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(54) **CENTRE LESS RUBBER COT ARBOUR HOLDING&GUIDING DEVICE**

HALTE- UND FÜHRUNGSVORRICHTUNG FÜR EINEN AUFSTECKER EINES MITTELPUNKTLOSEN KAUTSCHUKBETTES

DISPOSITIF DE MAINTIEN ET DE GUIDAGE D'ARBRE A MANCHONS DE CAOUTCHOUC SANS CENTRE

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Description

BACKGROUND OF THE INVENTION

[0001] This invention relates to a centreless rubber cot arbour according to claim 1.

[0002] Rubber cot arbour mainly comprises a steel spindle or axle provided with one or two rubber cots used as top rollers in Ring Frame, Speed Frame, Draw Frame, Combers, etc. of cotton or synthetic yarn spinning mills, in the textile industries.

[0003] The arbours or top rollers used in Draw Frames or Combers are provided with single long cot up to 400 mm in length in the middle of the axle portion, while the arbours or top rollers used in Ring Frames or Speed Frames are provided with a pair of cots, one each at the two ends of the axle. The cots are preferably made of rubber. A very large number of top rollers or rubber cot arbours are used in a Spinning mill or machine, which work continuously at a high speed.

[0004] Regular grinding of the rubber cot arbours is required for ensuring quality of yarn by reducing thread breaks and minimizing lap formation. Generally centreless grinding is used for rubber cot arbours of Ring Frames and Speed Frames and 'with centre grinding' is used for Draw Frames and Comber Cots.

[0005] Manual rubber cot arbour loading and unloading device for manual rubber cot arbour grinding or buffing machines are known in the prior art. This manual rubber cot arbour loading and unloading device is prone to accidents during loading and unloading of the rubber cot arbour in the grinding unit.

[0006] Centreless rubber cot arbour holding & guiding device are also known and used in the automatic rubber cot arbour grinding or buffing machines sold in the marked under the brand name 'BERKOL' ® manufactured by 'HUBER + SUHNER'.

[0007] DE 1502574 A1 discloses a rubber cot grinding machine with cot holding means. It is arranged at spinning machines for grinding covers of their top rollers.

[0008] FR 2747330 A discloses the machine tool holds the work-piece in a series of mountings forming part of a mounting plate pivoted about an axis. During machining operations the mounting plate is located and secured to a fixed body by the engagement of conical teeth mounted on the two structures. - When a further stage of machining is required a motorized shaft drives a cam, which has a helicoidal flange and a circular flange and also a second circular cam disc. These cams actuate rollers that lift, rotate and then lower the shaft on axis such that the mountings are moved to new positions.

[0009] DE 19534180 A1 discloses a device for the grinding of drafting rolls with an emerizing roll, at which a drafting roll can be advanced to the emerizing roll casing on one side thereof by an automatically driven carriage holding the drafting roll, the carriage being mounted on a first guiding element, and a second guiding element being secured to the emerizing roll on the side opposite the first guiding element. This second guiding element supports a hand-driven second carriage, and the direction of rotation of the emerizing roll is reversible.

[0010] WO 2004/020147 A discloses grinding device for grinding bodies, particularly ferrules of optical plug connectors, comprising a device for holding the bodies to be ground. This device can be pressed along an axis with a predeterminable application force against grinding means that are arranged in a grinding plane running transversal to said axis. A high level of precision is achieved in a grinding device of this type having a simple design, whereby the holding device is guided in the axis by means of a parallelogram guide.

[0011] The existing centreless rubber cot arbour holding & guiding devices are having low performance as they contain one single unit for receiving unfinished rubber cot arbour from a measuring unit, whereby the same unit is used for feeding the unfinished rubber cot arbour to the grinding head or unit and then for unloading the finished rubber cot arbour to the finished rubber cot arbour storage unit of the automatic rubber cot arbour grinding or buffing machine.

[0012] For establishing better performance of an automatic rubber cot arbour grinding or buffing machine this invention according to claim 1 provides centreless rubber cot arbour holding and guiding device, in which multiple units or head have been provided for holding and guiding the rubber cot arbour to the grinding head, for grinding as well as for unloading the finished rubber cot arbour into the finished rubber cot arbour storage unit of the rubber cot arbour grinding or buffing machine. While one of the unit hold measured rubber cot arbour received from the measuring unit, second will wait for feeding the rubber cot arbour to the grinding unit, the third will be engaged with the grinding unit for grinding the rubber cot arbour and the forth will unload the finished rubber cot arbour storage unit.

[0013] Another object of this invention is to provide centreless rubber cot arbour holding & guiding device, which is quite compact while increasing the performance of the automatic rubber cot arbour grinding or buffing machine.

[0014] A further object of this invention to provide centreless ubber cot arbour holding & guiding device which provides a smooth automatic function while increasing the performance of the automatic rubber cot arbour grinding or buffing machine.

[0015] Typically the centreless rubber cot arbour holding and guiding device, is provided with the two head units.

[0016] Typically the centreless rubber cot arbour holding and guiding device, is provided with the three head units.

[0017] Typically the centreless rubber cot arbour holding and guiding device, is provided with the four head units.

[0018] Typically the centreless rubber cot arbour holding and guiding device, is provided with the six head units.

[0019] Typically the centreless rubber cot arbour holding and guiding device, is provided with the eight or even more head units.

[0020] Typically the centreless rubber cot arbour holding and guiding device, is having pneumatically or hydraulically operated pressing and jaw opening cylinders.

[0021] Typically the centreless rubber cot arbour holding and guiding device, is having a suction device provided on the box for sucking out the rubber dust created during grinding or buffing operation of the rubber cots of the arbours.

[0022] Typically the centreless rubber cot arbour holding and guiding device, is having moulded cast iron or fabricated steel box.

[0023] This invention also provides an automatic rubber cot arbour grinding or buffing machine, comprising a centreless rubber cot arbour holding and guiding device.

[0024] The invention will become more clear from the following description with reference to accompanying drawings wherein:

Figs. 1 and 2 show front view and side view of a single unit or head of the centreless rubber cot arbour holding and guiding device of automatic rubber cot arbour grinding or buffing machine.

Figs. 3, 4, & 5 : Show front view, top view and side view, respectively, of the centreless rubber cot arbour holding & guiding device along with measuring & dressing unit assembly of the automatic rubber cot arbour grinding or buffing machine.

Figs. 6, 7, & 8 : Show front view, top view and side view, respectively, of the centreless rubber cot rbour holding & guiding device with indexing rotary table, rubber arbour guiding device & top plate.

Figs. 9 & 10: Show front view and top view, respectively, of the rotary table & servo gear motor.

Figs. 11, 12 & 13: Show front view, top view and side view, respectively, of the rubber cot arbour loading carriage of the automatic rubber cot arbour grinding or buffing machine for loading unfinished rubber cot arbour.

Figs. 14, 15 & 16 : Show front view, top view and side view, respectively, of the rubber cot arbour unloading carriage of the automatic rubber cot arbour grinding or buffing machine for unloading unfinished rubber cot arbour with ejector.

Figs. 17 & 18 : Show front view, top view and side view, respectively showing loading of unfinished rubber cot arbour from unfinished rubber cot arbour measuring unit after measuring and delivering to holding and guiding device in the grinding position.

Figs. 19 & 20 : Show top view of two and three holding unit or head , showing working positions of unloading, loading, grinding & delivering finished rubber cot arbour, respectively.

Figs. 21 & 22 : Show top view of four and six holding unit or head , showing working positions of unloading, loading, grinding & delivering finished rubber cot arbour, respectively.

Fig. 23 : Show top view of eight holding unit or head , showing working positions of unloading, loading, grinding & delivering finished rubber cot arbour, respectively.

[0025] Referring to fig. 1 the automatic rubber cot arbour grinding or buffing machine, developed by us for which patent application is pending mainly comprises of an unfinished rubber cot arbour storage unit or system or loading magazine for safely storing a large number of unfinished rubber cot arbours (23) while occupying minimum floor space; a finished rubber cot arbour storage unit or system or unloading magazine for safely storing a large number of finished rubber cot arbours (24) while occupying minimum floor space, provided paralelly and adjacent to the unfinished rubber cot arbours loading magazine an unfinished rubber cot arbour conveyor unit or system (6) for conveying the unfinished rubber cot arbours (23) from loading magazine to a measuring unit (16) one by one quickly, without consuming much time or wasting any time; a loading or unloading carriage (17) for loading the unfinished rubber cot arbour (23), preferably after measuring the diameter of rubber cot in the measuring unit (16) and when not rejected but found suitable for grinding and simultaneously in sequence unloading the finished rubber cot arbour (24) from arbour holder unit to a rubber cot arbour holding and guiding after grinding, to unloading conveyor unit or system (10) for onward conveying to finished rubber cot arbours storage unit or unloading magazine , a grinding wheel head unit (11) movable along 'X' axis and 'Y' axis for grinding or buffing the rubber cot arbours as per presetting of fixed diameter or fixed cut; a diamond dressing tool unit (18) for dressing the grinding wheel or emery stone, after grinding a predetermined number of rubber cot arbours and a control panel (13) for controlling all the operational sequences smoothly as per desired program. The various units or systems mounted on a frame (15) and enclosed in a rotary table (5) having suitable doors, windows and covers.

[0026] In the above automatic rubber cot arbour grinding or buffing machine, developed by us the rubber cot arbour holding and guiding device is provided with a single unit for receiving the unfinished rubber cot arbour (23) from the carriage (8) and therefore feeding to grinding head for grinding to rubber cot in the desired size than to delivered finished rubber cot arbour to the carriage (8) and to the finished rubber cot arbours storage unit or unloading magazine. It is notice that due to the single

head unit the performance of the automatic rubber cot arbour grinding or buffing machine remains load. Therefore we have now developed centreless rubber cot arbour holding & guiding device in which multiple head units have been provided, one of which receives unfinished rubber cot arbour from the carriage (8), the second one feeds the unfinished rubber cot arbour the grinding head and the third one delivered that finished rubber cot arbour to the carriage (8) and than to the finished rubber cot arbour storage unit (4).

[0027] Referring to figs. 2 to 30, centreless rubber cot arbour holding & guiding device provided with multiple head unit which may be for example two, three, four, six, eight or even more numbers.

[0028] A 'T'- type bracket (2), guided on needle or ball bearing housings (3) is coupled by a coupling (4) with a rotary table (5), which can be a pneumatic rotary table or electro mechanical device. A fixed shaft (6) is fitted on the T-bracket (2) for fixing a rubber cot arbour clamp (7). A carriage (8) and an ejector (9) fitted with pneumatic or hydraulic cylinder are provided according to figures 3, 5, 6, 8, 17 or 18 for pushing the finished rubber cot arbour (24), after grinding, on to the carriage (8). A guiding device is also provided on the box (1). The said guiding device consists of a knurled shaft (10) along with a rubber dust cleaning brush (11), guided on needle or ball bearing pedestals (12) and driven by preferably an A.C. or D.C. geared motor (13) in clockwise and or or anticlockwise direction. A suction device (14) is also provided for sucking out the rubber dust produced during grinding or buffing operation of the rubber cots. The arbour holder unit is used to hold and guide the rubber cot arbour during grinding operation, precisely. It is rotable at its home position in grinding zone. All the rubber particles produced are extracted by the efficient suction of the suction device (14) provided with the arbour holder unit.

[0029] The multiple head units are mounted on a rotary table (5) which is supported on the box (1) with the help of support bars (18). The rotary table (5) rotate with the help of servo geared motor or pneumatic rotary table (5). To each of the head units is - as to be seen in figures 3, 5, 6, 8, 17 or 18 - allocated a pressing cylinder (21) pneumatically or hydraulically jaw opening cylinder (22) for holding the unit at the time of receiving the unfinished rubber cot arbour, feeding of the unfinished rubber cot arbour to the grinding head and for delivering the finished rubber cot arbour to the carriage (8) or finished rubber cot arbour storage unit.

[0030] The rotary table (5) is a rotate with the help of servo geared motor or pneumatic or hydraulic rotary table (5) in the desired manner, work performing sequential operations of the centreless rubber cot arbour holding & guiding device provided with multiple holding units.

[0031] The multiple head units provided on the rotary table may be two, three, four, six, eight or even more number depending on the size and capacity of the automatic rubber cot arbour grinding or buffing machine.

1. Sequence of operations in the multiple head units used for centreless rubber cot arbour holding and guiding device given as under:

- Two head units, of which one is used for receiving unfinished rubber cot arbour from the carriage, while the other is feeding the unfinished rubber cot arbour to the grinding head. After grinding the second unit will be delivering the finished rubber cot arbour and then moving to the position of first head unit for receiving the unfinished rubber cot arbour form the carriage. Thereby increasing two times in comparison with the single head unit of the automatic rubber cot arbour grinding or buffing machine.

2. Sequence of operation of the centreless rubber cot arbour holding and guiding device having the three head units is as under:

- First head unit is receiving unfinished rubber cot arbour form the carriage
  Second unit is feeding the unfinished rubber cot arbour to the grinding head
- Third unit is delivering the finished rubber cot arbour to the carriage and then replacing the position of first unit. Thereby increasing three times in comparison with the single head unit of the automatic rubber cot arbour grinding or buffing machine.

3. Sequence of operation of the centreless rubber cot arbour holding and guiding device having the four head units is as under:

- First head unit is receiving unfinished rubber cot arbour form the carriage
- Second unit is waiting with the unfinished rubber cot arbour grinding or buffing to the grinding head or unit.
- Third unit is feeding the unfinished rubber cot arbour to the grinding head
- Four unit is delivering the finished rubber cot arbour to the carriage and then replacing the position of first unit for receiving unfinished arbour from carriage. Thereby increasing four times in comparison with the single head unit of the automatic rubber cot arbour grinding or buffing machine.

4. Sequence of operation of the centreless rubber cot arbour holding and guiding device having the six head units is as under:

- First head unit is receiving unfinished rubber cot arbour form the carriage.
- Second, third and four units are waiting with the unfinished rubber cot arbour to be fed to the

grinding head or unit.

- Fifth unit is feeding the unfinished rubber cot arbour to the grinding head.
- Sixth unit is delivering the finished rubber cot arbour to the carriage and then replacing the position of first unit. Thereby further increasing six times in comparison with the single head unit of the automatic rubber cot arbour grinding or buffing machine.

5. Sequence of operation of the centreless rubber cot arbour holding and guiding device having the eight head units is as under:

- First head unit is receiving unfinished rubber cot arbour form the carriage.
- Second, third, fourth, fifth and sixth units are waiting with the unfinished rubber cot arbour to be fed to the grinding head or unit.
- Seventh unit is feeding the unfinished rubber cot arbour to the grinding head.
- Eighth unit is delivering the finished rubber cot arbour to the carriage and then replacing the position of first unit. Thereby further increasing six times in comparison with the single head unit of the automatic rubber cot arbour grinding or buffing machine.

[0032] In the same manner by increasing the numbers of head units (16), the performance of the automatic rubber cot arbour grinding or buffing machine can be further increased.

Claims

1. A centreless rubber cot arbour holding and guiding device for automatic rubber cot arbour grinding or buffing machine comprising rotary means for conveying rubber cots to a grinding station and holding means for holding rubber cots for grinding **characterized by** multiple head units mounted on a rotary table (5), each of the said head units (16) comprises a T-bracket (2), guided on needle or ball bearing housings (3), coupled with a rotary device such as a pneumatic rotary device or electro mechanical device mounted on a box (1), a fixed shaft (6) fitted on the said T-bracket (2), an arbour clamp (7) fixed on the said fixed shaft (6) for holding an arbour for grinding, a carriage (8) and an ejector (9) fitted with pneumatic or hydraulic cylinder supported on the said box (1) for pushing the finished rubber cot arbour after grinding on to the carriage (8), a guiding device provided on the said box, the said guiding device consisting of a knurled shaft (10) and a rubber dust cleaning brush (11) provided adjacent to the parallel to the said knurled shaft (10), and is guided on needle or ball bearing pedestals (12) and driven by a prime mover, such as an A.C. or D.C. geared motor (13), in clock wise or anti clock wise direction, the said rotary table (5) being supported on said box (1) with the help of support bars (18) and rotated in a desired manner with the help of servo geared motor or pneumatic/hydraulic rotary table, whereby the pressing cylinder (21) and jaw opening cylinder (22) hold each head unit at the time of receiving the unfinished rubber cot arbour, feed the unfinished rubber cot arbour to the grinding head and deliver the finished rubber cot arbour to the carriage (8) or the finished rubber cot arbour storage unit.

2. The centreless rubber cot arbour holding and guiding device, according to claim 1 in which, the multiple head units provided on the rotary table (5) are two in numbers.

3. The centreless rubber cot arbour holding and guiding device, according to claim 1 in which, the multiple head units provided on the rotary table (5) are three in numbers.

4. The centreless rubber cot arbour holding and guiding device, according to claim 1 in which, the multiple head units provided on the rotary table (5) are four in numbers.

5. The centreless rubber cot arbour holding and guiding device, according to claim 1 in which, the multiple head units provided on the rotary table (5) are six in numbers.

6. The centreless rubber cot arbour holding and guiding device, according to claim 1 in which, the multiple head units provided on the rotary table (5) are eight or even more numbers.

7. The centreless rubber cot arbour holding and guiding device, according to claim 1 in which the said pressing cylinder (21) and jaw opening cylinder (22) are pneumatically or hydraulically operated cylinders.

8. The centreless rubber cot arbour holding and guiding device, according to claim 1, in which a suction device (14) is provided on the said box (1) for sucking out the rubber dust created during grinding or buffing operation of the rubber cots of the arbours.

9. The centreless rubber cot arbour holding and guiding device, according to claim 1, in which the said box (1) is moulded cast iron box or fabricated steel box.

10. An automatic rubber cot arbour grinding or buffing machine, comprising a centreless rubber cot arbour holding and guiding device according to claims 1-9.

Patentansprüche

1. Halte- und Führungsvorrichtung für spitzenlosen Spindelgummibezug, die für eine automatische Schleif- oder Poliermaschine für Spindelgummibezüge vorgesehen ist, umfassend ein Drehmittel zum Befördern von Gummibezügen zu einer Schleifstation und eine Halteeinrichtung zum Halten von Gummibezügen zum Schleifen, **gekennzeichnet durch** mehrere an einem Drehtisch (5) angebrachte Kopfeinheiten, wobei jede der Kopfeinheiten (16) Folgendes umfasst: eine T-Klammer (2), die an nadel- oder kugelgelagerten Gehäusen (3) geführt ist, welche mit einem Drehmittel, wie einem pneumatischen Drehmittel, oder einer an einem Kasten (1) montierte elektromechanischen Einrichtung gekoppelt sind, eine feststehende Welle (6), die an der T-Klammer (2) angebracht ist, eine Spindelklemme (7), die an der feststehenden Welle (6) zum Halten einer Spindel zum Schleifen befestigt ist, einen Schlitten (8) und einen Auswerfer (9), die mit einem pneumatischen oder hydraulischen Zylinder ausgestattet sind, der an dem Kasten (1) abgestützt ist, um den fertigen Gummibezug nach dem Schleifen auf den Schlitten (8) zu schieben, wobei eine Führungseinrichtung an dem Kasten vorgesehen ist, wobei die Führungseinrichtung aus einer gerändelten Welle (10) besteht, und eine Gummistaubreinigungsbürste (11), die benachbart zu der Parallelen zu der gerändelten Welle (10) vorgesehen ist und auf nadel- oder kugelgelagerten Sockeln (12) geführt ist und von einem Hauptantrieb, wie einem Wechselstrom- oder Gleichstromgetriebemotor (13), im Uhrzeigersinn oder entgegen dem Uhrzeigersinn angetrieben wird, wobei der Drehtisch (5) mit Hilfe von Stützstangen (18) an dem Kasten (1) gehalten und mit Hilfe eines Servo-Getriebemotors oder eines pneumatischen/hydraulischen Drehtisches in gewünschter Weise gedreht wird, wobei der Presszylinder (21) und der Backenöffnungszylinder (22) jede Kopfeinheit zum Zeitpunkt des Aufnehmens des nicht fertiggestellten Spindelgummibezugs halten, den nicht fertiggestellten Spindelgummibezug dem Schleifkopf zuführen und den fertigen Spindelgummibezug dem Schlitten (8) oder der Lagereinheit für fertige Spindelgummibezüge zuführen.

2. Halte- und Führungsvorrichtung für spitzenlosen Spindelgummibezug nach Anspruch 1, wobei die auf dem Drehtisch (5) vorgesehenen mehreren Kopfeinheiten zwei sind.

3. Halte- und Führungsvorrichtung für spitzenlosen Spindelgummibezug nach Anspruch 1, wobei die auf dem Drehtisch (5) vorgesehenen mehreren Kopfeinheiten drei sind.

4. Halte- und Führungsvorrichtung für spitzenlosen Spindelgummibezug nach Anspruch 1, wobei die auf dem Drehtisch (5) vorgesehenen mehreren Kopfeinheiten vier sind.

5. Halte- und Führungsvorrichtung für spitzenlosen Spindelgummibezug nach Anspruch 1, wobei die auf dem Drehtisch (5) vorgesehenen mehreren Kopfeinheiten sechs sind.

6. Halte- und Führungsvorrichtung für spitzenlosen Spindelgummibezug nach Anspruch 1, wobei die auf dem Drehtisch (5) vorgesehenen mehreren Kopfeinheiten acht oder sogar mehr sind.

7. Halte- und Führungsvorrichtung für spitzenlosen Spindelgummibezug nach Anspruch 1, wobei der Presszylinder (21) und der Backenöffnungszylinder (22) pneumatisch oder hydraulisch betätigte Zylinder sind.

8. Halte- und Führungsvorrichtung für spitzenlosen Spindelgummibezug nach Anspruch 1, wobei an dem Kasten (1) eine Absaugeinrichtung (14) vorgesehen ist, um den während des Schleif- oder Poliervorgangs der Spindelgummibezüge erzeugten Gummistaub abzusaugen.

9. Halte- und Führungsvorrichtung für spitzenlosen Spindelgummibezug nach Anspruch 1, wobei der Kasten (1) ein gegossener Gusseisenkasten oder ein gefertigter Stahlkasten ist.

10. Automatische Schleif- oder Poliermaschine mit Spindelgummibezug, umfassend eine Halte- und Führungsvorrichtung für spitzenlosen Spindelgummibezug nach einem der Ansprüche 1 bis 9.

Revendications

1. Dispositif de maintien et de guidage d'arbres à manchons de caoutchouc sans centre pour une machine de rectification/polissage automatique d'arbres à manchons de caoutchouc, comprenant des moyens de rotation permettant d'acheminer des manchons de caoutchouc vers une station de rectification, et des moyens de retenue permettant de maintenir des manchons de caoutchouc à rectifier, **caractérisé par** plusieurs unités de tête montées sur une table rotative (5), chacune desdites unités de tête (16) comprenant un support en T (2), guidé sur des logements de roulement à aiguilles ou à billes (3), couplé à un dispositif rotatif tel qu'un dispositif rotatif pneumatique ou un dispositif électromécanique monté sur un boîtier (1), une tige fixe (6) étant montée sur ledit support en T (2), une pince pour arbre (7) fixée sur ladite tige fixe (6) pour maintenir un arbre à rectifier, un chariot (8) et un éjecteur (9) muni d'un

cylindre pneumatique ou hydraulique reposant sur ledit boîtier (1) pour pousser l'arbre à manchons de caoutchouc fini sur le chariot (8) après rectification, un dispositif de guidage étant prévu sur ledit boîtier, ledit système de guidage dispositif étant constitué d'une tige moletée (10) et d'une brosse de nettoyage de poussière de caoutchouc (11) disposée adjacente parallèlement à ladite tige moletée (10) et guidée sur des socles de roulement à aiguilles ou à billes (12) et entraînée par un élément moteur, tel qu'un motoréducteur de courant alternatif ou continu (13), dans le sens horaire ou antihoraire, ladite table rotative (5) reposant sur ledit boîtier (1) à l'aide de barres de support (18) et tournant de manière souhaitée à l'aide d'un servomotoréducteur ou d'une table rotative pneumatique/hydraulique, ce qui permet au cylindre de pression (21) et au cylindre d'ouverture de mâchoire (22) de maintenir chaque unité de tête au moment de la réception de l'arbre à manchons de caoutchouc non fini, d'amener l'arbre à manchons de caoutchouc non fini vers la tête de rectification et d'acheminer l'arbre à manchons de caoutchouc fini vers le chariot (8) ou vers l'unité de stockage d'arbres à manchons de caoutchouc finis.

2. Dispositif de maintien et de guidage d'arbres à manchons de caoutchouc sans centre selon la revendication 1, dans lequel les multiples unités de tête prévues sur la table rotative (5) sont au nombre de deux.

3. Dispositif de maintien et de guidage d'arbres à manchons de caoutchouc sans centre selon la revendication 1, dans lequel les multiples unités de tête prévues sur la table rotative (5) sont au nombre de trois.

4. Dispositif de maintien et de guidage d'arbres à manchons de caoutchouc sans centre selon la revendication 1, dans lequel les multiples unités de tête prévues sur la table rotative (5) sont au nombre de quatre.

5. Dispositif de maintien et de guidage d'arbres à manchons de caoutchouc sans centre selon la revendication 1, dans lequel les multiples unités de tête prévues sur la table rotative (5) sont au nombre de six.

6. Dispositif de maintien et de guidage d'arbres à manchons de caoutchouc sans centre selon la revendication 1, dans lequel les multiples unités de tête prévues sur la table rotative (5) sont au moins au nombre de huit.

7. Dispositif de maintien et de guidage d'arbres à manchons de caoutchouc sans centre selon la revendication 1, dans lequel ledit cylindre de pression (21) et ledit cylindre d'ouverture de mâchoire (22) sont des cylindres à commande pneumatique ou hydraulique.

8. Dispositif de maintien et de guidage d'arbres à manchons de caoutchouc sans centre selon la revendication 1, dans lequel un dispositif d'aspiration (14) est prévu sur ledit boîtier (1) pour aspirer la poussière de caoutchouc produite lors de l'opération de rectification ou de polissage des manchons de caoutchouc des arbres.

9. Dispositif de maintien et de guidage d'arbres à manchons de caoutchouc sans centre selon la revendication 1, dans lequel ledit boîtier (1) est un boîtier coulé en fonte ou un boîtier en acier.

10. Machine de rectification ou de polissage automatique d'arbres à manchons de caoutchouc, comprenant un dispositif de maintien et de guidage d'arbres à manchons de caoutchouc sans centre selon les revendications 1 à 9.

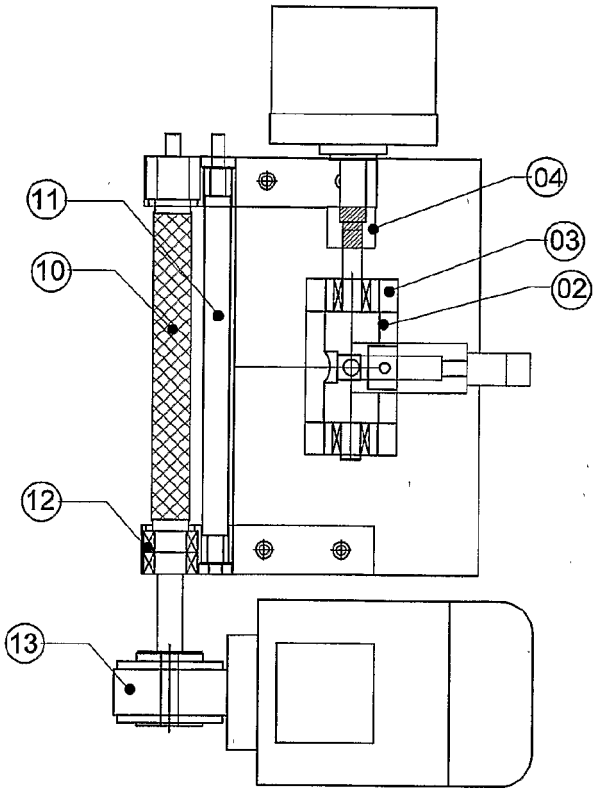

Fig - 1

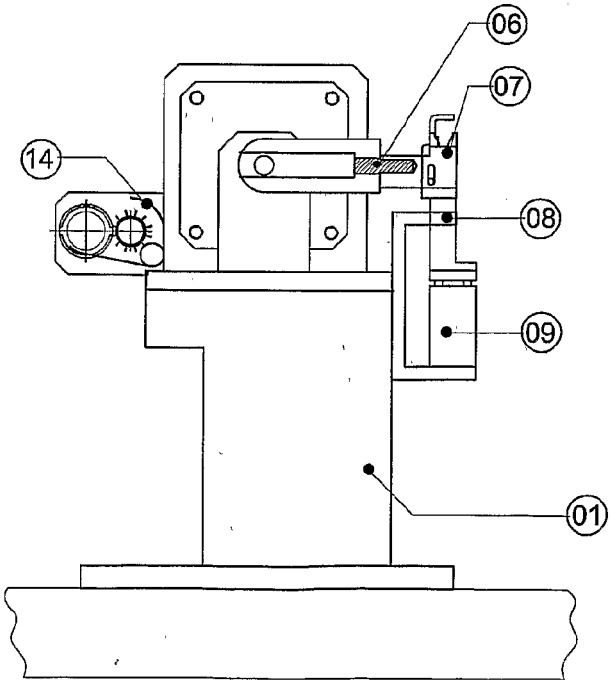

Fig - 2

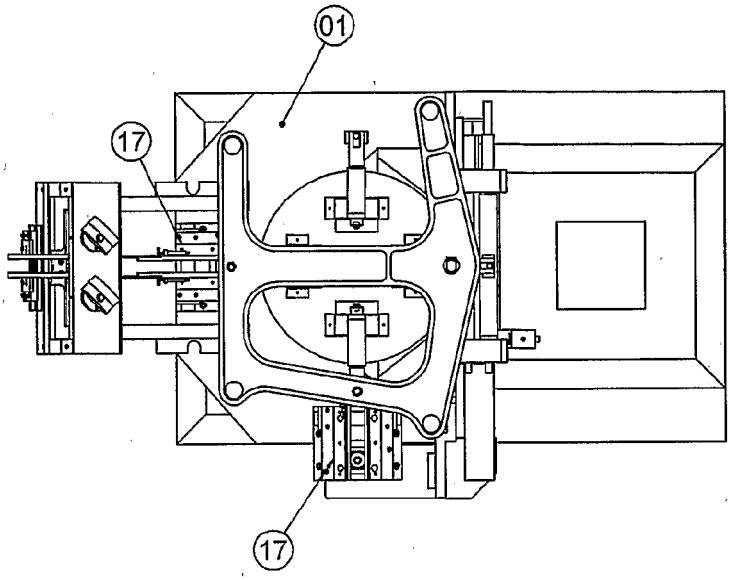

FIG - 04

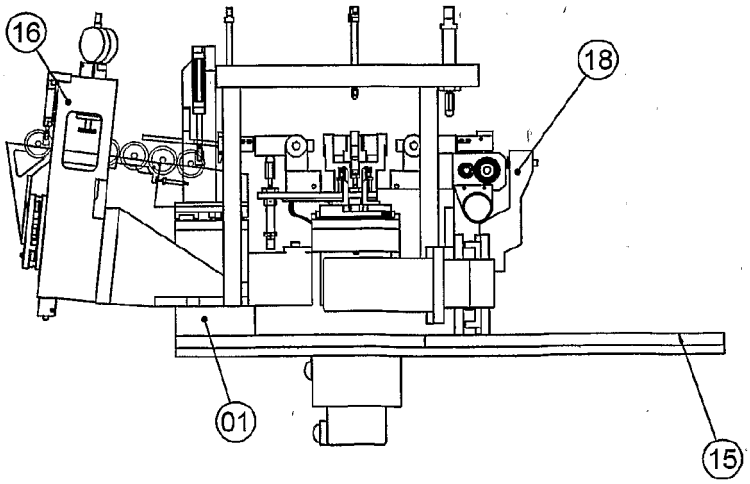

FIG - 03

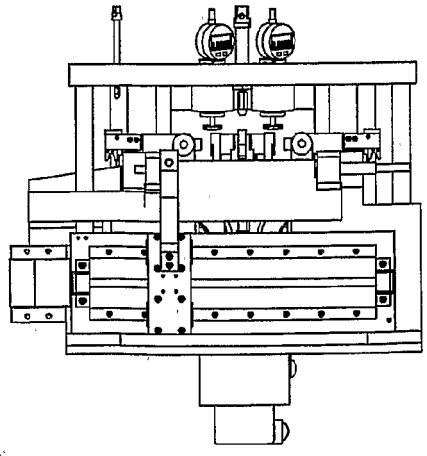

FIG - 05

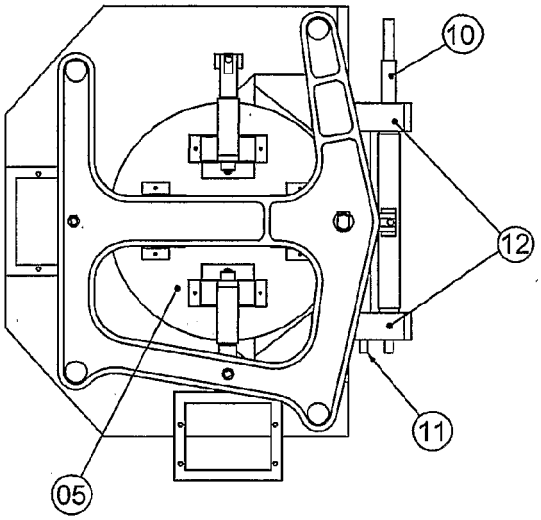

FIG - 07

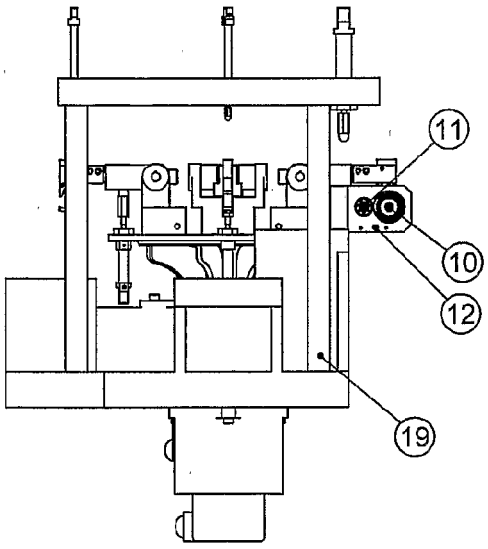

FIG - 06

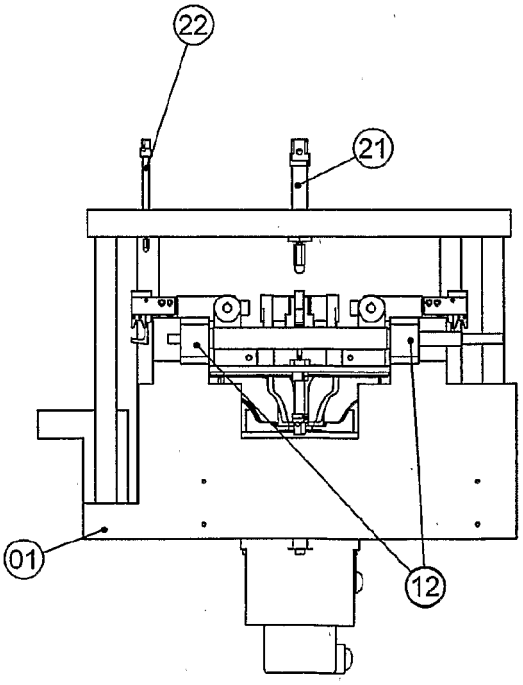

FIG - 08

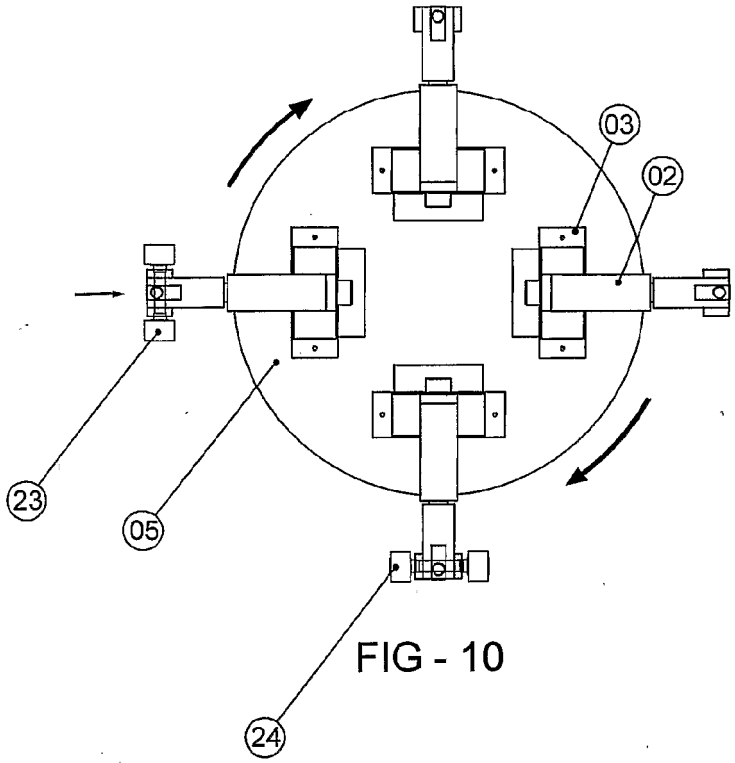

FIG - 10

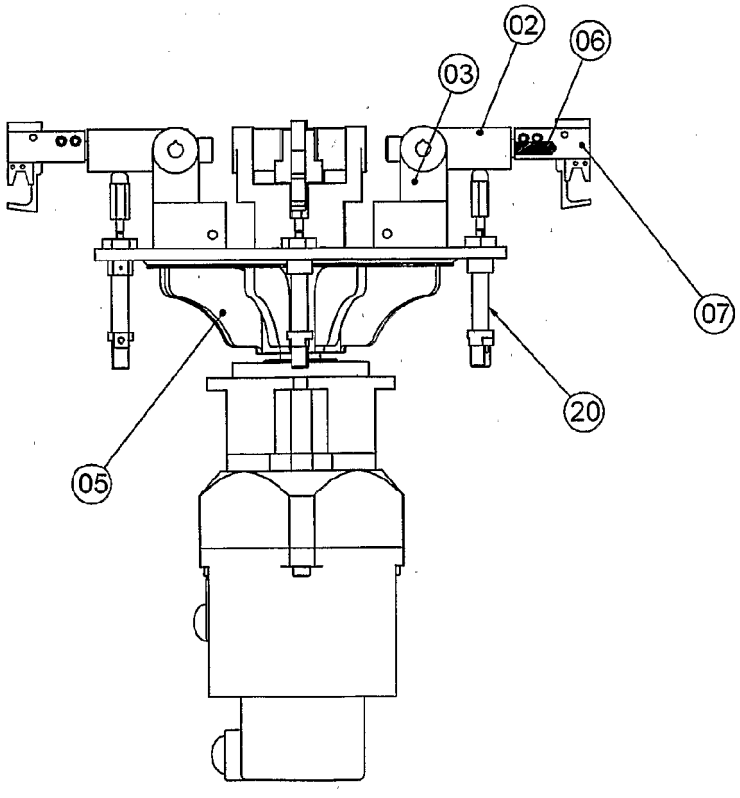

FIG - 09

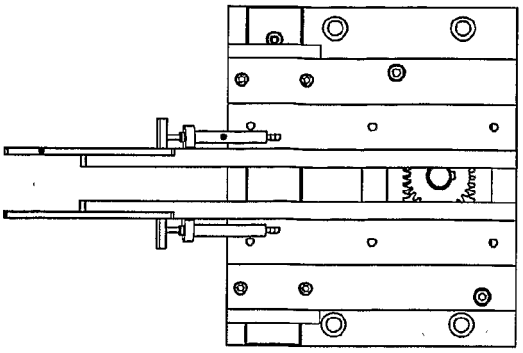

FIG - 12

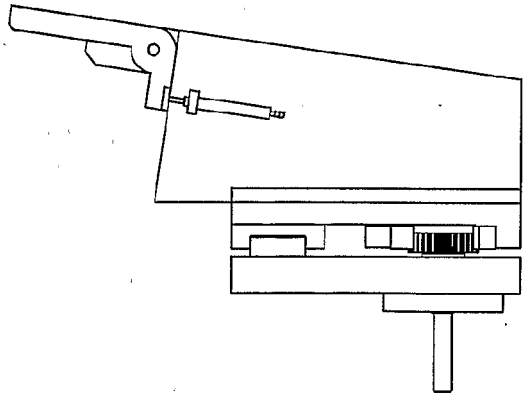

FIG - 11

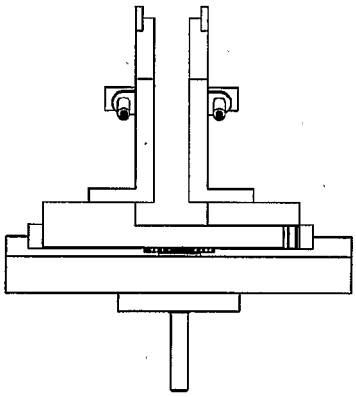

FIG - 13

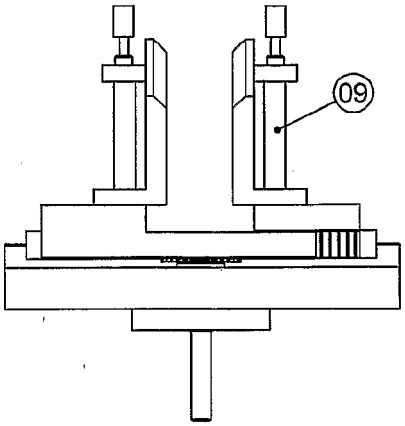

FIG - 14

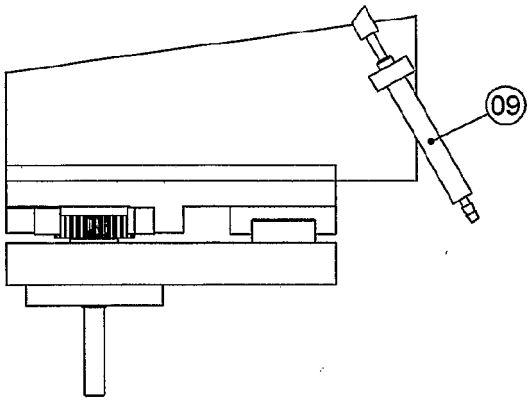

FIG - 16

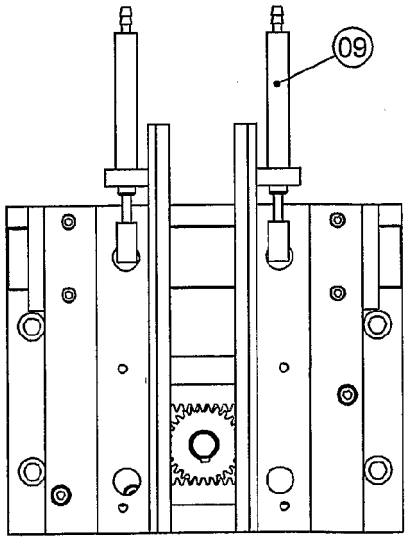

FIG - 15

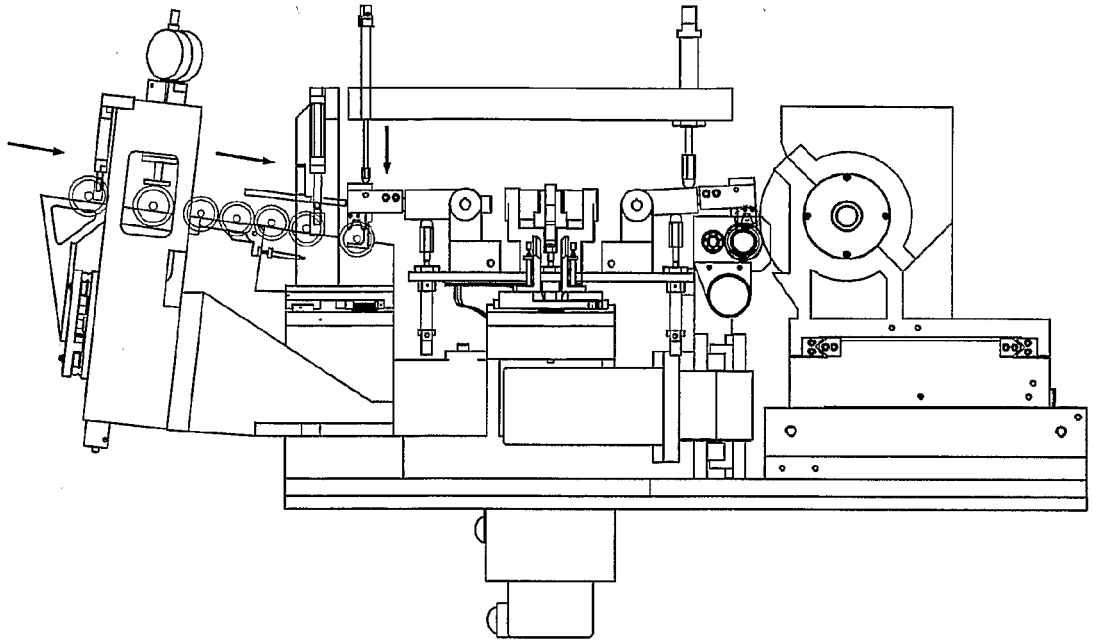

FIG - 17

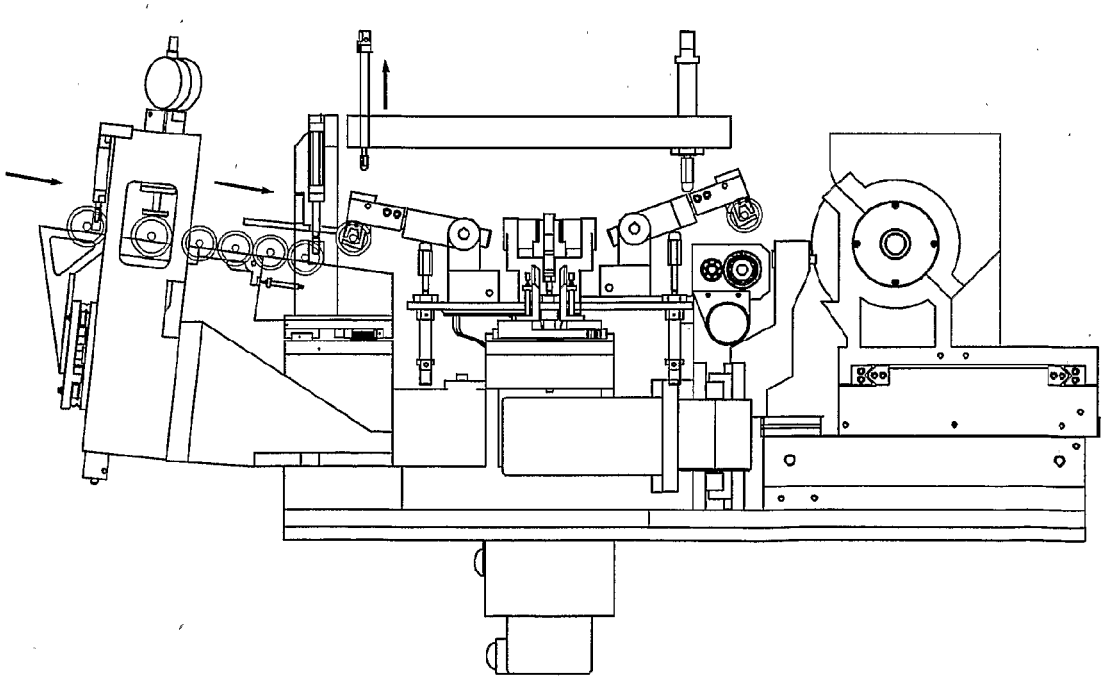

FIG - 18

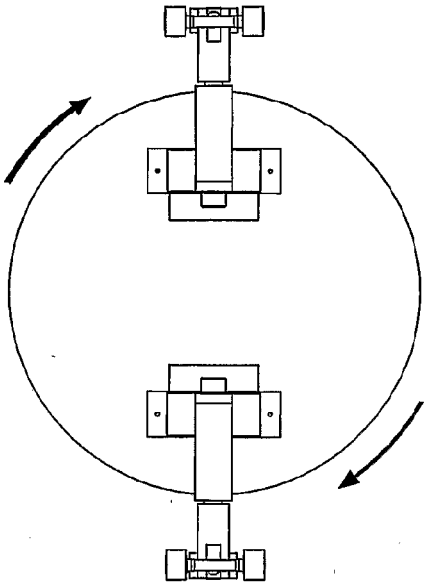

FIG - 19

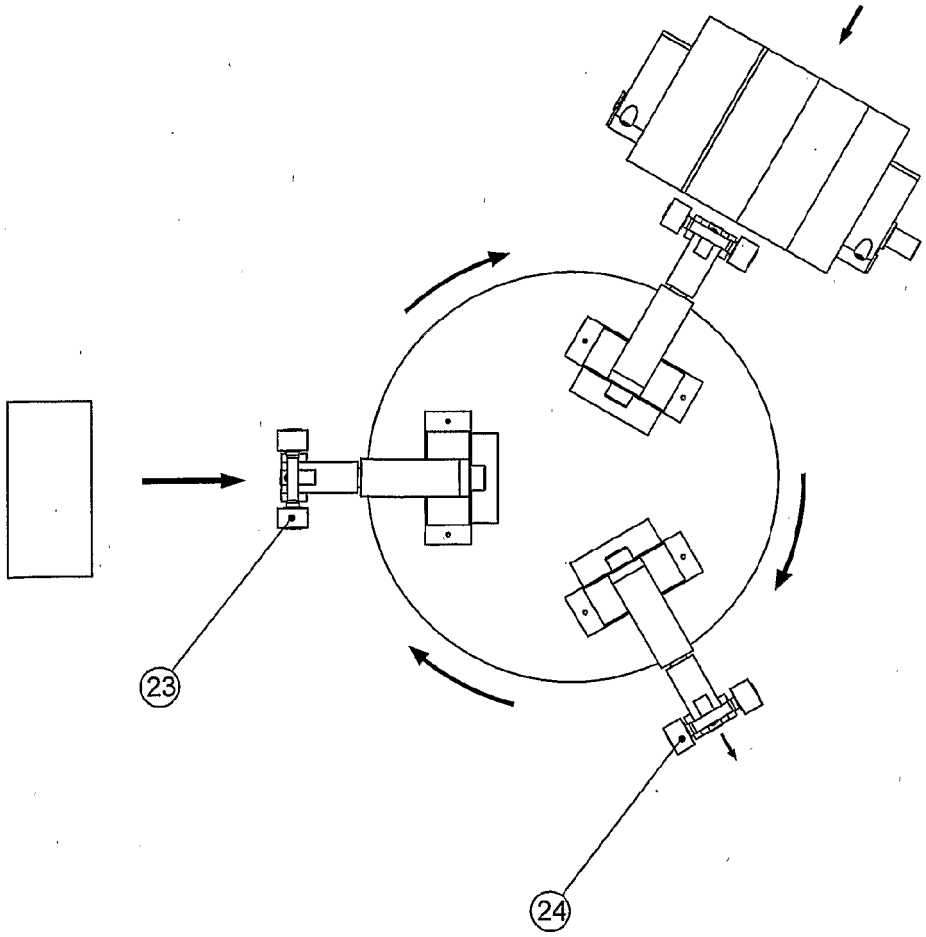

FIG - 20

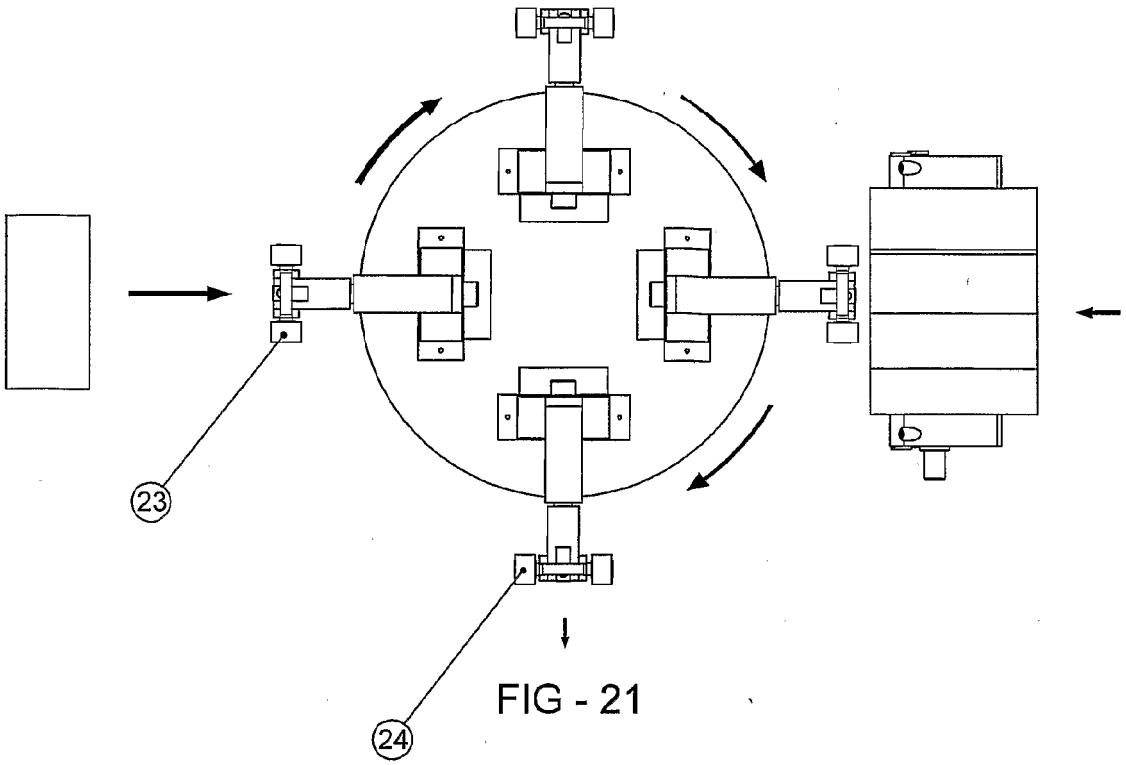

FIG - 21

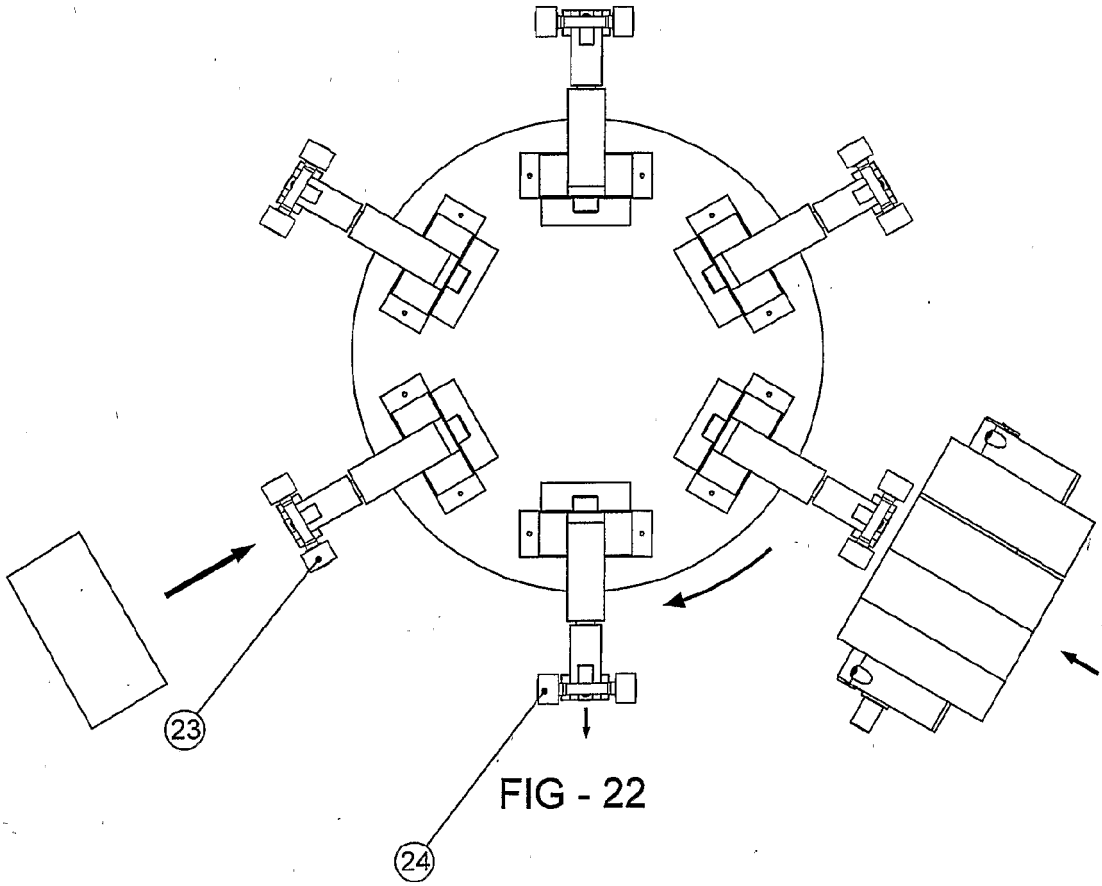

FIG - 22

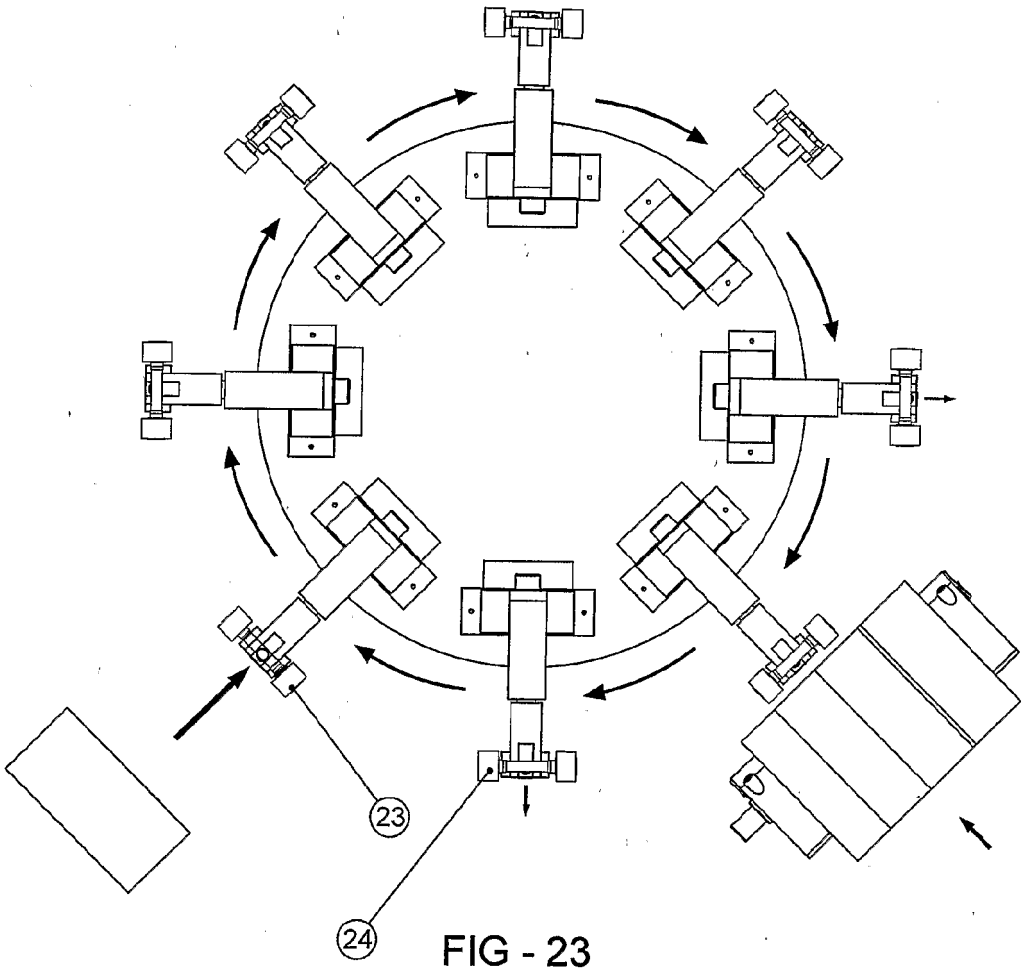

FIG - 23

REFERENCES CITED IN THE DESCRIPTION

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- WO 2004020147 A **[0010]**