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(54) Benævnelse: **SYSTEM OG FREMGANGSMÅDE TIL KONTROLLERENDE KOBLEDE LEVERINGS SPIRALER**

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DESCRIPTION

[0001] The present invention refers to a system and a process for controlling coupled delivering spirals for products according to WO-A1-2006/120846, which is the preamble of Claims 1 and 2.

[0002] As known, product delivering or "vending" machines are used, that, in order to deliver products, use delivering spirals substantially arranged in an horizontal position that, by rotating around their axis of symmetry under the action of a motor-reducer equipped with an electric control motor, translate the products inserted between their turns down to the delivering opening, through which the product, selected by the purchaser, falls down, typically by gravity, going out of the respective spiral turn. The motor is then connected to electronic control apparatuses for operating the motor itself, so that, when a product must be dispensed, such electronic control apparatuses control the motor so that, through the motor-reducer, the delivering spiral performs a complete (or half) rotation to drag all products contained therein: the first product housed in the spiral turn which is nearest to the free edge will then be able to be unconstrained from the turn itself and fall down the delivering opening.

[0003] When however the sizes of the products are excessive to be able to be housed in a single delivering spiral, the state of the art provides for the use of two coupled delivering spirals. In this case, the two delivering spirals have the same diameter and pitch, but are wound along opposite directions. The product is inserted into both delivering spirals. The two delivering spirals are therefore mutually connected through mechanical means (typically gears) so that the motion of a spiral is transmitted to the other spiral, thereby making them rotete synchronised but along contrary directions. In this manner, a single motor is enough, connected to one of the two delivering spirals, so that both anyway rotate synchronously.

[0004] However, for such products whose sizes prevent them from being dispensed in two coupled delivering spirals, it is necessary for the two spirals to be placed at a great distance, this making extremely complicated and burdensome to mechanically connect them.

[0005] It is also known that, in order to make the motor perform a certain rotation, typically a complete (or half) revolution, it is necessary to detect the position of the drive shaft connecting the motor to the spirals, so that it is possible to discriminate when a complete (or half) rotation is performed. As it is also possible to note, in particular in enclosed FIG. 3, the prior art provides that the rotation R of a complete revolution of the drive shaft A of the motor M is determined through the use of a micro-switch MS that is activated by a cam stiffly connected to the shaft A itself. The cam typically has one (or two) notch. When a rotation R occurs, the micro-switch MS changes its status twice when the cam rotates by a complete revolution during its operating cycle.

[0006] The state of the art for motor-reducers provides that there are only two wires for every motor, that function both for supply and as positioning signal. The positioning signal is given by

a current interruption of a short length. The micro-switch typically has two, normally closed NC and normally open NA, output contacts. These two contacts are mutually connected and are connected to a supply pole of the motor M. The other pole is connected to the common contact of the micro-switch MS: therefore, the motor is connected to the supply through the contacts of the micro-switch MS.

[0007] In this way, as it is possible to note in the time T/current I graph of the enclosed FIG. 3, related to the operation of the motor of FIG. 3, during the micro-switch MS switching, there occurs a brief continuity interruption and therefore the motor supply is interrupted. The electronic control apparatus therefore interprets the position of the motor M by counting the number of interruptions and the time passing between them, and in this way it is possible to perform a complete rotation of the motor M itself.

[0008] Therefore, object of the present invention is solving the above prior art problems by providing a control system that allows controlling the operation of two coupled delivering spirals, substantially arranged at any distance between them, without requiring any mechanical coupling between the spirals themselves, consequently allowing to dispense a wide variety of products, even with big sizes.

[0009] Another object of the present invention is providing a control system of coupled spirals delivering products that can be easily and cheaply made, since it exploits also the electronic control apparatuses and the micro-switch already installed and/or used in known product dispensing or vending machines.

[0010] Another object of the present invention is providing a control system for coupled product-delivering spirals that can be installed also on already existing delivering machines.

[0011] Moreover, an object of the present invention is providing a process for controlling coupled spirals through the above-mentioned system.

[0012] The above and other objects and advantages of the invention, as will appear from the following description, are obtained with a product delivery machine comprising coupled delivery spirals, electronic control apparatus and a control system for coupled delivering spirals as claimed in claim 1.

[0013] Moreover, the above and other objects and advantages of the invention are obtained with a control process for coupled delivering spirals as claimed in claim 2.

[0014] It is intended that all enclosed claims are an integral part of the present disclosure.

[0015] The present invention will be better described by some preferred embodiments thereof, given as a non-limiting example, with reference to the enclosed drawings, in which:

- FIG. 1 shows a block diagram representing a preferred embodiment of the control

system according to the present invention;

- FIG. 2 shows some graphs representing the operating principle of the control system according to the present invention;
- FIG. 3 shows a block diagram representing a control system of a prior art motor; and
- FIG. 4 shows the time/current and time/voltage operating graphs for the motor of FIG. 3.

[0016] In general, the subject matter of the present invention is a control system that allows making a virtual micro-switch and a related virtual motor composed of at least two motors, and related micro-switches, separated in such a way that the electronic control apparatuses, already known per se for controlling the individual motors for rotating the delivering spirals, receive an aggregate signal from such virtual motor and that, therefore, the at least two motors and their related micro-switches are seen, by the above apparatuses, as a single prior art motor, and, in this way, controlled by taking care of providing adequate current interruptions to control its rotation through controlling the virtual motor. In this way, the two motors and their related micro-switches representing the virtual motor and its related virtual micro-switch behave, as regards the electronic control apparatuses, through the control system according to the present invention, as they were a single motor, known in the art.

[0017] With reference then in particular to FIG. 1, it is possible to note that the control system 1 according to the present invention comprises:

- at least one first electric motor 5a operatively coupled, possibly by interposing a first motor-reducer 7a, to a first delivering spiral 9a;
- at least one second electric motor 5b operatively coupled, possibly by interposing a first motor-reducer 7b, to a second delivering spiral 9b;
- at least one first micro-switch, substantially known per se, adapted to cooperate with a cam equipped with at least one notch and integral with the drive shaft of such first motor 5a to measure its rotation depending on current interruptions;
- at least one second micro-switch, substantially known per se, adapted to cooperate with a cam equipped with at least one notch and integral with the drive shaft of such second motor 5b to measure its rotation depending on current interruptions;
- first detecting means of at least one first signal S_a of the detected current interruptions and coming from the first micro-switch of the first motor 5a;
- second detecting means of at least one second signal S_b of the detected current interruptions and coming from the second micro-switch of the second motor 5b;
- processing means adapted to overlap such first signal S_a and such second signal S_b to produce a third aggregate signal S_v of the current interruptions detected by a virtual micro-switch of a virtual motor;
- transmitting means of such third signal S_v to electronic control apparatuses 3, known per se, of the rotation of delivering spirals of a product delivering or vending machine, such electronic control apparatuses 3 being adapted to supply with current such virtual motor depending on such third signal S_v, and such processing means being adapted to divide

such current supply between such first motor 5a and such second motor 5b depending on such related first S_a and second S_b signal.

[0018] Such first and second detecting means, such processing means and such transmitting means are embedded into a single electronic card 11 interposed between such electronic control apparatuses 3 and such first motor 5a and first micro-switch and such second motor 5b and second micro-switch.

[0019] Therefore such electronic card 11 is connected both to the electronic control apparatuses 3 and to the two motors 5a, 5b and, possibly, to their related motor-reducers 7a, 7b and manages such two motors 5a, 5b in such a way that both perform a complete rotation, starting approximately at the same time, and end their rotation after having performed a complete rotation.

[0020] The rotation of a complete revolution of the drive shaft of each one of the two motors 5a, 5b is therefore determined by the related micro-switch that is activated by the corresponding cam, integral with the shaft of the respective motore 5a, 5b.

[0021] As it is possible to note in FIG. 2, which shows the time T/current I graphs respectively of the first signal S_a, of the second signal S_b and of the aggregate signal S_v, when each one of the two motors 5a, 5b performs a complete rotation, its related micro-switch changes its status twice. Like in the known prior art, each one of the two motors 5a, 5b has only two wires that function both as current supply and as transmission of the related first and second signal S_a, S_b.

[0022] The signal S_a, S_b is therefore supplies by a short-term current interruption. Each one of the micro-switches therefore has two, normally closed NC e normally open NA, output contacts. These two contacts are mutually connected and are connected to a supply pole of the related motor 5a, 5b, while the other pole is connected to the common contact of the respective micro-switch: consequently, each one of the two motors 5a, 5b is connected to the current supply through the contacts of the corresponding micro-switch.

[0023] In this way, as it is possible to note in the time T/current A graphs of FIG. 2, when switching each one of the two micro-switches, there occurs a brief continuity interruption and therefore the motor supply is interrupted, determining the behaviour of the related first S_a or second S_b signal. The processing means therefore receive such signals S_a, S_b, overlap them and take care of producing the third aggregate signal S_v of the virtual motor with the behaviour shown in the related graph of FIG. 2. Such signal is then sent by the transmitting means to the electronic control apparatuses 3 that therefore interpret the position of the virtual motor by counting the number of interruptions of the aggregate signal S_v that they receive and the time that passes between the interruptions, and in this way it is possible to perform, substantially

synchronously, through the control system 1 according to the present invention, a complete rotation of each one of the motors 5a, 5b, driving in current a complete rotation of the virtual motor itself.

[0024] The present invention further deals with a process for controlling a product delivering machine with coupled delivering spirals 9a, 9b through the previously described control system 1, comprising the steps of: a) detecting at least one first signal S_a of current interruptions detected and coming from said first micro-switch of said first motor 5a; b) detecting at least one second signal S_b of current interruptions detected and coming from said second micro-switch di said second motor 5b; c) overlapping and aggregating said first signal S_a and said second signal S_b, to produce a third aggregate signal S_v of current interruptions detected by the virtual micro-switch of the virtual motor; d) sending said third aggregate signal S_y to said electronic control apparatuses 3; e) interpreting, by said electronic control apparatuses 3, the position of the virtual motor by counting the number of interruptions of the aggregate signal S_v that they receive and the time that passes between the interruptions; and f) receiving a current supply of said virtual motor from said electronic control apparatuses 3 depending on said third signal S_v and dividing said current supply between said first motor 5a and said second motor 5b depending on said related first S_a and second S_b signal, thereby performing, substantially synchronously, a complete rotation of each one of the motors 5a, 5b, driving in current acomplete rotation of the virtual motor.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO2006120846A1 [0001]

SYSTEM OG FREMGANGSMÅDE TIL KONTROLLERENDE KOBLEDE LEVERINGS SPIRALER

PATENTKRAV

1.Produkt leverings maskine indeholdende koblede leverings spiraler (9a, 9b), elektroniske kontrol apparater (3) og et kontrol system (1) til nævnte koblede leverings spiraler (9a, 9b), nævnte kontrol system (1) er udformet til at frembringe en virtuel motor omfattende:

- mindst en første elektrisk motor (5a) operativt koblet, fortrinsvis ved at indskyde en første motor reducer (7a), til en første leverings spiral (9a);
- mindst en anden elektrisk motor (5b) operativt koblet, fortrinsvis ved at indskyde en anden motor reducer (7b), til en anden leverings spiral (9b);

nævnte kontrol system (1) er også udformet til at frembringe en virtuel microswitch omfattende:

- mindst en første microswitch indrettet til at arbejde sammen med en cam udstyret med mindst en udskæring og integreret med en drivaksel i nævnte første motor (5a) for at måle dens rotation afhængig af afbrydelser frembragt af dens forsynings-strøm;
- mindst en anden microswitch indrettet til at arbejde sammen med en cam udstyret med mindst en udskæring og integreret med en drivaksel i nævnte første motor (5b) for at måle dens rotation afhængig af afbrydelser frembragt af dens forsynings-strøm;

nævnte kontrol system (1) omfatter endvidere:

- første detekterings middel af mindst et første signal (s_a) afledt fra nævnte detekterede strøm afbrydelser og stammende fra nævnte første microswitch i nævnte første motor (5a); og
- andet detekterings middel af mindst et anden signal (s_b) afledt fra nævnte detekterede strøm afbrydelser og stammende fra nævnte anden microswitch i nævnte anden motor (5b);

kendetegnet ved, at nævnte kontrol system (1) endvidere omfatter:

- forarbejdnings midler tilpasset til at overlappe og samle nævnte første signal (S_a) og nævnte andet signal (S_b), til at frembringe et tredje samle signal (S_v) af detekterede strøm afbrydelser af den virtuelle motors virtuelle microswitch;

overførings midler af nævnte tredje signal (S_v) til nævnte elektroniske kontrol apparater (3) i produkt leverings maskinen,

nævnte elektroniske kontrol apparater (3) er tilpasset til at forsyne med strøm nævnte virtuelle motor afhængig af nævnte tredje signal (S_v), og nævnte forarbejdnings midler er tilpasset til at dele nævnte strømforsyning mellem nævnte første motor (5a) og nævnte anden motor (5b) afhængig af nævnte relaterede første (S_a) og andet (S_b) signal, nævnte elektroniske kontrol apparater (3) er udformet til at fortolke den virtuelle motors position ved at tælle antallet af afbrydelser af det samlede signal (S_v) som de modtager og tiden som går mellem afbrydelserne,

hvori nævnte kontrol system (1) derved udfører, i væsentligt omfang synkront, en hel rotation af hver af motorerne (5a, 5b), drevet af strøm en hel rotation af den virtuelle motor;

hvori nævnte første og anden detekterings midler, nævnte fremstillings midler og nævnte overførings midler er indeholdt i et enkelt elektronisk kort (11) indskudt mellem nævnte elektroniske kontrol apparater (3) og nævnte første motor (5a) og første microswitch og nævnte anden motor (5b) og anden microswitch;

hvori hver af de nævnte to motorer (5a, 5b) har kun to ledninger, til strømforsyning og til overføring af nævnte relaterede første og andet signal (S_a, S_b); og

hvori hver af nævnte microswitch har to, normalt lukkede NC og normalt åbne NA, output kontakter, nævnte to kontakter er gensidigt forbundne og forbundne til en strømforsynings pol i en relateret motor (5a, 5b), mens den anden pol er forbundet med en almindelig kontakt til en respektive microswitch.

2.Fremgangsmåde til kontrol af en produkt leverings maskine med koblede leverings spiraler (9a, 9b) gennem kontrol systemet (1) i henhold til patentkrav 1, fremgangsmåden omfatter følgende trin:

a) detektering af mindst et første signal (S_a) af detekterede strøm afbrydelser og stammende fra nævnte første microswitch i nævnte første motor (5a);

b) detektering af mindst et andet signal (S_b) af detekterede strøm afbrydelser og stammende fra nævnte anden microswitch i nævnte anden motor (5b);

c) overlapning og samling af nævnte første signal (S_a) og nævnte andet signal (S_b), til at frembringe et tredje samle signal (S_v) af detekterede strøm afbrydelser detekteret af den virtuelle motors virtuelle microswitch;

d) overføring af nævnte tredje samle signal (S_v) til nævnte elektroniske kontrol apparater (3);

e) fortolkning, af nævnte elektroniske kontrol apparater (3), positionen af den virtuelle motor ved at tælle antallet af

afbrydelser af den samlede signal (S_v) som de modtager og tiden som går mellem afbrydelserne; og

f) modtagelse af strømforsyning i nævnte virtuelle motor fra nævnte elektriske kontrol apparater (3) afhængig af nævnte tredje signal (S_v) og fordeling af nævnte strømforsyning mellem første motor (5a) og nævnte anden motor (5b) afhængig af nævnte relaterede første (S_a) og andet (S_b) signal, som derved udfører i væsentlig omfang synkront, en komplet rotation af hver af motorerne (5a, 5b), drevet af strøm en komplet rotation af den virtuelle motor.

DRAWINGS

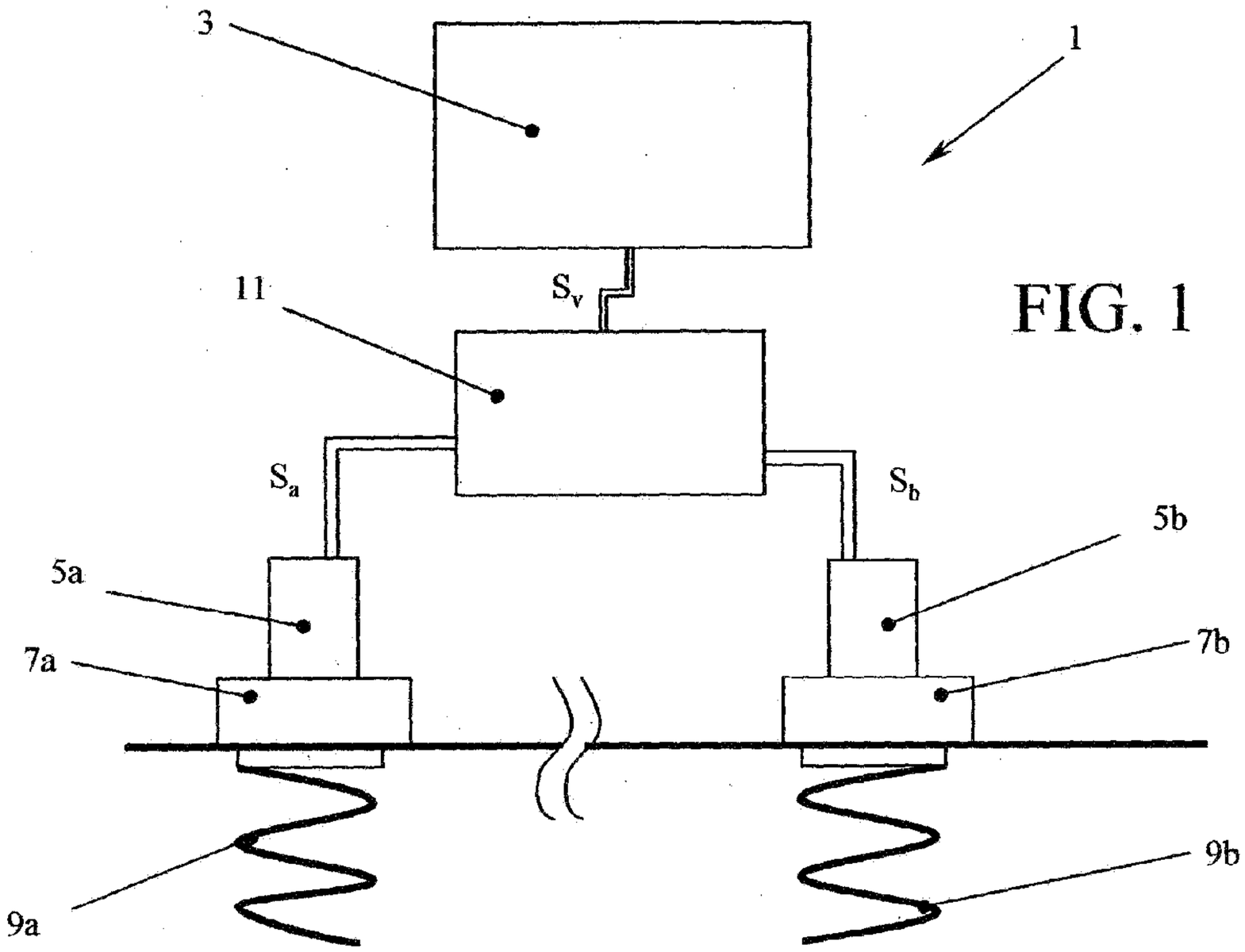

FIG. 1

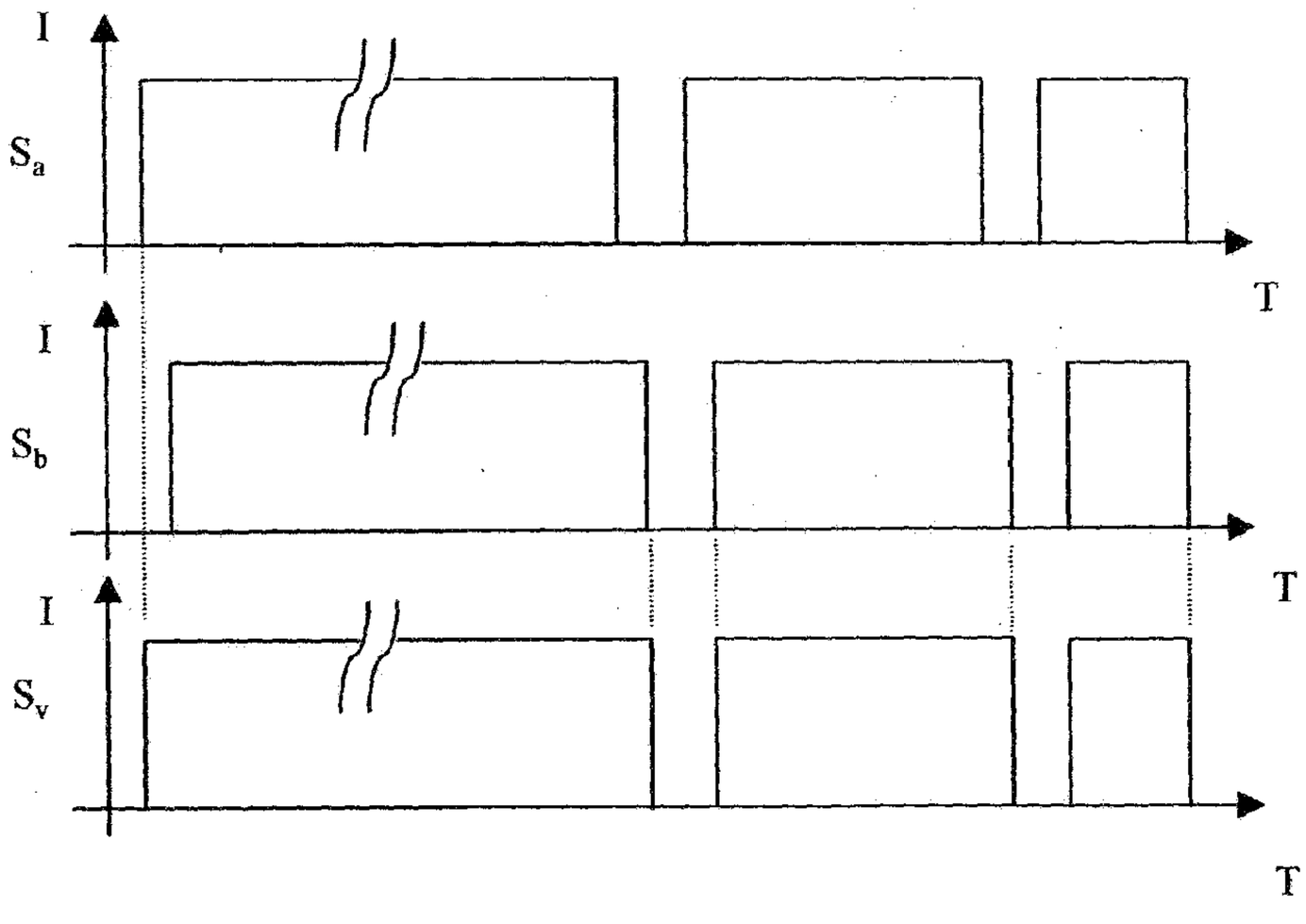

FIG. 2

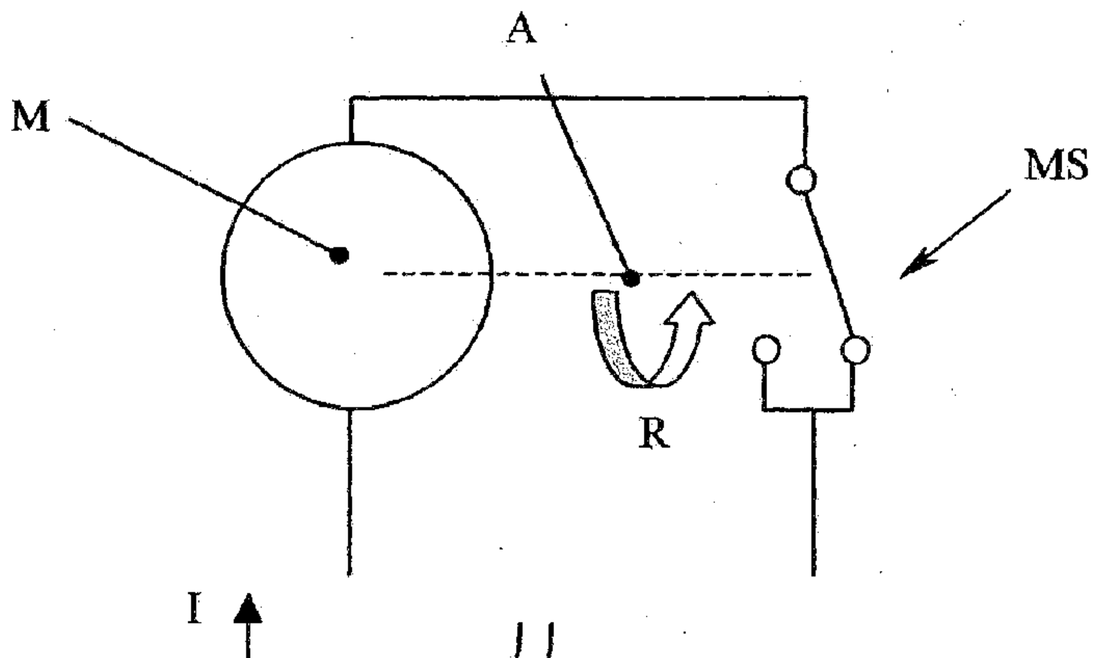

FIG. 3

FIG. 4