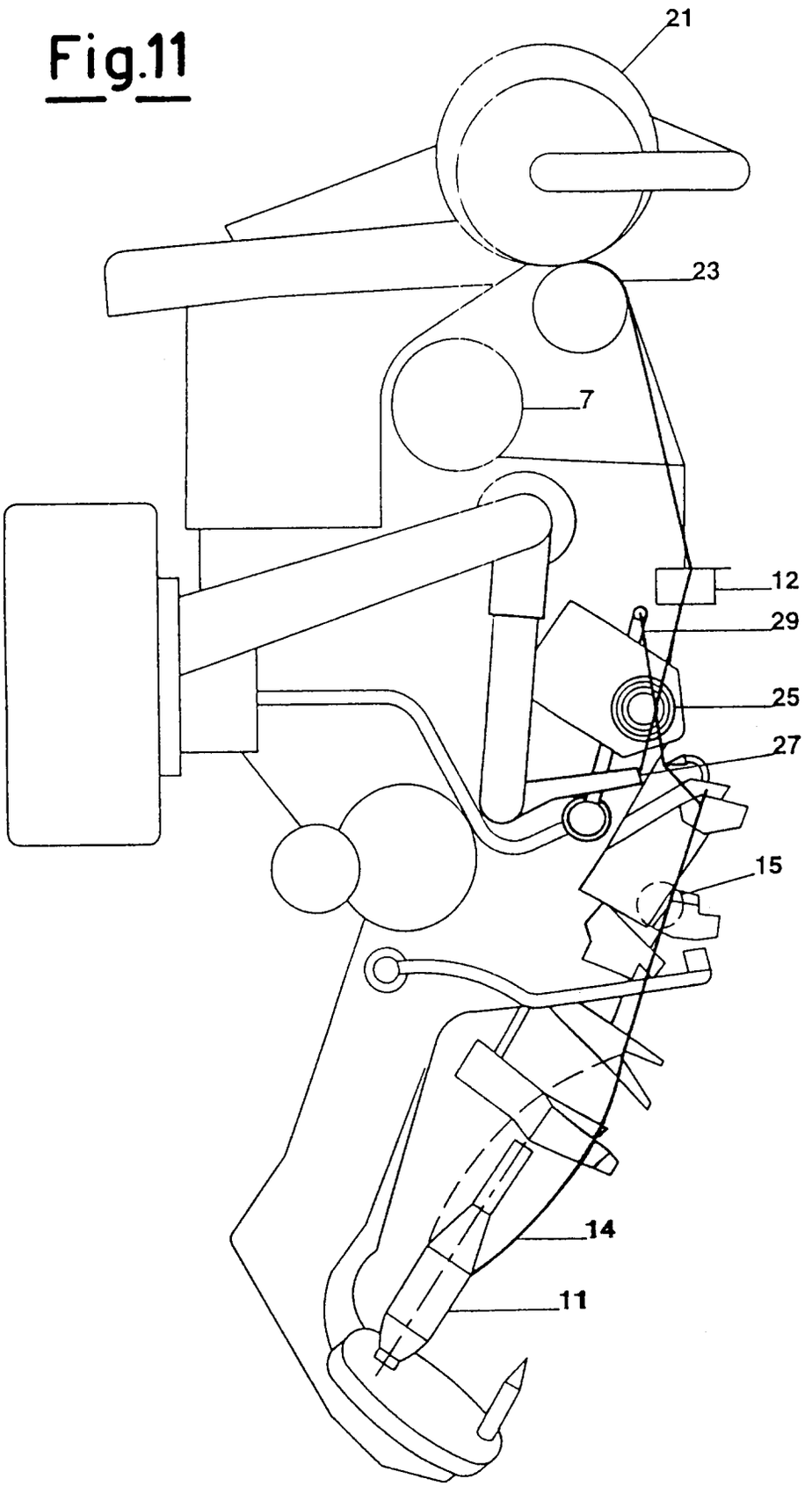


Fig.11



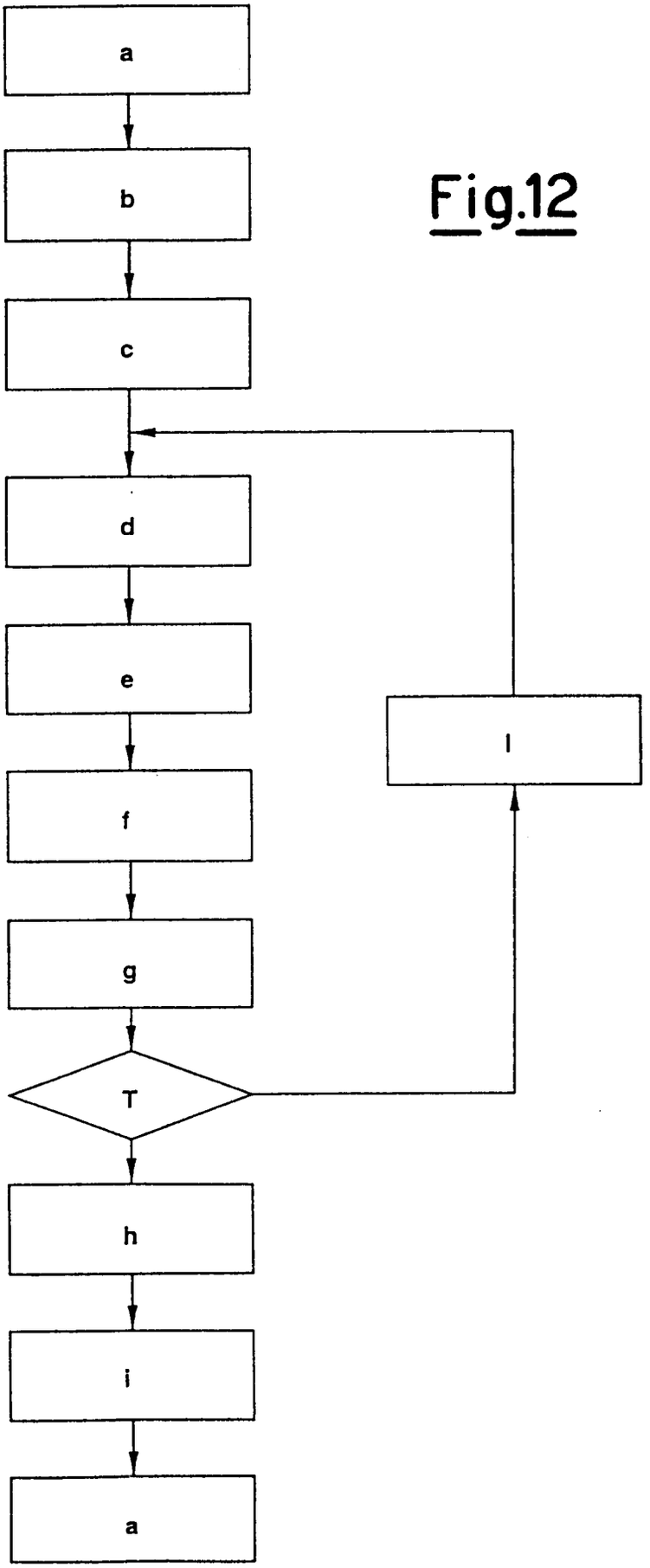


Fig.12