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(54) **AN IMPROVED LOADING SYSTEM FOR RUBBER COT ARBOURS IN A RUBBER COT GRINDING OR BUFFING MACHINE**

VERBESSERTES LADESYSTEM FÜR GUMMIBANDDORNE IN EINER GUMMIBEZUGMAHL-
ODER -AUFRAUMASCHINE

SYSTÈME DE CHARGEMENT AMÉLIORÉ POUR ARBRES À REVÊTEMENT DE CAOUTCHOUC
DANS UNE MACHINE DE MEULAGE OU DE POLISSAGE DE REVÊTEMENT DE CAOUTCHOUC

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Description**Field of Invention**

[0001] The Present invention relates to an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine. In particular, it relates to improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that precisely conveys rubber cot arbours; requires low maintenance and eliminates the requirement of manually handling the arrangement of arbours into the magazine with the help of skilled manpower; in turn eliminating human dependency.

Background of the invention

[0002] Rubber cot arbours are widely used for cotton/synthetic yarn spinning mills in textile industry. Rubber cot arbour mainly comprises a steel spindle or a middle axle provided with one or two rubber cots used as top rollers in Ring Frame, Speed Frame, Draw Frame, Combers, etc. Regular grinding of the rubber cot arbours is required for ensuring quality yarns by reducing thread breaks and minimizing lap formation.

[0003] Storage units / magazine for loading the unfinished rubber cot arbours to the rubber cot arbour grinding machine/ buffing machine are known. The conventional storage magazines have trolleys with plurality of trays in which the rubber cot arbours need to be manually placed one by one. This placement of the rubber cot arbour into the tray has to be precise as misalignment leads to damage to the rubber cot arbour as well as the rubber cot arbour grinding machine. The rubber cot arbours need to be arranged one by one systematically in the trays provided in the trolley for holding the rubber cots; this also requires precision and skilled labour to do so that it has a human dependency and human dependency in the process of loading the rubber cot arbour makes it time consuming,

Rubber cot arbour storage magazine has low capacity and, hence requires frequent loading and unloading of arbours, needing frequent attention of the operator and taking more time. The capacity of the loading/unloading storage unit/magazine is not adequate thereby needing frequent loading of unfinished rubber cot arbours as well as frequent unloading of finished rubber cot arbours, thereby needing more man power for handling the rubber cot arbour grinding machine. The conventional machines continue to work even there is no arbour on the loading magazine, thus consumes more power.

[0004] Moreover, each rubber cot arbour needs to be properly cleaned before it is arranged in the tray holding the rubber cot arbours; this cleaning is done manually. If not cleaned carefully the rubber cot arbours are prone to damage due to mishandling by the labour, it can further lead to choking of the machine as the rubber cot arbours arranged in the holding tray is not cleaned properly. thus, cleaning of the rubber cot arbours requires highly skilled labour; which is difficult to get in a developing country. All these drawbacks effect the efficiency of the machine, making the efficiency low. Manual handling leads to increase in production cost. Thus, the machine is not economically viable.

Prior Arts and Its Disadvantages

[0005] Indian patent number 255942 (application No. 1681/MUM/2006) which belongs to inventor of present application discloses a storage magazine for loading unloading rubber cot arbour comprising a pair of identical rubber cot arbour storage units adopted to the provided side by side, on one side of the automatic rubber cot grinding/buffing machine, each of the said rubber cot arbour loading/unloading unit/magazine consisting of a plurality of trays being kept inclined and arranged vertically in a spaced apart manner in a pair of columns, mounted on a pair of frames keeping the two trays of a pair at the same level with an adjustable central gap, as desired, forming a straight track for the rubber cot arbours. An unfinished rubber cot arbour storage unit/magazine (2) for safely storing a large number of unfinished rubber cot arbours (3) while occupying minimum floor space; a finished rubber cot arbour storage unit/magazine (4) for safely storing a large number of finished rubber cot arbours (5) while occupying minimum floor space, provided parallelly and adjacent to the unfinished rubber cot arbours loading magazine (2) an unfinished rubber cot arbour conveyor system (6) for conveying the unfinished rubber cot arbours (3) from loading magazine (2) to a measuring unit (7) one by one quickly, without consuming much time or wasting any time; a loading/unloading carriage (8) for loading the unfinished rubber cot arbour. The conveyor (6) is operated by a prime mover; wherein the prime mover is an electric motor or a hydraulic pneumatic system.

[0006] This conveyor has a chain sprocket mechanism for driving movement. This machine is a completely mechanically controlled machine. The machine trolley and the rubber cot arbour need to be arranged manually in the storage magazine for loading unloading rubber cot arbour. Moreover, the unfinished rubber cot arbours have cotton trapped in the rubber cots and the middle axle. This cotton pieces needs to be removed with due care and precision by a skilled labour before placing it in the storage magazine for loading unloading rubber cot arbour.

[0007] However, the storage magazine for loading unloading rubber cot arbour has mainly capacity of storing 400

rubber cot arbours. Whereas the automatic rubber cot grinding, or buffing machine has capacity of buffing 600 arbours per hour. Thus, the machine is underutilized due to poor storage capacity. One has to wait till completion of initial loading and unloading activity before starting next batch of arbours for loading into magazine for further processing which leads to wastage of time. As the storage magazine for loading unloading rubber cot arbour is mechanically operated and does not have a controller, the machine continues to work even there is no arbour on the loading magazine, thus consumes more power. The chain sprocket mechanism of the conveyor needs to be lubricated time to time. If there is no frequent proper lubrication the chain wears out faster than belts and ropes. The chain sprocket mechanism is prone to slippage from the sprocket, which can cause breakdown in the machine. Thus, requires high maintenance. The cleaning of the rubber cot arbour requires human dependency. The rubber cot arbours need to be arranged systematically on the trays such that the rubber cot arbours get carried by the frames on the conveyor. Manual handling demands for skilled operator/labourer and makes it human dependent process. This increase the processing time of the rubber cot arbours. The efficiency of the machine is decreased. Human dependency leads to increase in production cost and the overall cost of the machine.

[0008] Indian Patent Application number 2433/MUM/2015 which belongs to inventor of present application discloses an automotive rubber cot grinding and/or buffing machine having a fixed magazine at each loading and unloading point, the storage and handling assembly comprising: a movable trolley for storing and handling of the rubber cot arbours to be loaded in or unloaded from the fixed magazines, the movable trolley comprises: a plurality of trays for holding the rubber cot arbours, each of the trays comprises a track for permitting movement of the rubber cot arbours, the set of two trays, being fixed adjacent to each other, holds rubber cot arbours and enables movement of the rubber cot arbours over the tracks of the set of trays; a pair of tray holding units, each of the tray holding unit comprises two vertically installed elongated frames facing each other and connected through a connecting link, the vertically installed elongated frames being configured to move horizontally through a pair of linear guides, the plurality of trays are fixed to the vertically installed elongated frames in either downwardly tilted position or upwardly tilted position based on the loading and unloading operation;

A lifter unit being attached to fixed magazines at loading and unloading points of the rubber cot grinding and/or buffing machine, the lifter unit comprises: a resting unit to accommodate the movable trolley, a jack assembly for making up and down movement of the movable trolley, a control unit to control the movement of jack assembly, an operating knob to enable movement of the jack assembly on the instruction of the control unit, a plurality of locking and locating rods being provided on the resting unit and configured to accommodate inside the fixing grooves of base plate of moving trolley. The lifter unit lifts the rubber cot arbour from the holding tray of the movable trolley and places the unfinished rubber cot arbours to a dispatch height of the grinding and/or buffing machine; where further it goes in various processing stages in the grinding and/or buffing machine to get finished rubber cot arbours. There is no pause in between the lifting and placing movement.

[0009] Control units are provided to control each part with due precision in the magazines at loading and unloading points of the rubber cot grinding and/or buffing machine. The rubber cot arbours needs to be arranged one by one systematically in the in the trays provided in the trolley for holding the rubber cots; these rubber cots are unfinished, and they may contain cotton trapped in the rubber cot and and the middle axle of the rubber cot arbour; this cotton needs to be cleaned before arranging the rubber cot arbours in the tray as it requires high precision and clean arbours to load.

[0010] However, the robotic control for the storage and handling assembly for rubber cot arbours is a complex construction and requires high precision in operating this assembly. Thus, it requires highly skilled labour for handling the machine; The machine requires high maintenance regularly to avoid any breakdowns. Moreover, each rubber cot arbour needs to be properly cleaned before it is arranged in the tray holding the rubber cot arbours; this cleaning is done manually. If not cleaned carefully the rubber cot arbours are prone to damage due to mishandling by the labour, it can further lead to choking of the machine as the rubber cot arbours arranged in the holding tray is not cleaned properly. thus, cleaning of the rubber cot arbours requires highly skilled labour; which is difficult to get in a developing country. Moreover, if a person skilled in art wants to place mechanical cleaning, it is not possible as there is no pause in between the movement of the lifter. The rubber cot arbours needs to be arranged one by one systematically in the in the trays provided in the trolley for holding the rubber cots; this also requires precision and skilled labour to do so and the process of loading manually is time consuming. This effect the efficiency of the machine. Manual handling leads to increase in production cost. Thus, the machine is not economically viable.

[0011] Document WO2008/044240 discloses a loading system for rubber cot arbours, said system comprising a conveying assembly, a guiding assembly, a cleaning unit, a driving unit and a control unit.

[0012] However, this device presents a problem related to the delivery of rubber cradle arbors, whose efficiency is limited because of the centered and guided transport structure provided for it..

Disadvantages of the Prior Art:

[0013]

1. Most of the prior arts fail to provide an efficient loading system for rubber cot arbours in a rubber cot grinding / buffing machine.
2. None of the prior art provide inbuilt cleaning of the rubber cot arbours.

- Most of the prior art cleaning cannot be attached in the machine as the process is continuous and there is no pause provided in between to enable to clean the rubber cot arbour in the machine.
- Most of the prior art require manual cleaning of the rubber cot arbours before being placed in the tray.
- Manual cleaning of the rubber cot arbours requires skilled labour, that is human dependency is more.
- Human dependency in cleaning of arbours requires more time to clean and place the arbours.
- Human dependency decreases the speed of cleaning the arbours which in turn effects the production efficiency of the rubber cot arbour grinding or buffing machine.
- This also lowers the accuracy of cleaning which in turn damage to the rubber cot arbours and the rubber cot arbour grinding machine.
- Human dependency incurs more labour cost, in turn increase the production cost of the machine.

3. Some of the prior arts require are mechanically operated, the drawbacks of mechanical operation is listed as below:

- The rubber cot arbours are arranged manually into the tray of the storage magazine one by one systematically, this increases the human dependency.
- Human dependency for placing the rubber cot arbours one by one consumes lot of time, which decreases the grinding efficiency of the rubber cot arbour grinding machine.
- The storage magazine of the rubber cot arbour grinding machine has limited space for storage for the rubber cot arbours, which does not match with the finishing capacity of the rubber cot grinding / buffing machine, this leads to underutilization of the rubber cot grinding machine.
- the rubber cot arbour grinding machine remains idle until the completion the initial unloading/ loading of the storage magazine machine, which effects that is it decreases the efficiency of the storage magazine and also the rubber cot grinding machine.
- It has a mechanical conveying system that uses a chain and sprocket mechanism. The chain sprocket mechanism of the conveyor needs to be lubricated time to time. If there is no frequent proper lubrication the chain wears out faster.
- The chain sprocket mechanism is prone to slippage from the sprocket, which can cause breakdown in the machine. Thus, requires high maintenance.
- Some of the prior art consumes more power, as it is mechanically operated as it continues to work when there is no rubber cot arbour into the tray of the loading magazine.

4. Some of the prior art have robotic control for the storage assembly which is complex and sophisticated in construction, this it requires proper care and high precision in operating the assembly.

- the rubber cot arbours are arranged manually into the tray of the storage magazine one by one systematically, this increases the human dependency
- The human dependency to place the rubber cot arbours one by one consumes lot of time.
- Human dependency decreases the grinding efficiency of the rubber cot arbour grinding machine.
- Human dependency increases the production cost of the machine.
- The rubber cot arbours are picked by a robotic arm from the storage magazine which needs proper and precise placement of the rubber cot arbours.
- If the parts are not handled with due care and precision high precision prone to machine breakdowns, due to blockage in the magazine and machine
- The storage magazine requires high maintenance due to sophisticated parts.
- the production cost is higher die to use of sophisticated parts.
- This increases the overall cost of the machine.

[0014] Thus, there is an unmet need to develop loading system for rubber cot arbour grinding / buffing machine conveys the rubber cot arbours appropriately, requires low maintenance and eliminates the requirement of human dependency in handling of the rubber cot arbours precisely while loading them into the machine.

Objects of the Present Invention:

[0015] The main object of the present invention is to provide an improved loading system for rubber cot arbours in a

rubber cot grinding or buffing machine that conveys the rubber cot arbours appropriately, requires low maintenance and eliminates the requirement of human dependency in handling of the rubber cot arbours precisely while loading them into the machine.

[0016] Yet another object of the present invention is to provide an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that eliminates the need of cleaning the rubber cot arbours manually.

[0017] Yet another object of the present invention is to provide an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that eliminates the need of arranging the rubber cot arbours manually.

[0018] Yet another object of the present invention is to provide an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that eliminates the need of hiring skilled labour.

[0019] Another object of the present invention is to provide an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that solves the problem of storage space and matches the requirement of the rubber cot arbour grinding machine.

[0020] Yet another object of the present invention is to provide an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that saves processing time of the rubber cot arbours.

[0021] Yet another object of the present invention is to provide an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that saves labour cost.

[0022] Yet another object of the present invention is to provide an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that eliminates the need of chain sprocket drive.

[0023] Yet another object of the present invention is to provide an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that is breakdown resistant.

[0024] Yet another object of the present invention is to provide an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that is rugged and requires less precision and care in handling.

[0025] Yet another object of the present invention is to provide an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that eliminates the problem of blockage inside the machine.

[0026] Yet another object of the present invention is to provide an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that eliminates the requirement of sophisticated parts in the storage magazine assembly.

[0027] Yet another object of the present invention is to provide an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that requires low maintenance.

[0028] Yet another object of the present invention is to provide an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that has low production cost.

Brief description of Drawings

Fig. 1	:	Shows the 3D perspective top view of the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine
Fig. 2	:	Shows the sectional view of the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine
Fig. 3	:	Shows the exploded view showing all parts of the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine
Fig. 4	:	Shows the 3D perspective view of an embodiment of the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine with two conveyor assemblies
Fig. 5	:	Shows top view of another embodiment of the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine
Fig. 6	:	Shows the side view of another embodiment of the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine

Detailed Description of the invention

[0029] In order to provide foregoing objects, the present invention provides an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine. In particular, it provides improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine that precisely conveys rubber cot arbours; requires low maintenance and eliminates the requirement of manually handling the arrangement of arbours into the magazine with the help of skilled manpower; in turn eliminating human dependency.

Meaning of reference numerals of component parts of Present invention:**[0030]**

- 5 1 : An improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine
 100 : Conveying Assembly
 200 : Guiding Assembly
 300 : Cleaning Unit
 400 : Driving Unit
 10 500 : Controller
 101 : Storage Conveyor
 102 : Guiding conveyor
 103 : Feeding conveyor
 104 : Spiral conveyor
 15 105 : Bottom Conveyor
 201 : First Feeder
 202 : Second Feeder, also referred as feeders together
 203 : Guide
 204 : Stopper
 20 205 : Centering device
 206 : Delivery Unit
 301 : Brush
 302 : Air suction
 401 : Prime mover
 25 402 : Crank
 403 : Rod
 500 : Controller

[0031] Referring to **fig. 1 to 3**, the improved loading system for rubber cot arbour (1) comprises of:

- 30 • Conveying Assembly (100),
 • Guiding Assembly (200),
 • Cleaning Unit (300),
 • Driving Unit (400),
 35 • Controller (500).

[0032] Wherein,

Said conveying assembly (100) is connected to the guiding assembly (200); wherein the conveying assembly conveys the rubber cot arbour to the guiding assembly (200). Said cleaning unit (300) is provided at the end of the guiding assembly (200); wherein the guiding assembly (200) guides the rubber cot arbours up to the cleaning unit (300). The driving unit (400) is connected to the conveying assembly (100) and the guiding assembly (200) as shown in **Fig. 2**; wherein the driving unit drives the conveying assembly (200) and the guiding assembly (200). The controller (500) controls the driving unit (400); wherein the controller (500) is timer based or sensor based.

[0033] Said controller (500) is connected to the prime mover (401), the centering device (205) and the cleaning unit (300). All the movements of the loading system for rubber cot arbours in a rubber cot grinding or buffing machine is controlled by the controller (500). The controller (500) is timer based, sensor based, or it works on both timer and sensor.

[0034] The conveying Assembly (100) comprises of:

- 50 • Storage Conveyor (101),
 • Guiding conveyor (102),
 • Feeding conveyor (103).

[0035] Wherein, the storage conveyor (101) is connected to the guiding conveyor (102); the guiding conveyor is in turn connected to the feeding conveyor (103) as shown in fig. 1; wherein the conveying assembly (100) provides a path for the rubber cot arbours to move forward. The guiding conveyor (102) is a straight-line conveyor or a spiral conveyor as shown in **fig. 5 and 6**. The guiding conveyor (102) also may be selected from belt conveyor, chain conveyor, roller conveyor or alike. Storage conveyor (101) is the first conveyor, on which said rubber cot arbours are emptied. The dumping / emptying the baskets of the rubber cots on to the storage conveyor (101) eliminates the need of arranging

the rubber cot arbour one by one systematically, eliminates the need of highly skilled labour. The task of dumping the rubber cot arbour can be done by any ordinary unskilled labour. It solves the issue of storage space by providing the conveying assembly (100). Said conveying assembly (100) is connected to the Guiding assembly (200); wherein;

[0036] The guiding assembly (200) comprises of:

- First Feeder (201),
- Second Feeder (202), also referred as feeders (201,202) together
- Guide (203),
- Stopper (204),
- Centering device (205)
- Delivery unit (206)

[0037] Said First Feeder (201) and second feeder (202) are placed at the end of the conveyor assembly (100) to receive the rubber cot arbours from the conveyor assembly (100) as shown in **fig. 2**; wherein the feeders (201, 202) move up and down linearly, the movement is driven by the driving unit (400). The upper surface of said first feeder (201) and second feeder (202) is at an angle to hold the rubber cot arbour properly. The height of the feeder (201, 202) is variable and thus the number of feeders (201,202) can be varied accordingly. The conveying assembly (100) and the guiding assembly requires very low maintenance. The feeders (201, 202) guides the rubber cot arbour upwards to the delivery unit (206).

[0038] Said Guides (203) are connected at the sides of the feeders (201, 202); wherein said guides (203) provide support to the rubber cot arbour and avoid falling mishandling of the rubber cot arbour from the feeder (201, 202).

[0039] Said centering device (205) and the delivery unit (206) is provided at a dispatch height where the second feeder (202) places the rubber cot arbours;

Said delivery unit (206) receives and holds the rubber cot arbour. Once the delivery unit (206) receives the rubber cot arbour the controller actuates the centering device (205); wherein the centering device (205) is actuated from both the sides of the delivery unit as shown in the exploded view in fig. 3. Said centering device (205) holds the rubber cot arbour from the side and adjusts the rubber cot arbour precisely in the center. Also, the centering device (205) centers varied size of rubber cot arbours. Therefore avoiding any misalignment which improves the overall performing efficiency of the machine (1).

[0040] Said stopper (204) is connected at the dispatch height in between the second feeder (202) and the delivery unit (206); wherein the stopper (204) is slidable, to allow only one cot at a time to pass through, to the delivery unit (206).

[0041] Said cleaning unit (300) is connected above the delivery unit (206); Wherein, the cleaning unit (300) comprises of:

- Brush (301)
- Air suction (302)

[0042] Said brush (301) and air suction (302) is connected parallelly above the centering device; wherein the brush (301) descends once the centering device (205) centers the rubber cot arbour, to clean the rubber cot arbour and the air suction (302) provided at the side of the brush (301) cleans up the rubber cot arbour by suction force. The cleaning unit (300) cleans up the rubber cot arbour before giving it to the rubber cot grinding or buffing machine for further finishing and grinding. Once the rubber cot arbour is cleaned the controller actuates the delivery unit (206); wherein the delivery unit (206) releases the rubber cot arbour forward for further processing. Thus, the cleaning unit (300) eliminates the requirement of human dependency to clean the rubber cot arbours. It also eliminates the need of highly skilled labour to perform the cleaning of rubber cot arbour. Thus, eliminates labour cost. Also improves the efficiency of the storage magazine as the cleaning is done by the cleaning unit (300) which is faster than human efforts. Moreover, it eliminates the problem of choking of the loading system due to unclean arbours being arranged into the system; thereby making the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine (1) breakdown resistant. Thus, the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine (1) requires very low maintenance.

[0043] The driving unit (400) comprises of:

- Prime mover (401)
- Crank (402)
- Rod (403)

[0044] Wherein, said prime mover (401) is connected to a rod (403) and the rod (403) is in turn connected to a crank (402). the driving unit (400) drives the conveyor assembly (100) and the guiding assembly (200). The Driving unit (400) is connected to the controller (500); The prime mover (401) is a motor, hydraulic or pneumatic cylinder.

[0045] The dumping / emptying the baskets of the rubber cots on to the storage conveyor (101) eliminates the need of arranging the rubber cot arbour one by one systematically, eliminates the need of highly skilled labour. The task of dumping the rubber cot arbour can be done by any ordinary unskilled labour. It solves the issue of storage space by providing the conveying assembly (100). the cleaning unit (300) eliminates the requirement of human dependency to clean the rubber cot arbours. Thus, eliminates labour cost. Also improves the efficiency of the storage magazine as the cleaning is done by the cleaning unit (300) which is faster than human efforts. Moreover, it eliminates the problem of choking of the loading system due to unclean arbours being arranged into the system; thereby making the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine (1) breakdown resistant. Thus, the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine (1) requires very low maintenance. Due to the improved constructional features the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine (1) is significantly efficient. the cost of the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine (1) is significantly lesser than the alternative due to the aforementioned improved features.

[0046] Alternatively, in another embodiment of the present invention the position of the rubber cot arbour is detected by a sensing means; wherein the sensing means is an infrared sensor, PIR sensor, ultrasonic sensor, image processing sensor, RGB sensor, weighing gauge, piezoelectric sensor or alike. Said sensing means is connected with the controller (500) as the input to the controller (500), the sensing means is in turn connected to the conveying assembly (100), guiding assembly (200), centering device (205). The sensing means detects the rubber cot arbour on the conveying assembly (100) and provides the information to the controller (500). On receiving the input from the sensing means, the controller actuates to turn on the driving unit (400) which starts the conveying assembly (100).

[0047] In another embodiment, referring to **Fig. 4**, plurality of conveying assemblies (100) can be connected to a guiding assembly (200), which works parallelly simultaneously or can work one after another. This decreases the frequency at which the loading system rubber cot arbours in a rubber cot grinding or buffing machine, is reloaded with unfinished rubber cot arbours.

[0048] Having described what is considered the best form presently contemplated for embodying the present invention, various alterations, modifications, and/or alternative applications of the invention for any system will be promptly apparent to those skilled in the art. Therefore, it is to be understood that the present invention is not limited to the practical aspects of the actual preferred embodiments hereby described and that any such modifications and variations must be considered as being within the spirit and the scope of the invention, as described in the above description.

Working of the invention

[0049] In the present invention, referring to **Fig. 1 to Fig. 3**, the controller controls the movements in the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine (1). Here the controller works on timer basis. When the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine (1) is turned on, the controller (500) signals driving unit (400) to drive the conveyor assembly (100).

[0050] The rubber cot arbours are loaded on the storage conveyor (101) by emptying a basket or are dumped on the storage conveyor (101); Said storage conveyor (101) conveys the rubber cot arbour to the guiding conveyor (102) and the guiding conveyor (102) conveys the rubber cot arbour to the feeding conveyor (103); said feeding conveyor (103) conveys the rubber cot arbour to the guiding assembly (200); thereby conveying assembly (100) conveys the rubber cot arbours forward to the guiding assembly (200).

[0051] Once the rubber cot arbour reaches the guiding assembly (200), said first feeder (201) and second feeder (202) slide up to guide the rubber cot arbour upwards to the dispatch height; this up and down movement is done by the driving unit (400) and the movement is controlled by the controller (500). As the rubber cot arbours move up, the stopper (204) slides up to stop the rubber cot arbour, and lets only one rubber cot arbour to pass at a time, to the delivery unit (206); thereby ensuring proper queuing of the rubber cot arbour and avoiding mismanagement of the rubber cot arbours by allowing only one rubber cot arbour at a time.

[0052] Said controller (500) then actuates the centering device (205); wherein the centering device (205) holds the rubber cot arbour properly at the center point of the centering device (205). While the rubber cot arbour is held by the delivery unit (206), the cleaning unit (300) is turned on by the controller (500). The brushes (301) descends as soon as the cleaning unit is turned on. The brushes rotate and move to clean the rubber cot arbour. the dust and the waste get collected by the air suction (302). Then the controller (500) signals the centering device (205); wherein the centering device (205) releases the rubber cot arbour. After cleaning the rubber cot arbour, it is passed on forward, where further it goes in various processing stages in the grinding and/or buffing machine to get finished rubber cot arbours.

[0053] Alternatively, in another embodiment, referring to **Fig. 1 to Fig. 3**, the sensing means is connected to the conveying assembly (100), guiding assembly (200), centering device (205) and the delivery unit (206). Once the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine (1) is turned ON, the controller (500) sends a signal to the sensing means to continuously detect the position of the rubber cot arbour. When the sensing

means detects rubber cot arbours on the storage conveyor (101), the controller (500) actuates the driving unit (400) to drive the conveyor assembly (100); wherein the conveying assembly conveys the rubber cot arbours forward to the guiding assembly (200).

[0054] The sensing means on the guiding assembly detects the rubber cot arbours that are conveyed by the conveying assembly (100) and provides an input to the controller (500); thereby the controller (500) signals the driving unit to slide the guiding assembly (200) up. The guiding assembly (200) guides the rubber cot arbours to a dispatch height. At the dispatch height the rubber cot arbour is passed to the delivery unit (206). The sensing means detects the rubber cot arbour on the delivery unit (206) and provides input to the controller (500); wherein the controller actuates the stopper (204) to stop the rubber the entry of the rubber cot arbour into the delivery unit (206). The stopper (204) slides up to stop the rubber cot arbour, and lets only one rubber cot arbour to pass at a time, to the delivery unit (206); thereby ensuring proper queuing of the rubber cot arbour and avoiding mismanagement of the rubber cot arbours by allowing only one rubber cot arbour at a time.

[0055] On receiving of the rubber cot arbour in the delivery unit (206), Said controller (500) actuates the centering device (205); wherein on receiving a rubber cot arbour, the centering device (205) holds the rubber cot arbour properly at the center point of the centering device (205). While the rubber cot arbour is held by the centering device (205), the cleaning unit (300) is turned on by the controller (500). The brushes (301) descends as soon as the cleaning unit is turned on. The brushes rotate and move to clean the rubber cot arbour. the dust and the waste get collected by the air suction (302). Then the controller (500) signals the centering device (205); wherein the centering device (205) releases the rubber cot arbour. After cleaning the rubber cot arbour, the controller (500) actuates the delivery unit (206) to pass on the rubber cot arbour forward, where further it goes in various processing stages in the grinding and/or buffing machine to get finished rubber cot arbours.

[0056] As the delivery unit (206) releases the rubber cot arbour, the sensing means provides an input to the controller (500); wherein the controller deactivates the stopper (204); thereby sliding down the stopper (204) and allowing the rubber cot arbour to pass into the centering device (205).

[0057] In another embodiment, referring to **Fig. 4**, plurality of conveying assemblies (100) can be connected to a guiding assembly (200), which works parallelly simultaneously or can work one after another; wherein the parallel working or one after another working is set in the controller (500) before the improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine (1) is turned ON. Thereby the plurality of conveying assemblies (100) decreases the frequency at which the loading system rubber cot arbours in a rubber cot grinding or buffing machine, is reloaded with unfinished rubber cot arbours.

Advantages of the invention:

[0058]

- The present invention provides an improved loading system for rubber cot arbours in a rubber cot grinding or buffing machine which eliminates human dependency for handling the rubber cot arbours precisely.
- The present invention has an inbuilt cleaning device in the system which eliminates the need of cleaning the rubber cot arbours manually.
- The present invention provides an improved loading system in which rubber cot arbours can be directly emptied on the storage conveyor thus eliminating the need of arranging the rubber cot arbours manually
- The present invention the task of emptying the container containing the rubber cot arbours can be done by an ordinary unskilled labour eliminates the need of hiring skilled labour.
- The present invention solves the problem of storage space by providing conveyors for guiding the rubber cot arbours forward and matches the requirement of the rubber cot arbour grinding machine.
- The present invention an improved loading system for rubber cot arbours in a rubber cot arbour grinding / buffing machine that has improved processing time as human dependency is eliminated.
- The present invention an improved loading system for rubber cot arbours in a rubber cot arbour grinding / buffing machine that eliminates human dependency thus saves labour cost.
- The present invention eliminates the need of chain sprocket drive, as the whole magazine is replaced by the present loading system.

- The present invention provides inbuilt cleaning of the rubber cot arbours thus is breakdown resistant.
- The present invention has an improved efficiency due to the improved features.
- 5 • The present invention eliminates the problem of blockage inside the rubber cot grinding machine by providing inbuilt cleaning device.
- The present invention eliminates the requirement of high precision handling as the sophisticated parts are replaced by simple parts such as conveyors and guides.
- 10 • The present invention requires low maintenance as eliminates the requirement of sophisticated parts.
- The present invention has low production cost due to the above improved features.

Claims

1. A system for loading rubber cot arbours in a rubber cot grinding or buffing machine (1), which comprises:

- a conveying assembly (100),
- a guiding assembly (200),
- a cleaning unit (300),
- a driving unit (400),
- a controller (500);

wherein, said conveying assembly (100) is connected to the guiding assembly (200); said guiding assembly (200) is in turn connected to the cleaning unit (300); the conveying assembly (100) and the guiding assembly (200) are connected to the driving unit (400); wherein the driving unit is adapted to drive the conveying assembly (200) and the guiding assembly (200);

wherein said controller (500) is adapted to control the driving unit (400);

the conveying assembly (100) comprising:

- a storage conveyor (101);
- a guiding conveyor (102);
- a feeding conveyor (103);

wherein the storage conveyor (101) is connected to the guiding conveyor (102); the guiding conveyor is in turn connected to the feeding conveyor (103); wherein, the storage conveyor (101) is the first conveyor, on which said rubber cot arbours are to be emptied;

said conveying assembly (100) being connected to the guiding assembly (200);

wherein; the guiding assembly (200) comprises:

- a first feeder (201); • a second feeder (202),
- a guide (203);
- a stopper (204);
- a centering device (205);
- a delivery unit (206);

wherein said first Feeder (201) and second feeder (202) are connected at the end of the conveyor assembly (100); wherein said feeders (201, 202) are provided to receive the rubber cot arbours from the conveyor assembly (100); said feeders (201, 202) being connected to and driven by the driving unit (400) wherein the upper surface of said first feeder (201) and second feeder (202) is at an angle to hold the rubber cot arbour;

50 said guides (203) are fixed at the sides of the feeders (201, 202); wherein said guides (203) can provide support to the rubber cot arbours and can avoid falling mishandling of the rubber cot arbours from the feeder (201, 202);

55 said centering device (205) and the delivery unit (206) are situated in an area where the second feeder (202) places the rubber cot arbours;

said delivery unit (206) being adapted to receive and hold the rubber cot arbours; wherein the centering device (205) can be actuated from the sides of the delivery unit (206); wherein said centering device (205) is adapted to hold the rubber cot arbours from the side and to adjust the rubber cot arbours in the center;

said stopper (204) is situated at the dispatch height in between the second feeder (202) and the delivery unit (206); wherein the stopper (204) is slidable, to allow only one cot at a time to pass through, to the delivery unit (206); said cleaning unit (300) is connected above the delivery unit (206);
said cleaning unit (300) is connected above the centering device (6); wherein the cleaning unit (300) comprises:

- a brush (301);
- an air suction (302);

wherein said brush (301) and air suction (302) are connected parallelly above the centering device; wherein the brush (301) is adapted to descend to clean the rubber cot arbours and the air suction (302) provided at the side of the brush (301) can clean up the rubber cot arbours by suction force;
the driving unit (400) comprises:

- a prime mover (401);
- a crank (402);
- a rod (403);

wherein said prime mover (401) is connected to the rod (403) and the rod (403) is in turn connected to the crank (402); the driving unit (400) being adapted to drive the conveyor assembly (100) and the guiding assembly (200); wherein said driving unit (400) is connected to the controller (500); the controller (500) is connected to the prime mover (401), the centering device (205) and the cleaning unit (300); wherein all the movements of the loading system for rubber cot arbours in a rubber cot grinding or buffing machine (1) are controlled by the controller (500).

2. A loading system as claimed in claim 1, wherein there are plurality of conveying assemblies (100) connected to a guiding assembly (200).
3. A loading system as claimed in claim 1 and 2, wherein the guiding conveyor (102) in the conveying assembly is selected from straight-line conveyor and spiral conveyor.
4. A loading system as claimed in claim 1 to 3, wherein the height of the feeder (201, 202) is variable, and thereby the number of feeders (201,202) is varied accordingly.
5. A loading system as claimed in claim 1 to 4, wherein the controller (500) includes a timer.
6. A loading system as claimed in claim 1 to 4, wherein the controller (500) includes a sensing means,
7. A loading system as claimed in claim 1 to 4, wherein the controller (500) includes both timer and sensing means.
8. A loading system as claimed in claim 1 to 5, wherein the prime mover (401) is selected from a motor, hydraulic and a pneumatic cylinder.

Patentansprüche

1. System zum Laden von Gummibezugsdornen in eine Gummibezugschleif- oder -poliermaschine (1), das Folgendes umfasst:

- eine Förderbaugruppe (100),
- eine Führungsbaugruppe (200),
- eine Reinigungseinheit (300),
- eine Antriebseinheit (400),
- eine Steuerung (500);

wobei

die Förderbaugruppe (100) mit der Führungsbaugruppe (200) verbunden ist; die Führungsbaugruppe (200) wiederum mit der Reinigungseinheit (300) verbunden ist; die Förderbaugruppe (100) und die Führungsbaugruppe (200) mit der Antriebseinheit (400) verbunden sind; wobei die Antriebseinheit dazu geeignet ist, die

Förderbaugruppe (200) und die Führungsbaugruppe (200) anzutreiben; wobei die Steuerung (500) dazu geeignet ist, die Antriebseinheit (400) zu steuern; wobei die Förderbaugruppe (100) Folgendes umfasst:

- einen Speicherförderer (101);
- einen Führungsförderer (102);
- einen Zuführförderer (103);

wobei der Speicherförderer (101) mit dem Führungsförderer (102) verbunden ist; der Führungsförderer wiederum mit dem Zuführförderer (103) verbunden ist; wobei der Speicherförderer (101) der erste Förderer ist, auf dem die Gummibezugsdorne zu entleeren sind; wobei die Förderbaugruppe (100) mit der Führungsbaugruppe (200) verbunden ist; wobei die Führungsbaugruppe (200) Folgendes umfasst:

- einen ersten Zuführer (201);
- einen zweiten Zuführer (202),
- eine Führung (203);
- einen Anschlag (204);
- eine Zentriervorrichtung (205);
- eine Liefereinheit (206);

wobei der erste Zuführer (201) und der zweite Zuführer (202) am Ende der Förderbaugruppe (100) verbunden sind; wobei die Zuführer (201, 202) zum Aufnehmen der Gummibezugsdorne von der Förderbaugruppe (100) bereitgestellt werden; wobei die Zuführer (201, 202) mit der Antriebseinheit (400) verbunden sind und von dieser angetrieben werden, wobei die obere Oberfläche des ersten Zuführers (201) und des zweiten Zuführers (202) in einem Winkel angeordnet ist, um den Gummibezugsdorn zu halten; wobei die Führungen (203) an den Seiten der Zuführer (201, 202) fixiert sind; wobei die Führungen (203) Halt für die Gummibezugsdorne bereitstellen und ein Herunterfallen oder eine falsche Handhabung der Gummibezugsdorne von den Zuführern (201, 202) verhindern können; wobei die Zentriervorrichtung (205) und die Liefereinheit (206) sich in einem Bereich befinden, in dem der zweite Zuführer (202) die Gummibezugsdorne platziert; wobei die Liefereinheit (206) dazu geeignet ist, die Gummibezugsdorne aufzunehmen und zu halten; wobei die Zentriervorrichtung (205) von den Seiten der Liefereinheit (206) aus betätigt werden kann; wobei die Zentriervorrichtung (205) dazu geeignet ist, die Gummibezugsdorne von der Seite her zu halten und die Gummibezugsdorne in der Mitte einzustellen; wobei der Anschlag (204) auf der Ausgabehöhe zwischen dem zweiten Zuführer (202) und der Liefereinheit (206) liegt; wobei der Anschlag (204) verschiebbar ist, um lediglich jeweils einen Bezug zur Liefereinheit (206) durchzulassen; wobei die Reinigungseinheit (300) oberhalb der Liefereinheit (206) verbunden ist; wobei die Reinigungseinheit (300) oberhalb der Zentriervorrichtung (6) verbunden ist; wobei die Reinigungseinheit (300) Folgendes umfasst:

- eine Bürste (301);
- eine Luftabsaugung (302);

wobei die Bürste (301) und die Luftabsaugung (302) parallel über der Zentriervorrichtung verbunden sind; wobei die Bürste (301) dazu geeignet ist, sich abzusenken, um die Gummibezugsdorne zu reinigen, und die Luftabsaugung (302), die an der Seite der Bürste (301) bereitgestellt wird, die Gummibezugsdorne durch Saugkraft reinigen kann; wobei die Antriebseinheit (400) Folgendes umfasst:

- eine Zugmaschine (401);
- eine Kurbel (402);
- einen Stab (403);

wobei die Zugmaschine (401) mit dem Stab (403) verbunden ist und der Stab (403) wiederum mit der Kurbel (402) verbunden ist; wobei die Antriebseinheit (400) dazu geeignet ist, die Förderbaugruppe (100) und die Führungsbaugruppe (200) anzutreiben; wobei die Antriebseinheit (400) mit der Steuerung (500) verbunden ist; wobei die Steuerung (500) mit der Zugmaschine (401), der Zentriervorrichtung (205) und der Reinigungseinheit (300) verbunden ist; wobei alle

Bewegungen des Ladesystems für Gummibezugsdorne in einer Gummibezugschleif- oder -poliermaschine (1) durch die Steuerung (500) gesteuert werden.

- 5 2. Ladesystem nach Anspruch 1, wobei eine Vielzahl von Förderbaugruppen (100) mit einer Führungsbaugruppe (200) verbunden ist.
3. Ladesystem nach Anspruch 1 und 2, wobei der Führungsförderer (102) in der Förderbaugruppe aus einem geradlinigen Förderer und einem Spiralförderer ausgewählt ist.
- 10 4. Ladesystem nach Anspruch 1 bis 3, wobei die Höhe des Zuführers (201, 202) variabel ist und dadurch die Anzahl der Zuführer (201, 202) dementsprechend variiert.
5. Ladesystem nach Anspruch 1 bis 4, wobei die Steuerung (500) einen Zeitgeber einschließt.
- 15 6. Ladesystem nach Anspruch 1 bis 4, wobei die Steuerung (500) ein Erfassungsmittel einschließt.
7. Ladesystem nach Anspruch 1 bis 4, wobei die Steuerung (500) sowohl einen Zeitgeber als auch ein Erfassungsmittel einschließt.
- 20 8. Ladesystem nach Anspruch 1 bis 5, wobei die Zugmaschine (401) aus einem Motor, einem Hydraulik- und einem Pneumatikzylinder ausgewählt wird.

Revendications

- 25 1. Système de chargement d'arbres à manchon de caoutchouc dans une machine de meulage ou de polissage de manchon de caoutchouc (1), qui comprend :
 - 30 • un ensemble de convoyage (100),
 - un ensemble de guidage (200),
 - une unité de nettoyage (300),
 - une unité d'entraînement (400),
 - un organe de commande (500) ;
- 35 dans lequel,

ledit ensemble de convoyage (100) est relié à l'ensemble de guidage (200) ; ledit ensemble de guidage (200) est à son tour relié à l'unité de nettoyage (300) ; l'ensemble de convoyage (100) et l'ensemble de guidage (200) sont reliés à l'unité d'entraînement (400) ; dans lequel l'unité d'entraînement est conçue pour entraîner l'ensemble de convoyage (200) et l'ensemble de guidage (200) ; dans lequel ledit organe de commande (500) est conçu pour commander l'unité d'entraînement (400) ; l'ensemble de convoyage (100) comprenant :

 - 45 • un convoyeur de stockage (101) ;
 - un convoyeur de guidage (102) ;
 - un convoyeur d'alimentation (103) ;

dans lequel le convoyeur de stockage (101) est relié au convoyeur de guidage (102) ; le convoyeur de guidage est à son tour relié au convoyeur d'alimentation (103) ; dans lequel, le convoyeur de stockage (101) est le premier convoyeur, sur lequel lesdits arbres à manchon de caoutchouc sont destinés à être vidés ; ledit ensemble de convoyage (100) étant relié à l'ensemble de guidage (200) ; dans lequel ; l'ensemble de guidage (200) comprenant :

 - 55 • un premier organe d'alimentation (201)
 - un second organe d'alimentation (202),
 - un guide (203) ;
 - une butée (204) ;
 - un dispositif de centrage (205) ;

- une unité de distribution (206) ;

dans lequel ledit premier organe d'alimentation (201) et ledit second organe d'alimentation (202) sont reliés au niveau de l'extrémité de l'ensemble convoyeur (100) ; dans lequel lesdits organes d'alimentation (201, 202) sont prévus pour recevoir les arbres à manchon de caoutchouc provenant de l'ensemble convoyeur (100); lesdits organes d'alimentation (201, 202) étant reliés à et entraînés par l'unité d'entraînement (400) dans lequel la surface supérieure dudit premier organe d'alimentation (201) et dudit second organe d'alimentation (202) est à un angle pour maintenir l'arbre à manchon de caoutchouc ;

lesdits guides (203) sont fixés au niveau des côtés des organes d'alimentation (201, 202) ; dans lequel lesdits guides (203) peuvent fournir un support aux arbres à manchon de caoutchouc et peuvent éviter une mauvaise manipulation des arbres à manchon de caoutchouc provenant du organe d'alimentation (201, 202) ;

ledit dispositif de centrage (205) et l'unité de distribution (206) sont situés dans une zone où le second organe d'alimentation (202) place les arbres à manchon de caoutchouc ;

ladite unité de distribution (206) étant conçue pour recevoir et maintenir les arbres à manchon de caoutchouc ; dans lequel le dispositif de centrage (205) peut être actionné depuis les côtés de l'unité de distribution (206) ; dans lequel ledit dispositif de centrage (205) est conçu pour maintenir les arbres à manchon de caoutchouc depuis le côté et pour ajuster les arbres à manchon de caoutchouc au centre ;

ladite butée (204) est située au niveau de la hauteur d'expédition entre le second organe d'alimentation (202) et l'unité de distribution (206) ; dans lequel la butée (204) est coulissante, pour ne laisser passer qu'un seul manchon à la fois, à l'unité de distribution (206) ; ladite unité de nettoyage (300) est reliée au-dessus de l'unité de distribution (206) ;

ladite unité de nettoyage (300) est reliée au-dessus du dispositif de centrage (6) ; dans lequel l'unité de nettoyage (300) comprend :

- une brosse (301) ;
- une aspiration d'air (302) ;

dans lequel ladite brosse (301) et l'aspiration d'air (302) sont reliées parallèlement au-dessus du dispositif de centrage ; dans lequel la brosse (301) est conçue pour descendre pour nettoyer les arbres à manchon de caoutchouc et l'aspiration d'air (302) prévue au niveau du côté de la brosse (301) peut nettoyer les arbres à manchon de caoutchouc par force d'aspiration ;

l'unité d'entraînement (400) comprend :

- un moteur principal (401) ;
- un vilebrequin (402) ;
- une tige (403) ;

dans lequel, ledit moteur principal (401) est relié à la tige (403) et la tige (403) est à son tour reliée au vilebrequin (402) ; l'unité d'entraînement (400) étant conçue pour entraîner l'ensemble convoyeur (100) et l'ensemble de guidage (200) ;

dans lequel ladite unité d'entraînement (400) est reliée au organe de commande (500) ; le organe de commande (500) est relié au moteur principal (401), au dispositif de centrage (205) et à l'unité de nettoyage (300) ; dans lequel tous les mouvements du système de chargement pour arbres à manchon de caoutchouc dans une machine de meulage ou de polissage de manchon de caoutchouc (1) sont commandés par le organe de commande (500).

2. Système de chargement selon la revendication 1, dans lequel il y a une pluralité d'ensembles de convoyage (100) reliés à un ensemble de guidage (200).

3. Système de chargement selon les revendications 1 et 2, dans lequel le convoyeur de guidage (102) dans l'ensemble de convoyage est choisi parmi un convoyeur en ligne droite et un convoyeur en spirale.

4. Système de chargement selon les revendications 1 à 3, dans lequel la hauteur du organe d'alimentation (201, 202) est variable, et ainsi le nombre d'organes d'alimentation (201, 202) varie en conséquence.

5. Système de chargement selon les revendications 1 à 4, dans lequel le organe de commande (500) comporte un temporisateur.

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6. Système de chargement selon les revendications 1 à 4, dans lequel le organe de commande (500) comporte un moyen de détection.
7. Système de chargement selon les revendications 1 à 4, dans lequel le organe de commande (500) comporte à la fois un temporisateur et un moyen de détection.
8. Système de chargement selon les revendications 1 à 5, dans lequel le moteur principal (401) est choisi parmi un moteur, un vérin hydraulique et un vérin pneumatique.

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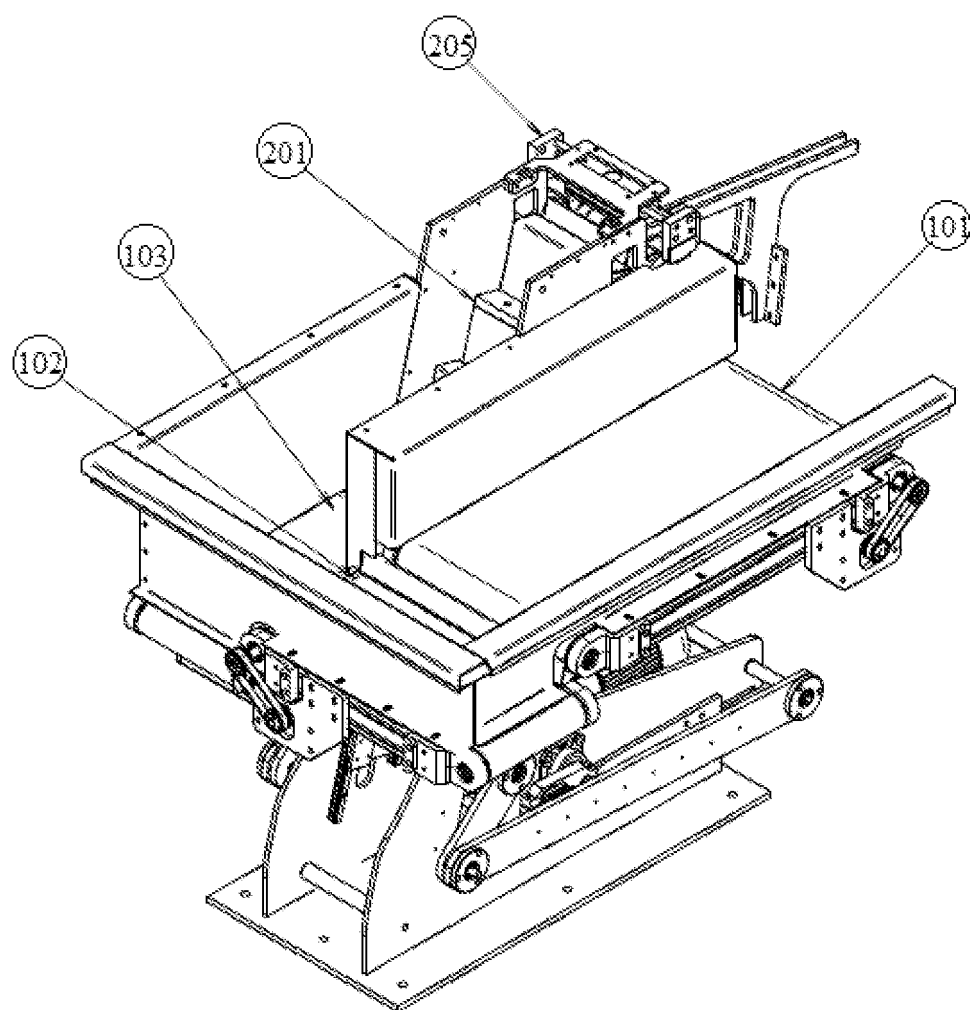


FIG. 1

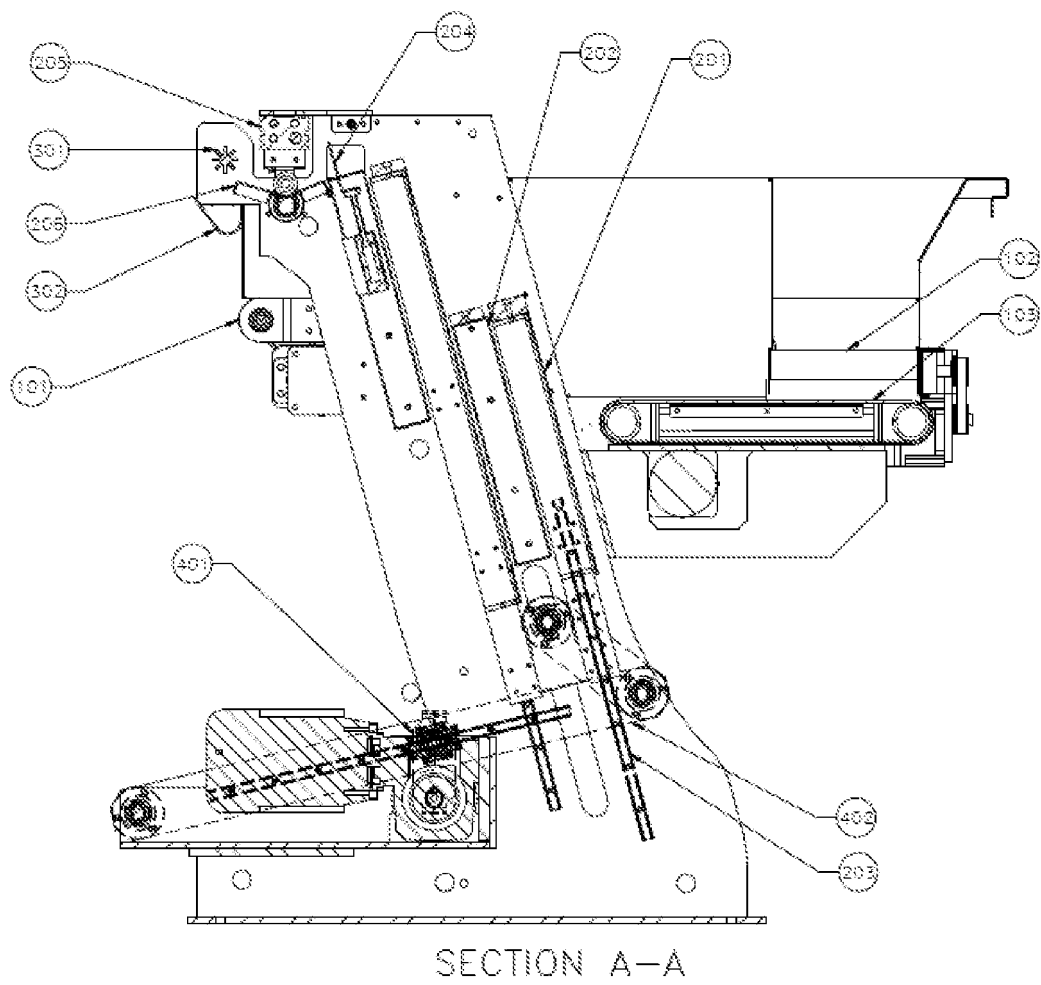


FIG. 2

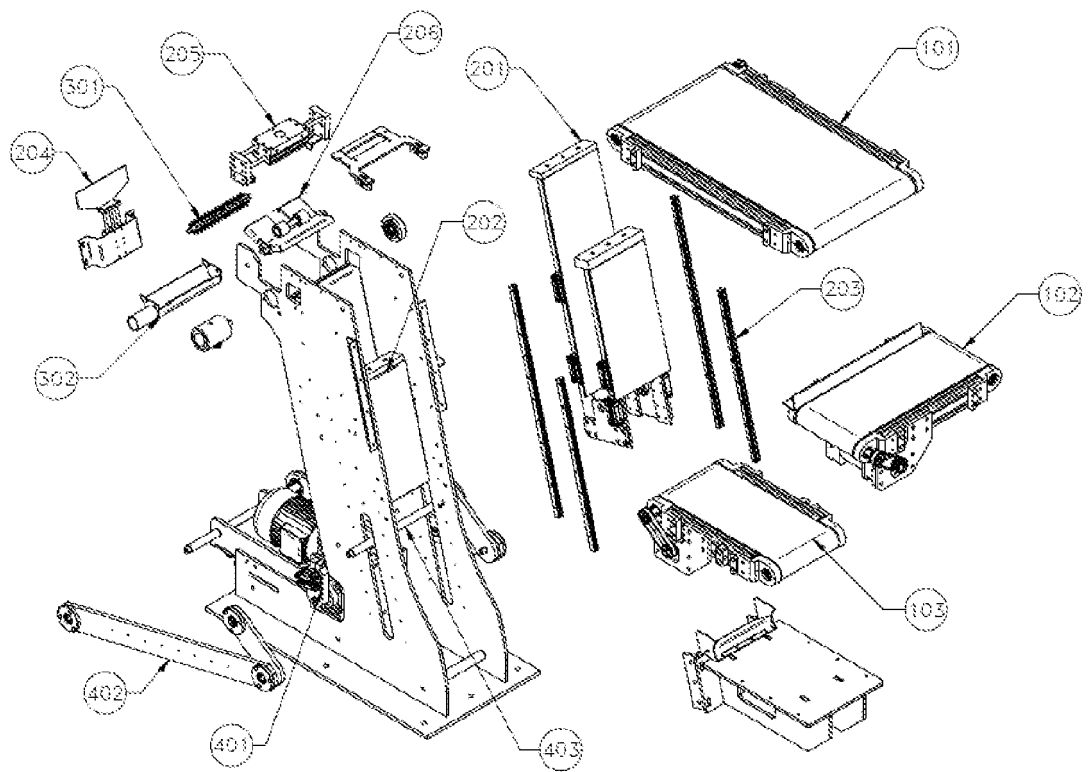


FIG. 3

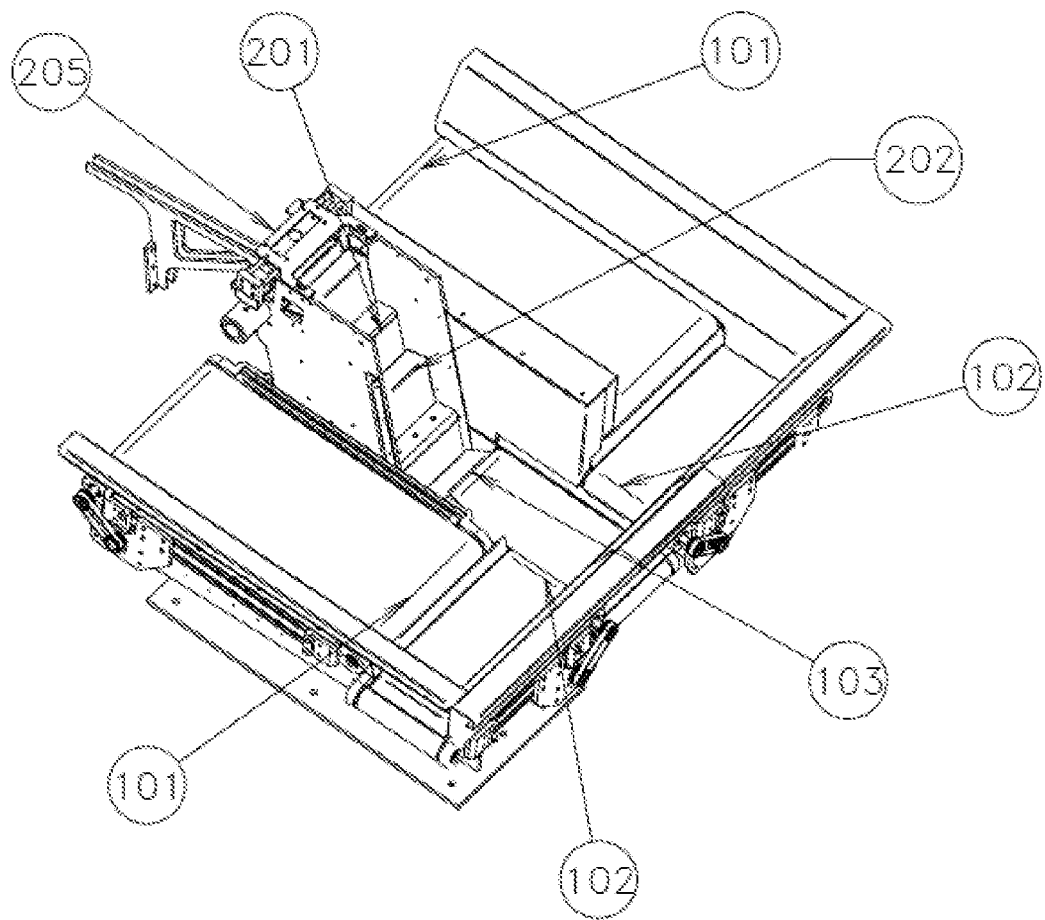


FIG. 4

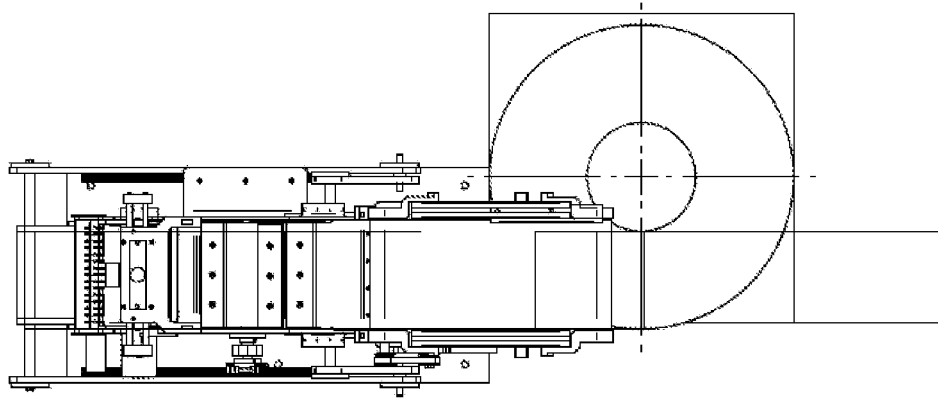


FIG. 5

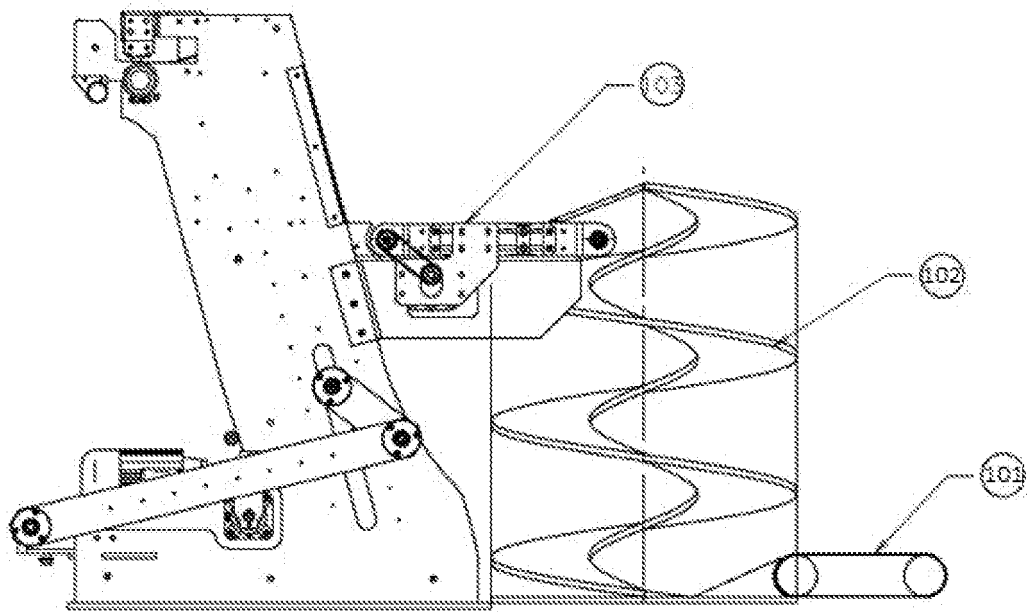


FIG. 6

REFERENCES CITED IN THE DESCRIPTION

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