

(19)



(11)

EP 1 472 947 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
02.01.2008 Bulletin 2008/01

(51) Int Cl.:
A43D 37/00 (2006.01) **A43D 49/00** (2006.01)
A43D 25/00 (2006.01)

(21) Application number: **03425286.6**

(22) Date of filing: **02.05.2003**

(54) **Multistation automatic machine for processing shoe edge and bottom**

Maschine mit mehreren Stationen für die automatische Bearbeitung von Schuhrändern und
Schuhboden

Machine automatique multiposte pour le traitement des bords et des semelles de chaussures

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR**

(43) Date of publication of application:
03.11.2004 Bulletin 2004/45

(73) Proprietor: **OFFICINA MECCANICA B.D.F. S.P.A.**
27023 Cassolnovo,
Pavia (IT)

(72) Inventor: **Ceriani, Davide**
27023 Cassolnovo (Pavia) (IT)

(74) Representative: **Simino, Massimo et al**
Perani Mezzanotte & Partners
Piazza San Babila 5
20122 Milano (IT)

(56) References cited:
EP-A- 0 963 712 **DE-B- 1 120 318**
DE-C- 4 104 468 **GB-A- 856 555**
US-A- 1 388 838

EP 1 472 947 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention concerns an automatic machine with a plurality of working stations, to carry out machinings on the edge and bottom of footwear, particularly shoe cementing operations.

[0002] Various types of automatic machines have since long been introduced on the market to carry out different machinings on footwear, particularly roughening, seam reducing and cementing operations, as well as applying heels and soles. All these machines have evidently been proposed to reduce the number of specialized workers employed in the footwear sector, both due to the increasing costs of this type of labour and due to the progressive ever increasing shortage of the highly skilled labour required to carry out some particularly delicate steps of this production.

[0003] A first type of automatic machines substantially reproduces the approach to handwork and therefore consists of a machine with a single working station, equipped with one or more tools to machine the shoe. On this type of machines, the operative positions on the single working station only one shoe mounted on a last, and he starts the production cycle which may consist of one or more successive operations, at the end of which he removes the shoe which has been machined and introduces a new shoe; systems can be provided to shift the support for the shoe, so as to facilitate its positioning on and removal from the machine. An example of this type of automatic machine is described in EP-A-0 388 674. This type of automatic machines is apt to perform a good machining on the shoe, it has fairly reduced dimensions, but its productiveness is insufficiently high due to the fact that the machine is fully inoperative while the shoes are being positioned thereon and removed therefrom. The dead time reckoned for these operations is in fact between 50% and 80% of the time required for the actual working step, according to whether the machine performs a single or more successive operations on the shoe.

[0004] To overcome this drawback, a second more advanced type of automatic machines has been introduced on the market, characterized in that it comprises a shoe loading station, one or more working stations and, finally, an unloading station of the finished shoe. Different solutions have been proposed for what concerns the number and distribution of the working and loading/unloading stations, as well as the system to convey the shoes from one station to the next. A first solution provides for an inline machine, wherein the first station is the loading station, followed by the required number of intermediate working stations and ending with the unloading station. A second solution provides instead for a rotary machine with four stations, wherein the first station is used for the loading and unloading operations, while the other three stations are used for the required machining operations. An example of this solution is described in DE-41 04 468 (Leibrock); the improvement in respect of the previous solution lies both in the fact of having eliminated the need

for a double station to carry out the loading and unloading operations, and in the fact of having given a more compact shape to the machine, with evident advantages from the mechanical and plant layout point of view. Both these solutions are however characterized by the large overall dimensions of the machine which have highly conditioned the application thereof.

[0005] A third solution consists of a machine with only two stations, which provides for means to alternately move between said stations two shoes mounted on lasts, the two stations alternately acting one as a loading/unloading station and the other as a working station, and viceversa. Thanks to this particular double function of the two stations, it has been possible to realize this machine - described in EP-596.570, in the name of the same Applicant - with an extremely compact design, whereby it has met with great success on the market, particularly in its carding/cementing combination. In fact, the replacement of a machine of the first aforementioned type with a machine of this last type has allowed to increase its productiveness by 50%, without taking up any additional space.

[0006] Encouraged by the success of this machine, the Applicant has become perfectly aware that on the market, particularly that involving the small and medium shoe factories, there is still a high requirement for automatic machines apt to perform machinings on footwear, which - following the same basic concept of the machine described in EP-596.570 - allow however to increase the productiveness, while substantially taking up the same space as the already existing machines. Machines of this type allow in fact to increase the cost-effectiveness of a shoe factory, without requiring any extension of the production areas and even without requiring any changes in the distribution of the machinery and of the respective utility plants, thereby easily overcoming the resistances of this line of industrial activity against the innovation of the machinery, which resistances are in fact mainly tied to the costs and times required for a complete restructuring of the production units.

[0007] Automatic machines comprising working stations arranged according to a circular path extended on a vertical plane are known from DE 1120318B, GB 856555 and US-A-1 388 838.

[0008] The object of the present invention is to thus supply an automatic machine to carry out machinings on footwear which, while substantially taking up the same space as the most compact automatic machines of known type, allows to significantly increase the productiveness thereof.

[0009] According to the present invention, said object is reached by means of an automatic machine to carry out machinings on the edge and bottom of footwear, comprising the features of claim 1. Other characteristics of the automatic machine according to the present invention are described in the secondary claims.

[0010] Further characteristics and advantages of the present invention will anyhow be more evident from the

following detailed description of some preferred embodiments of the automatic machine to carry out machinings on footwear according to the invention, given with reference to the accompanying drawings, in which:

Fig. 1 is a diagrammatic side elevation illustrating a first embodiment of the automatic machine to carry out machinings on footwear according to the present invention, meant for the operations of cementing the bottom and the edge of a shoe;

Fig. 2 is a diagrammatic front elevation of the automatic machine illustrated in fig. 1;

Fig. 3 shows, on an enlarged scale, a detail of fig. 1 which illustrates the first working station used for both operations of loading the shoe to be machined and unloading the finished shoe;

Fig. 4 shows, on an enlarged scale, a detail of fig. 1 which illustrates the second working station used for the first machining on the shoe;

Fig. 5 shows, on an enlarged scale, a detail of fig. 1 which illustrates the third working station used for the second machining on the shoe;

Fig. 6 is a diagrammatic front elevation of a second embodiment of the automatic machine to carry out machinings on footwear according to the present invention, comprising three working stations, meant for the operations of pounding and seam reducing at the bottom of a shoe;

Fig. 7 is a diagrammatic front elevation of a third embodiment of the automatic machine to carry out machinings on footwear according to the present invention, comprising three working stations, meant for the operations of roughing and seam reducing at the bottom of a shoe; and

Fig. 8 is a diagrammatic front elevation of a fourth embodiment of the automatic machine to perform machinings on footwear according to the present invention, comprising four working stations, meant for the operations of roughing, pounding and seam reducing at the bottom of a shoe.

[0011] The general structure of the automatic machine to carry out machinings on footwear according to the present invention is clearly illustrated in figs. 1 and 2. It comprises a closed box-type frame T, onto a sidewall 1 of which is idly pivoted the shaft 2 of a rotating support 3 with a plurality of spokes 4. The shaft 2 is perpendicular to the sidewall 1, while the spokes 4 extending therefrom lie on a plane parallel to said wall and thus perpendicular to the shaft 2. The rotating support 3 is caused to rotate by a main motor M_p through a conventional type belt transmission, both diagrammatically illustrated in fig. 2. In the first embodiment of the invention - shown in figs. 1 to 5 - the rotating support 3 comprises three spokes 4 positioned at 120° one from the other, the number of spokes of the support 3 obviously determining the number of the working stations in the machine.

[0012] The motor M_p is operated by an on-board

processing unit - the control console C of which is positioned in the front part of the machine - to cause the intermittent rotation of the support 3, so that the different spokes 4 of said support move their position in the respective working stations, each of which is used to carry out a different operation or machining on the shoe.

[0013] To allow carrying out these operations, each spoke 4 ends with suitable gripping devices allowing to steadily block on the spoke, for the whole working cycle, a shoe mounted on its last. The gripping devices are pneumatically operated through specific compressed air channels extending along the shaft 2 and then branching off, by means of a three-way rotating joint, in correspondence of channels each housed into the three spokes 4, so that the feeding of compressed air to the gripping devices takes place independently from the position of the support 3 and from its steady or moving condition. The operation of the single gripping devices is thus obtained, in known manner, by means of independent controls for each gripping device, so that each device can be operated not only for the initial introduction and final removal of the shoe, but also in the intermediate stations when required for the machinings carried out on said shoes. Also the operation of the gripping devices is obviously controlled by the internal processing unit according to the particular working cycle.

[0014] In the automatic machine according to the present invention, a new shoe to be machined mounted on its last is introduced in station I, to which the operative can gain access through an opening 5 provided in the front part of the machine. The blocking of the shoe onto the end of the spoke 4 is illustrated in further detail in fig. 3, where it can be seen that the last F, with its upper mounted thereon, is inserted on the spoke 4 - through a pin/hole system known per se, and thus not illustrated - and set in its position by a fixed heel support 6. The last F is then blocked in this position by means of a pneumatically operated gripping device 7, which locks the neck of the last F on both sides. Other systems to block the last can anyhow be adopted, without thereby departing from the scope of the present invention.

[0015] Once the last F has thus been blocked in position onto the end of the spoke 4, the on-board processing unit operates the motor M_p which causes the shifting by 120° of the rotating support 3, so that the shoe which has just been positioned in station I is shifted onto the working station II, while a new spoke 4 reaches the station I and is ready for a new shoe to be introduced thereon.

[0016] The working station II is illustrated in further detail in fig. 4. This station is used to carry out the cementing of the lateral edge L of the shoe. The tool to spread the adhesive substance consists of a cementing head 8, carrying at its front end the brush 9 to spread the adhesive substance. The motion of the cementing head 8 is controlled by the processing unit, according to a preset working program, by operating five motors, X, Y, Z, A and B, which cause shifting of the cementing head 8 along the three orthogonal axes X, Y and Z, and the rotation of said

head about two mutually perpendicular axes A and B, passing through the point of contact of the brush 9 with the edge of the shoe.

[0017] In particular: the motor X controls the movement of the slide 10 along the guides 11; the motor Y controls the movement of the slide 12 along the guides 13 integral with the slide 10; the motor A controls the rotation of the rotating support 14 about the axis A integral with the slide 12; the motor Z controls the lifting/lowering of the support 15 for the head 8 in respect of the rotating support 14; and, finally, the motor B controls the rotation of the cementing head 8 in respect of the rotation axis B. The axis B and the axis Y are perpendicular to the plane of the drawing shown in fig. 4.

[0018] A subsequent rotation of the support 3, at the end of the machining carried out on the shoe in station II, shifts said shoe onto station III, where the second machining is carried out thereon. Said station is illustrated in detail in fig. 5. Station III is used to carry out the cementing of the shoe bottom. The tool to spread the adhesive substance consists of a cementing head 18, carrying at its front end the brush 19 to spread the adhesive substance. Also in this case, the motion of the cementing head 18 is controlled by the processing unit, according to a preset working program, by operating five motors, X1, Y1, Z1, A1 and B1 - similar to those previously described for station II - with a slightly different mechanical arrangement, as described hereunder.

[0019] In particular: the motor X1 controls the movement of the slide 20 along the guides 21; the motor Y1 controls the movement of the slide 22 along the guides 23 integral with the slide 20; the motor Z1 controls the lifting/lowering of said slide 22 in respect of the slide 20; the motor A1 controls the rotation of the rotating support 24 about the axis A1 integral with the slide 22; and, finally, the motor B1 controls the rotation of the cementing head 18 in respect of the rotation axis B1. The axis B1 and the axis Y1 are perpendicular to the plane of the drawing shown in fig. 5.

[0020] Fig. 6 illustrates a second embodiment of the invention, in which three working stations are provided, similar to the previous ones, except that station II is used to carry out a pounding operation, while station III is used to carry out a seam reducing operation.

[0021] Fig. 7 illustrates a third embodiment of the invention, with three working stations, in which station II is used to carry out a roughing operation on the shoe upper, while station III is used to carry out a seam reducing operation quite similar to that illustrated in the second embodiment of the invention.

[0022] A last embodiment of the invention is finally shown in fig. 8 wherein, in a higher machine, the rotating support 3 comprises four spokes 4 which thus determine four corresponding working stations.

[0023] In addition to the first station I used to load/unload the shoe mounted on its last, there are a second working station II for the roughing operation of the shoe upper, a third working station III for the pounding opera-

tion on the heel of the shoe, and a fourth and last station IV for the seam reducing operation.

[0024] The machine structure illustrated heretofore allows to perfectly reach the object of the present invention. In fact, the plan overall dimensions of the aforescribed machine is substantially equal to that of a conventional machine with a single working station. The space for the other two or three stations is in fact obtained by utilizing the height of the machine which, normally, does not involve any problem of installation. Moreover, the machine according to the first embodiment described heretofore has an additional important advantage, in that cementing of the shoe edge is carried out in station II, namely with the bottom of the shoe facing downwards. In this way, any possible dripping of the adhesive substance cannot interfere with the shoe upper, thereby notably reducing the amount of production rejects. When the shoe is then shifted from station II to station III, the adhesive substance is already sufficiently dried up as to no longer involve any dripping problem and then retain any dripping which may be determined during cementing of the shoe bottom, without hence damaging the integrity of the upper.

[0025] The invention has been described with reference to some preferred embodiments thereof, but it is evident that its protection scope is not limited to such embodiments, but includes any variant within reach of a person skilled in the art, provided that it falls within the definitions given in the accompanying claims.

Claims

1. Automatic machine to carry out machining on the edge and bottom of footwear, of the type comprising at least three working stations arranged according to a circular path extended on a vertical plane, along which the shoes to be machined mounted on lasts move, **characterised in that** in one of said working stations operations of loading the shoe to be machined and of unloading the finished shoe are performed, and in each one of the other working stations a different shoe machining operation is performed.
2. Automatic machine as in claim 1), wherein said shoes mounted on lasts (F) are blocked onto the ends of the spokes (4) of a rotating support (3), having a number of spokes (4) corresponding to that of said working stations, the rotation axis of said support (3) coinciding with the axis of said circular path.
3. Automatic machine as in claim 2), wherein the means to block said shoes mounted on lasts consist of pneumatically operated gripping devices (7).
4. Automatic machine as in claim 3), wherein said blocking means are fed with fluid under pressure through channels integral with said spokes (4) and

fed by a correspondent number of channels housed into the shaft (2) of said support (3), through a multi-way rotating joint.

5. Automatic machine as in any one of the previous claims, wherein three working stations (I, II, III) are provided, two at a higher level and one at a lower level, the working station at a higher level which is closer to the front part of the machine being the first station (I) used to load and unload the shoe. 5
6. Automatic machine as in claim 5), wherein said working station at a lower level is the second working station (II), used to carry out cementing of the lateral edge (L) of the shoe, while the third working station (III) is used to carry out cementing of the bottom of the shoe. 10
7. Automatic machine as in claim 5), wherein said working station at a lower level is the second working station (II), used to carry out a pounding operation on the heel of the shoe, while the third working station (III) is used to carry out a seam reducing operation on the bottom of the shoe. 15
8. Automatic machine as in claim 5), wherein said working station at a lower level is the second working station (II), used to carry out a roughing operation on the shoe bottom, while the third working station (III) is used to carry out a seam reducing operation on the bottom of the shoe. 20
9. Automatic machine as in any one of claims 1) to 4), wherein four working stations (I, II, III, IV) are provided, two at a higher level and two at a lower level, the working station at a higher level which is closer to the front part of the machine being the first station (I) used to load and unload the shoe. 25
10. Automatic machine as in claim 9), wherein said working stations at a lower level are the second (II) and the third (III) working station, respectively used to carry out a roughing operation on the shoe and a pounding operation on the heel of the shoe, while the fourth working station (IV) is used to carry out a seam reducing operation on the bottom of the shoe. 30

Patentansprüche

1. Automatische Maschine zum Durchführen der Bearbeitung von Kanten und Unterseite von Schuhen eines Typs, der zumindest drei Arbeitsplätze umfasst, die auf einer kreisförmigen Bahn in einer vertikalen Ebene angeordnet sind, entlang der die auf Leisten befestigten zu bearbeitenden Schuhe bewegt werden, **dadurch gekennzeichnet, dass** an einem der Arbeitsplätze das Laden und das Entladen 55

des fertigen Schuhs durchgeführt und in jedem anderen Arbeitsplatz ein anderer Schuhbearbeitungsvorgang durchgeführt wird.

2. Automatische Maschine gemäß Anspruch 1, wobei die auf den Leisten (F) befestigten Schuhe auf den Enden der Speichen (4) einer Drehhalterung (3) mit mehreren Speichen (4) gesperrt sind, wobei die Rotationsachse der Halterung (3) mit der Achse der kreisförmigen Bahn zusammenfällt. 10
3. Automatische Maschine gemäß Anspruch 2, wobei die Mittel zum Sperren der Schuhe auf Leisten aus pneumatisch betriebenen Greifvorrichtungen (7) bestehen. 15
4. Automatische Maschine gemäß Anspruch 3, wobei die Sperrmittel unter Druck mit Flüssigkeit durch Kanäle, die in den Speichen (4) eingebaut sind, versorgt werden und durch eine entsprechende Anzahl an Kanälen versorgt werden, die in der Welle (2) der Halterung (3) durch ein mehrfach rotierendes Gelenk angeordnet sind. 20
5. Automatische Maschine wie in einem der vorhergehenden Ansprüche, wobei drei Arbeitsplätze (I, II, III) vorgesehen sind, zwei auf einer höheren Ebene und einer auf einer niedrigeren Ebene, wobei der Arbeitsplatz auf der höheren Ebene, der näher an der Vorderseite der Maschine liegt, der erste Arbeitsplatz (I) ist, an dem der Schuh geladen und entladen wird. 25
6. Automatische Maschine gemäß Anspruch 5, wobei der Arbeitsplatz auf der niedrigeren Ebene der zweite Arbeitsplatz (II) ist, mit dem das Verkleben der Seitenkante (L) des Schuhs durchgeführt wird, während der dritte Arbeitsplatz (III) zum Verkleben der Schuhsohle verwendet wird. 30
7. Automatische Maschine gemäß Anspruch 5, wobei der Arbeitsplatz auf der niedrigeren Ebene der zweite Arbeitsplatz (II) ist, mit dem ein Hämmervorgang auf den Schuhabsatz durchgeführt wird, während der dritte Arbeitsplatz (III) zum Durchführen eines Nahtverminderungsvorgangs auf der Schuhsohle verwendet wird. 35
8. Automatische Maschine gemäß Anspruch 5, wobei der Arbeitsplatz auf der niedrigeren Ebene der zweite Arbeitsplatz (II) ist, mit dem ein Schleifvorgang auf der Schuhsohle durchgeführt wird, während der dritte Arbeitsplatz (III) zum Durchführen eines Nahtverminderungsvorgangs auf der Schuhsohle verwendet wird. 40
9. Automatische Maschine wie in einem der vorhergehenden Ansprüche 1 bis 4, wobei vier Arbeitsplätze 45

(I, II, III, IV) vorgesehen sind, zwei auf einer höheren Ebene und zwei auf einer niedrigeren Ebene, wobei der Arbeitsplatz auf der höheren Ebene der näher an der Vorderseite der Maschine liegt, der erste Arbeitsplatz (I) ist, an dem der Schuh geladen und entladen wird.

10. Automatische Maschine gemäß Anspruch 9, wobei die Arbeitsplätze auf der niedrigeren Ebene der zweite (II) und dritte (III) Arbeitsplatz sind, mit dem ein Aufrauhvorgang am Schuh und ein Hämmervorgang auf den Absatz des Schuhs durchgeführt wird, während der vierte Arbeitsplatz (IV) zum Durchführen eines Nahtverminderungsvorgangs auf der Schuhsohle verwendet wird.

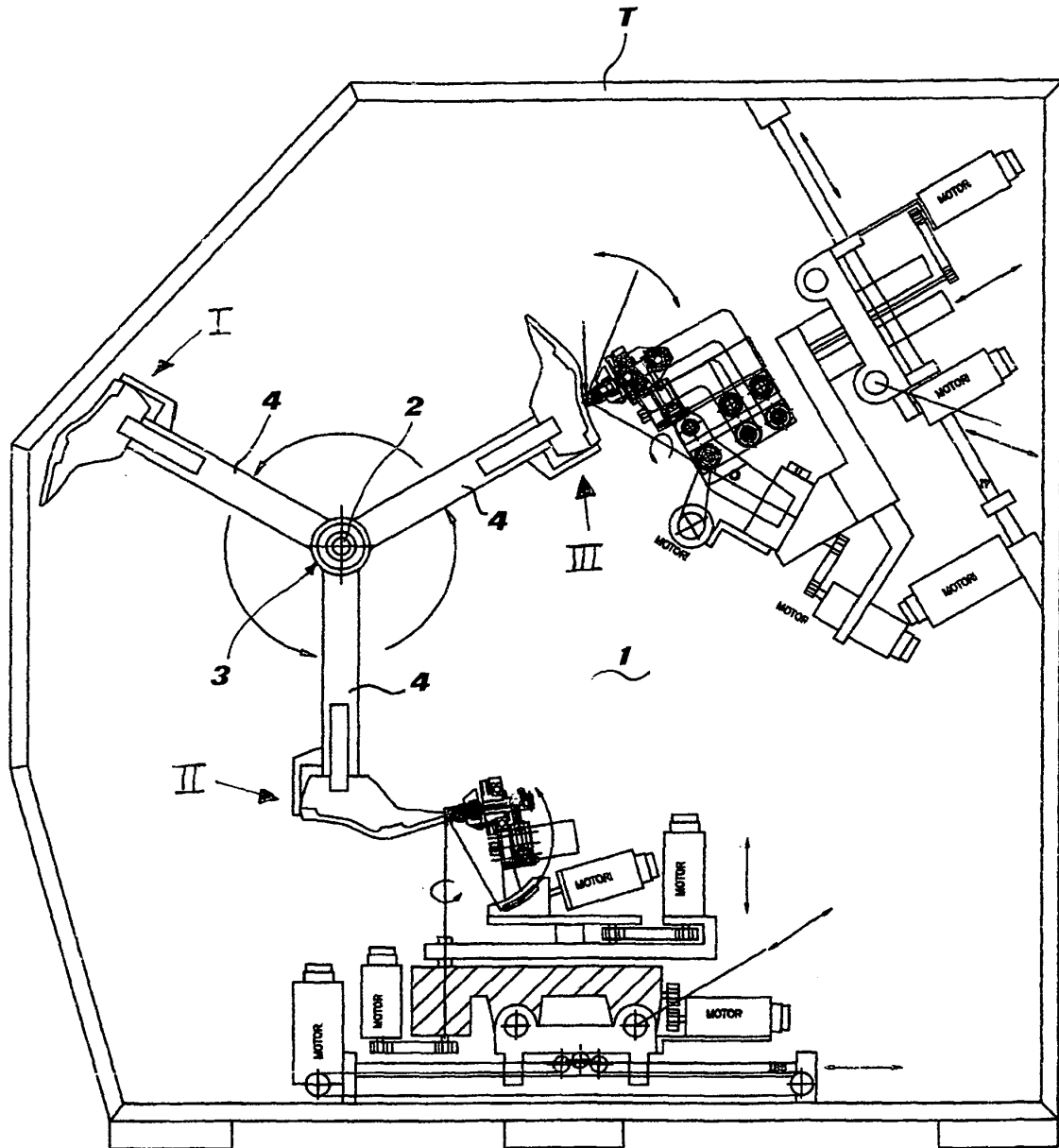
Revendications

1. Machine automatique pour réaliser l'usinage sur le bord et le dessous d'une chaussure, du type comprenant au moins trois stations de travail agencées selon une trajectoire circulaire située dans un plan vertical, le long de laquelle les chaussures à usiner montées sur des formes, se déplacent, **caractérisée en ce que** dans l'une desdites stations de travail, on réalise les opérations de chargement de la chaussure à usiner et de déchargement de la chaussure finie, et dans chacune des autres stations de travail, une opération d'usinage de chaussure différente est réalisée.
2. Machine automatique selon la revendication 1, dans laquelle lesdites chaussures montées sur des formes (F) sont bloquées sur les extrémités des rayons (4) d'un support rotatif (3), ayant un certain nombre de rayons (4) correspondant à celui desdites stations de travail, l'axe de rotation dudit support (3) coïncidant avec l'axe de ladite trajectoire circulaire.
3. Machine automatique selon la revendication 2, dans laquelle les moyens pour bloquer lesdites chaussures montées sur les formes, se composent de dispositifs de préhension (7) actionnés de manière pneumatique.
4. Machine automatique selon la revendication 3, dans laquelle lesdits moyens de blocage sont alimentés avec du fluide sous pression par des canaux solidaires desdits rayons (4) et alimentés par un nombre correspondant de canaux logés dans l'arbre (2) dudit support (3), par un joint rotatif à plusieurs voies.
5. Machine automatique selon l'une quelconque des revendications précédentes, dans laquelle on prévoit trois stations de travail (I, II, III), deux à un niveau supérieur et une à un niveau inférieur, la station de travail au niveau supérieur qui est plus près de la

partie avant de la machine, étant la première station (I) utilisée pour charger et décharger la chaussure.

6. Machine automatique selon la revendication 5, dans laquelle ladite station de travail à un niveau inférieur est la seconde station de travail (II), utilisée pour réaliser le collage du bord latéral (L) de la chaussure, alors que la troisième station de travail (III) est utilisée pour réaliser l'encollage du dessous de la chaussure.
7. Machine automatique selon la revendication 5, dans laquelle ladite station de travail à un niveau inférieur est la seconde station de travail (II), utilisée pour réaliser une opération de rabattage sur le talon de la chaussure, alors que la troisième station de travail (III) est utilisée pour réaliser une opération de réduction de couture sur le dessous de la chaussure.
8. Machine automatique selon la revendication 5, dans laquelle ladite station de travail à un niveau inférieur est la seconde station de travail (II), utilisée pour réaliser une opération de cardage sur le dessous de la chaussure, alors que la troisième station de travail (III) est utilisée pour réaliser une opération de réduction de couture sur le dessous de la chaussure.
9. Machine automatique selon l'une quelconque des revendications 1 à 4, dans laquelle on prévoit quatre stations de travail (I, II, III, IV), deux à un niveau supérieur et deux à un niveau inférieur, la station de travail à un niveau supérieur qui est plus près de la partie avant de la machine étant la première station (I) utilisée pour charger et décharger la chaussure.
10. Machine automatique selon la revendication 9, dans laquelle lesdites stations de travail à un niveau inférieur sont la seconde (II) et la troisième (III) station de travail, respectivement utilisées pour réaliser une opération de cardage sur la chaussure et une opération de rabattage sur le talon de la chaussure, alors que la quatrième station de travail (IV) est utilisée pour réaliser une opération de réduction de couture sur le dessous de la chaussure.

FIG.1



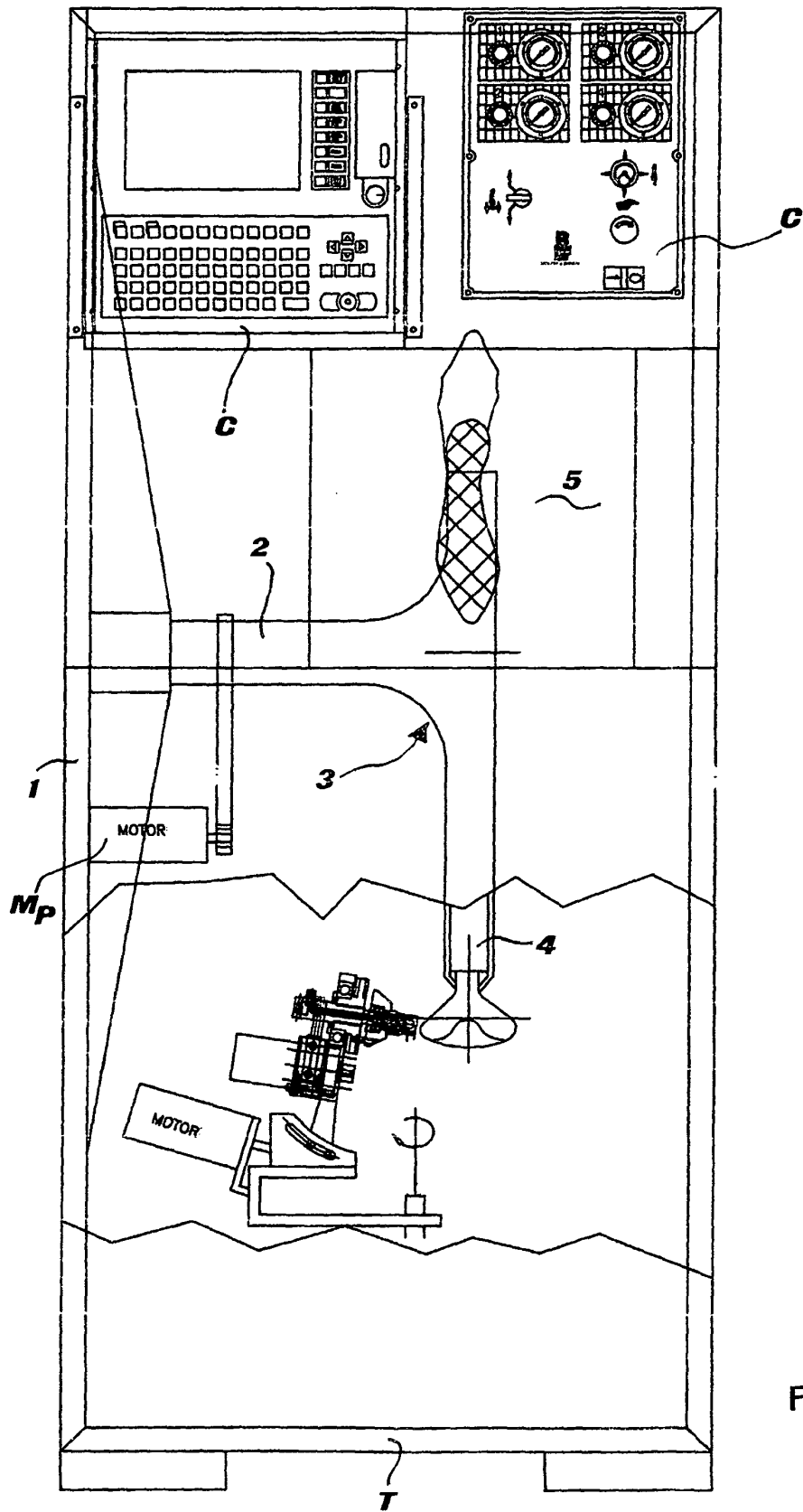


FIG.2

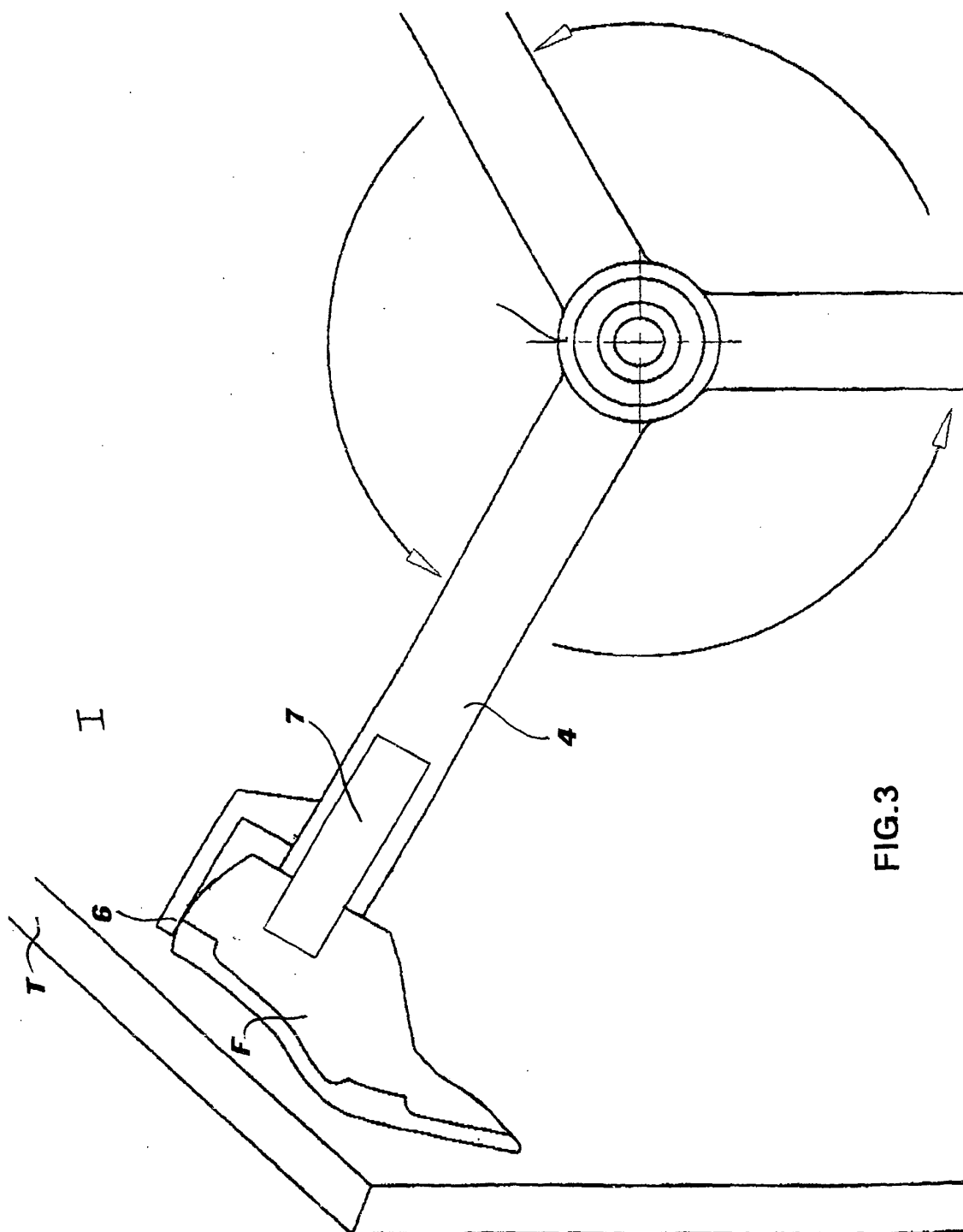
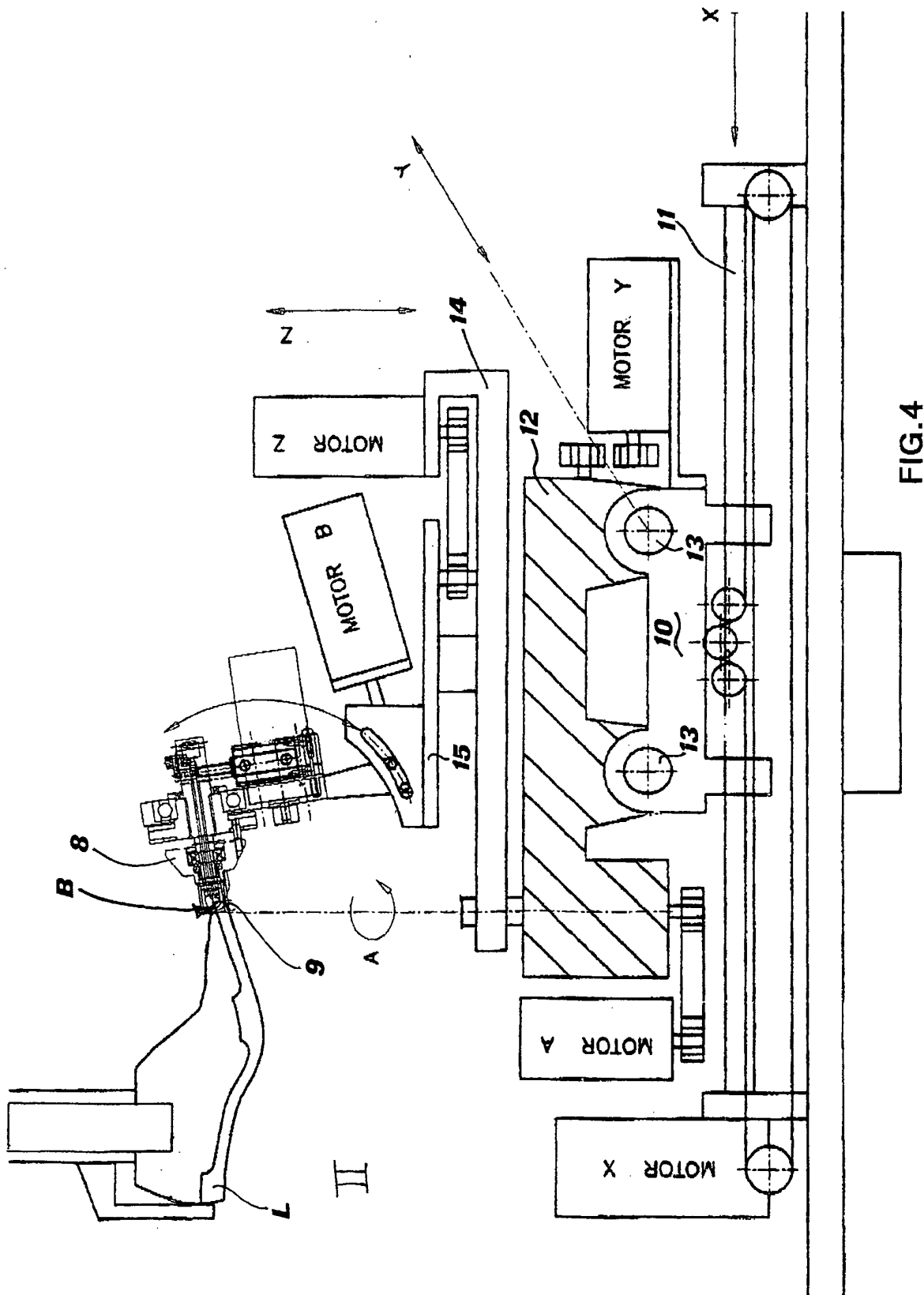


FIG.3



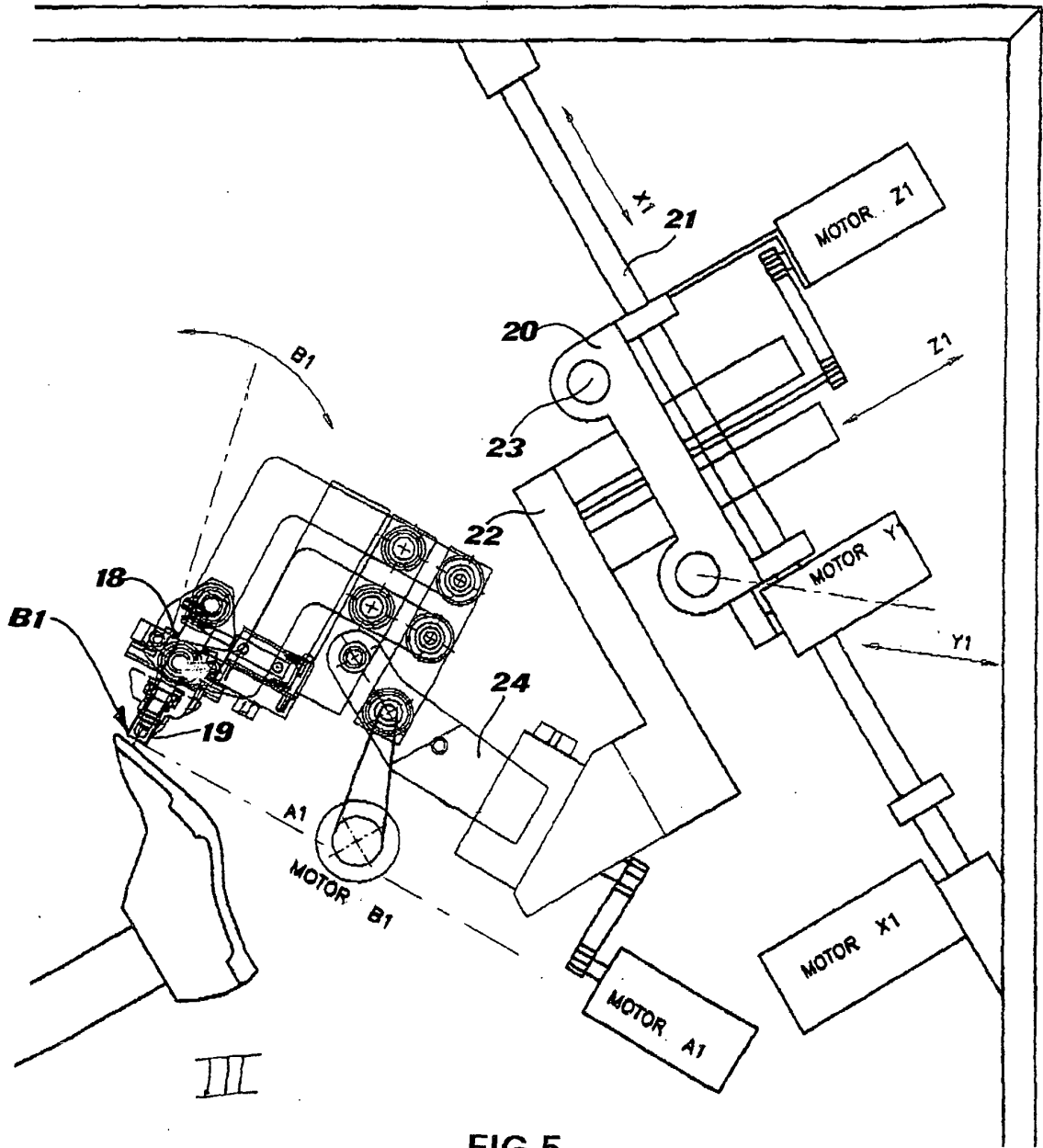
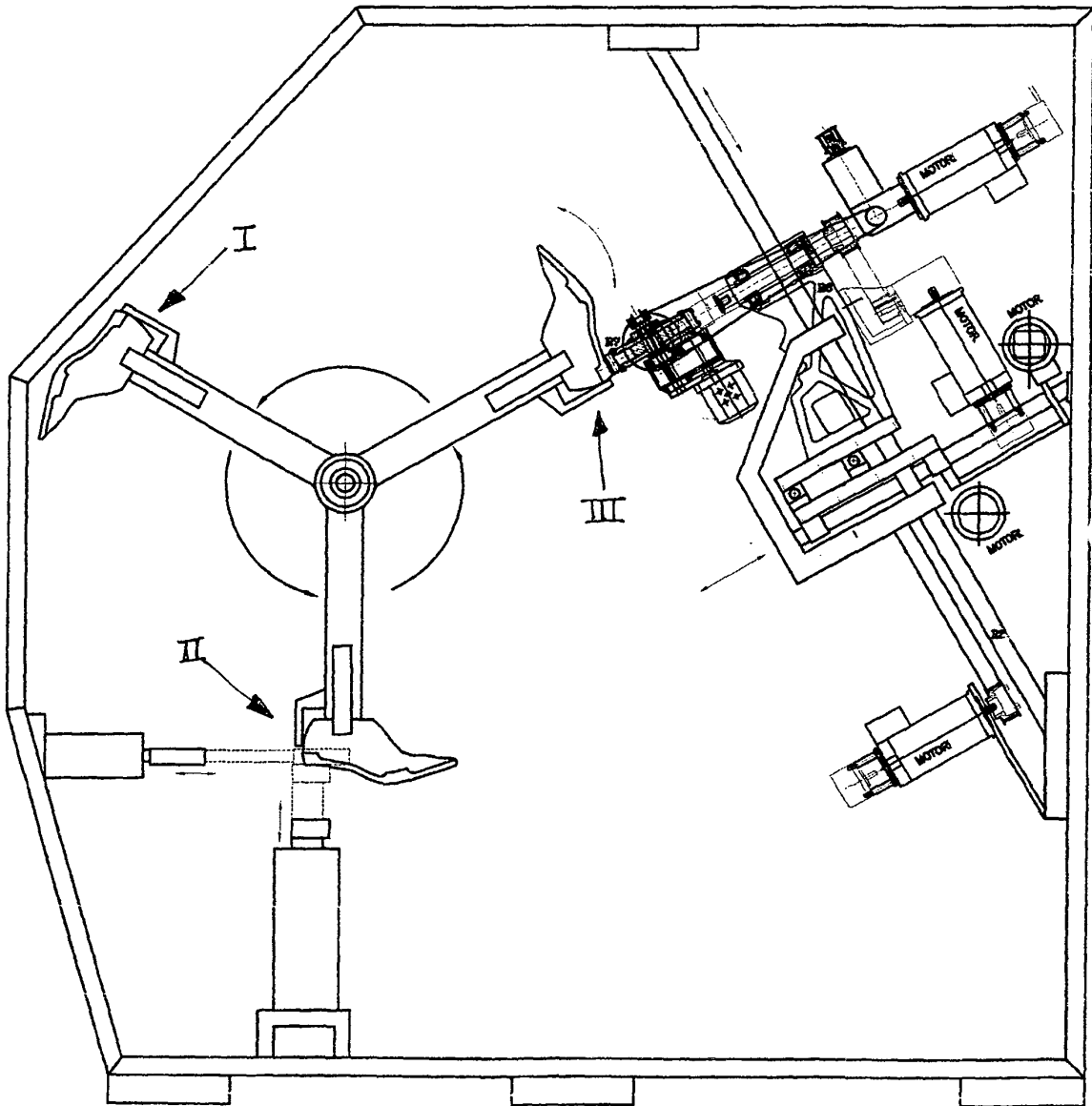


FIG.6



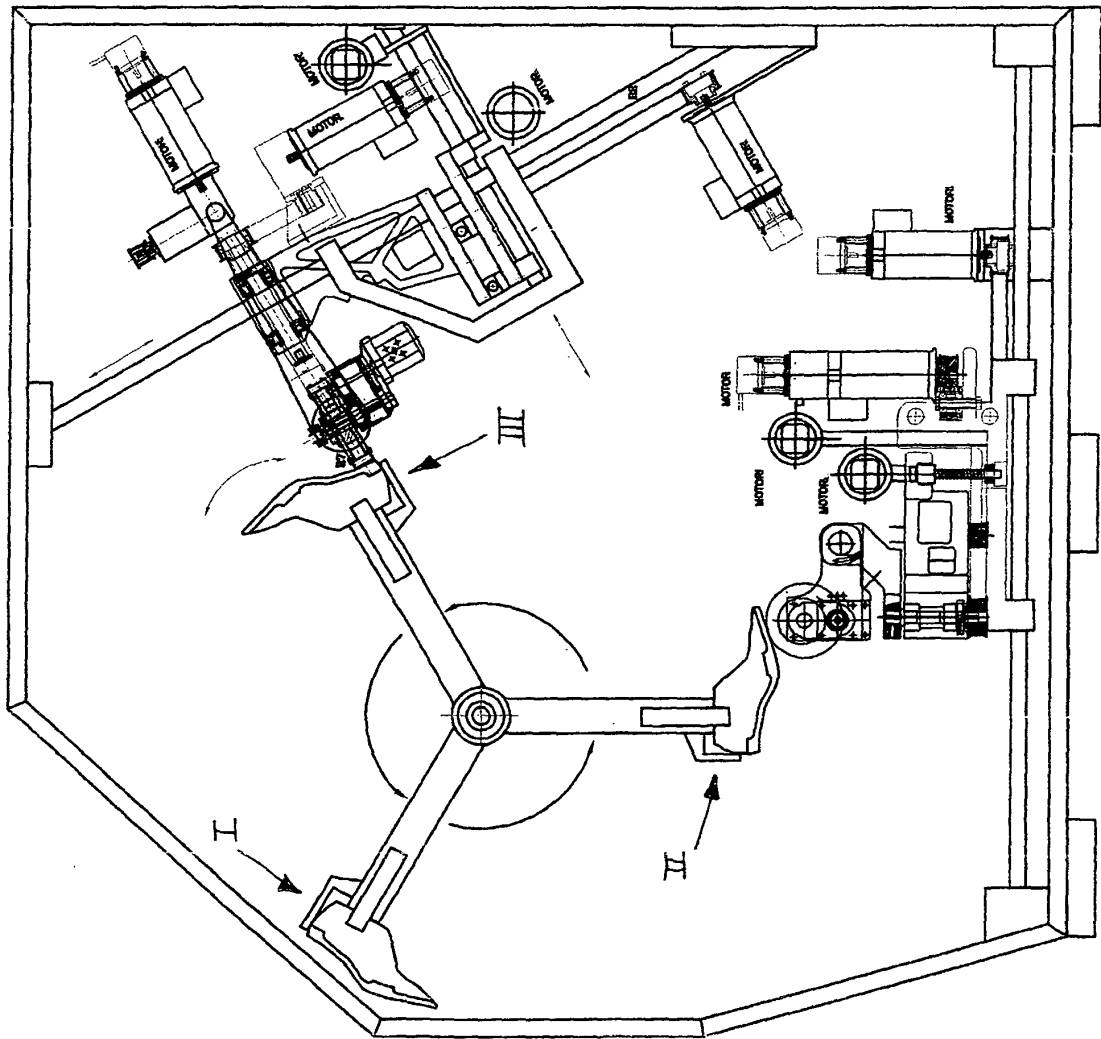
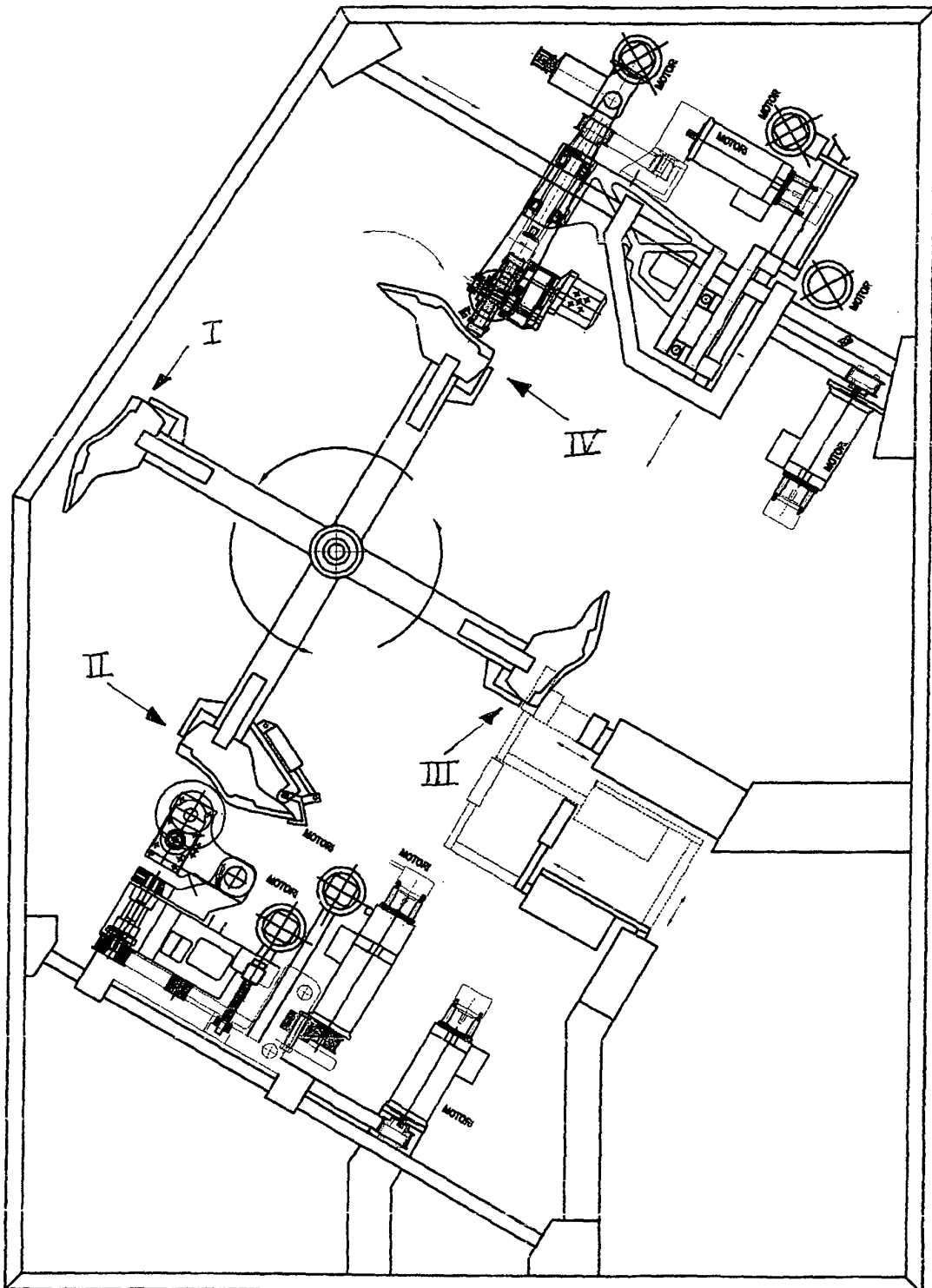


FIG.7

FIG.8



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 0388674 A [0003]
- DE 4104468, Leibrock [0004]
- EP 596570 A [0005] [0006]
- DE 1120318 B [0007]
- GB 856555 A [0007]
- US 1388838 A [0007]