A mold opening/closing and tire vulcanizing station
Eine Station zum Öffnen und Schliessen der Metallformen und zum Vulkanisieren von Reifen
Station d’ouverture/fermeture d’une forme et de vulcanisation de pneus

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Description

TECHNICAL FIELD

[0001] The present invention relates to a mold opening/closing and tire vulcanizing station.

BACKGROUND ART

[0002] Generally, a tire vulcanizing press is mounted with a tire mold suitable for a tire to be manufactured. For this tire mold, the interior of the mold must be cleaned regularly to maintain the quality of tire. Also, in order to change the size of tire to be manufactured or the tire surface pattern, the mold must be changed during the production. Further, the mold contaminated during production is sometimes removed to be cleaned, and installed again to be used after cleaning.

[0003] When the tire mold is changed, a procedure is used in which the fastening of an upper half mold of the mold to an upper pressurizing/heating plate on the press side and the fastening of a lower half mold of the mold to a lower pressurizing/heating plate on the press side are released, the mold is taken out to the outside by using a forklift, an overhead traveling crane, etc., and a new mold is installed by the reversing procedure to start the production.

[0004] In the mold change operation, it is ideal that the used mold is removed and changed to a new mold immediately after a final tire has been vulcanized in the mold to be changed so that the production can be started immediately by using the new mold. Actually, however, the arrival of a new tire to be installed is delayed, or the posting of an assistant operator is delayed, resulting in a time loss. Also, the mold is in a cool state, or even if the mold has been preheated, the press is often located far from the mold storage space. Moreover, the mold has not been heated enough to start the production immediately. As a result, the preheating operation in the press is needed after the mold change, leading to a decrease in the productivity.

[0005] For the above-described reasons, in order to avoid the decrease in productivity, the frequency of mold change for the tire vulcanizing press is decreased to the utmost, that is, some quantities of tires must inevitably be produced continuously. However, such a continuous production cannot meet the need for decreasing the volume of inventories of products to the utmost in the recent situation in which the types of tire have increased.

[0006] From this point of view, the applicant has proposed a tire vulcanizing system disclosed in Japanese Patent Provisional Publication No. 8-164528 (No. 164528/1996). However, this system also has the following problem: Although tires can be produced efficiently if the vulcanization time at all vulcanizing stations is uniform, it is considerably difficult to make the vulcanization time uniform at present, so that the vulcanization time must be determined for each tire.

[0007] Therefore, the present tire vulcanizing system is desired to have the following features:

(1) Even if the frequency of mold change is increased, the productivity of the vulcanizing system is not decreased.

(2) When the mold is changed and a new mold is installed to a vulcanizing machine, the mold has been heated enough to a temperature level at which the mold can be used.

(3) At least the mold changing operation in each vulcanizing machine and the attaching/detaching operation of a supply pipe for a heating/pressurizing medium can be performed in an unattended manner.

(4) The production can be made in a different vulcanization time for each mold (for each tire).

(5) The supply equipment for a green tire well matches the mold changing equipment.

[0008] A mold mounting apparatus and a mold conveying system for a tire vulcanizing machine have been disclosed in Japanese Patent Provisional Publication No. 6-71651 (No. 71651/1994) and Japanese Patent Provisional Publication No. 6-99437 (No. 99437/1994), but these are not satisfactory for the following reasons:

(1) The mold being transported is not provided with a heating plate, so that the temperature decreases during transportation.

(2) Work (performed by hands of the operator) for installing a mold at the position of each vulcanizing machine, and for opening the mold once to install a bladder assembly in the mold is needed. Further, the decrease in mold temperature during this work is inevitable.

(3) A supply pipe for a heating medium to a heating chamber at the outer peripheral portion of the mold must be attached and detached manually by the operator.

(4) Because it is necessary to heat the tire mold in a state in which upper and lower heating plates of a mold preheating machine and the tire mold are brought into close contact with each other, a mold pressurizing apparatus is needed at the position of the mold preheating machine, which makes the mold mounting apparatus disadvantageous economically.

[0009] EP0712705 in the name of the applicant, being the base of the preamble of claim 1, herefor discloses a Tire Mold Transporter which shuttles between a vulcanizing stations, in which plural pairs of tire molds are arranged for performing vulcanization, and a mold opening/closing station 2 in which the tire mold is opened and the vulcanized tire taken therefrom, and subsequently an unvulcanised tire is deposited therein before the mold is again closed. Although this document is primarily concerned with the manner in which the molds are transport-
ed between the vulcanizing stations and the mold opening/closing station, the mold opening/closing station is briefly described as including a base unit consisting of a pair of mold opening/closing, units joined together in back to back arrangement. Each unit comprises an elevation cylinder which are mounted in arms extending in cantilever manner from a central pillar of the unit, and it is by means of these elevation cylinders that connection to and disconnection from the mold assemblies which are repeatedly disposed on the base frame of said unit is achieved.

DISCLOSURE OF THE INVENTION

[0010] The present invention has been made in view of the above situation, and accordingly as object thereof is to provide a tire vulcanizing system and a mold opening/closing and vulcanizing station therefor, in which tires can be produced efficiently without the decrease in the rate of operation of the mold opening/closing and vulcanizing station even if the frequency of mold change increases.

[0011] To solve the problems with the above-described prior art, the present invention provides a tire mold opening/closing and tire vulcanizing station comprising a base frame capable of receiving at least one pair of tire mold assemblies, at least one pillar for elevation and guidance erected on said base frame, tire mold assemblies being capable of being disposed on said base frame to the right and left sides of said pillar an upper movable beam which can freely be moved vertically relative to the pillar which provides guidance for said beam, said upper movable beam being provided with connecting/disconnecting means on the right and left sides thereof for connecting and disconnecting said upper movable beam to and from said at least one pair of tire mold assemblies disposed on the right and left sides of said pillar characterized in that the upper movable beam is moved vertically at the right and left sides of pillar at the same time whereas the connecting/disconnecting means provided thereon are capable of being individually operated on the right and left sides of said pillar.

[0012] It is preferable that the upper movable beam is caused to move vertically relative to the pillar by means of an elevating cylinder.

[0013] It is further preferable that the elevating cylinder is disposed in the pillar.

[0014] It is further preferable that positioning means are provided on said base frame at the right and left sides of the pillar.

[0015] It is further preferable that bladder operating/driving means are provided in the base frame at the right and left sides of the pillar, to which a bladder assembly provided in the tire mold assemblies may be disconnect-ed and connected.

[0016] It is further preferable that the base frame is provided with heating/pressurizing medium supply means which may be connected to and disconnected from the tire mold assemblies.

[0017] It is further preferable that the connecting/dis-connecting means provided on the upper movable beam comprise tire mold assembly opening/closing means which may be configured so as to open and close the tire mold assemblies on both sides of said pillar either simultaneously or individually.

[0018] As described above, the a vulcanizing system in accordance with the present invention comprises a mold assembly for vulcanizing a tire, which has a bladder assembly located in the tire to be supplied with a heating/pressurizing medium, a heating chamber at the outer peripheral portion of a tire mold, and upper and lower heating plates of the tire mold, and is configured movably and so as to be capable of overcoming a force to open the mold by means of the pressure in a bladder; a plurality of mold opening/closing and vulcanizing stations each of which receives the tire mold assembly and opens and closes the same, and has a vulcanized tire unloader, a green tire loader, and operating/driving means for a bladder assembly in the tire mold assembly; at least one set of changing/preheating station which performs the change of the tire mold incorporated in the mold assembly and the bladder assembly and the preheating thereof after change; and mold transportation means which reciprocates between the mold opening/closing and vulcanizing station and the changing/preheating station to transport the mold assembly. Therefore, the following effects can be achieved.

(1) There can be provided an efficient vulcanizing station in which the rate of operation of the mold opening/closing and vulcanizing station is not decreased even if the frequency of mold change increases.

(2) The tire mold, heating plate, heating chamber, and bladder assembly are taken out from the mold opening/closing and vulcanizing station in a unit, and these elements can be returned to the mold opening/closing and vulcanizing station in a state in which all operations relating to the mold change have been finished at the dedicated mold changing/preheating station, and can be connected automatically. Therefore, fully automatic operation at the mold opening/closing and vulcanizing station can be performed, whereby the productivity of tires can be increased.

Moreover, in the tire vulcanizing system in accordance with the present invention, green tire supply means or vulcanized tire carry-out means of the mold opening/closing and vulcanizing station can be provided above the travel region of a transportation carriage of the mold transportation means. Therefore, by disposing the green tire supply means above the mold transportation means, the space can be utilized effectively.

[0020] Also, in the tire vulcanizing system in accord-
BRIEF DESCRIPTION OF THE DRAWINGS

[0023] FIG. 1 is a plan view showing the whole of a tire vulcanizing system having mold opening/closing and vulcanizing stations in accordance with embodiments of the present invention;

FIG. 2 is a front view taken in the direction of the arrows along the line A-A of FIG. 1, showing a mold changing/preheating station and mold opening/closing and vulcanizing stations, in which both of first and second embodiments of the mold opening/closing and vulcanizing station are shown:

FIG. 3 is an enlarged front view of a mold opening/closing and vulcanizing station in accordance with the first embodiment shown in FIG. 2;

FIG. 4 is a side view taken in the direction of the arrows along the line B-B of FIG. 1, showing a mold opening/closing and vulcanizing station, in which the light-hand state of FIG. 3 is shown; and

FIG. 5 is an enlarged sectional view of portion D in FIG. 4.

BEST MODE FOR CARRYING OUT THE INVENTION

[0024] The present invention will now be described in detail with reference to embodiments shown in the accompanying drawings. FIG. 1 is a plan view of a tire vulcanizing system having mold opening/closing and vulcanizing stations in accordance with embodiments of the present invention, FIG. 2 is a front view taken in the direction of the arrows along the line A-A of FIG. 1, showing a mold changing/preheating station and mold opening/closing and vulcanizing stations, FIG. 3 is an enlarged view of a mold opening/closing and vulcanizing station in accordance with the first embodiment shown in FIG. 2, FIG. 4 is a side view taken in the direction of the arrows along the line B-B of FIG. 1, showing a mold opening/closing and vulcanizing station, and FIG. 5 is an enlarged sectional view of portion D in FIG. 4.

[0025] As shown in FIG. 1, a tire vulcanizing system in accordance with the present invention has a mold transportation apparatus 100, a mold changing/preheating station 200, mold opening/closing and vulcanizing stations 300, tire carry-out conveyors 400, and a green tire supply apparatus 500.

[0026] The mold transportation apparatus 100 is constituted of a mold transportation carriage 101 on which a mold assembly M is placed and carriage rails 102 on which the mold transportation carriage 101 is run by driving means, not shown. The carriage rails 102 are disposed along the transportation direction of the tire mold assembly M.

[0027] The mold changing/preheating station 200 is constituted of a mold opening/closing apparatus 201, a preheating apparatus 202, a table 203 on which a used mold or a mold to be installed newly is placed temporarily,
and a hoist 204 for re-stacking the mold.

[0028] The mold opening/closing station 300 is constituted of a loader 301 for a green tire, an unloader 302 for a vulcanized tire, a tire冷却 apparatus 303 disposed so as to coincide with the unloading position of the unloader 302, and an unloader 304 for a cooled tire, which is disposed on the cooling apparatus 303. A cooled tire taken out by the unloader 304 is conveyed to an appropriate place by the tire carry-out conveyer 400.

[0029] The green tire supply apparatus 500, which is disposed above the mold transportation apparatus 100, is constituted of a base 501, green tire stands 502 which are disposed on the base 501 to supply a green tire to the loader 301, and an aerial carrier 503 provided over the green tire stand 502. The green tire stand 502 is adapted to reciprocate between a delivery position II for a green tire and a receiving position I for a green tire having been carried by the aerial carrier 503.

[0030] The plurality of mold opening/closing and vulcanizing stations 300, the mold opening/closing apparatus 201, and the preheating apparatus 202 are arranged substantially in parallel at predetermined intervals along the carriage rails 102 of the mold transportation apparatus 100.

[0031] FIG. 2 shows the mold opening/closing apparatus 201 and the preheating apparatus 202 of the mold changing/preheating station 200. The mold opening/closing apparatus 201 is in a state such as to receive a mold assembly M and perform work for separating an upper plate assembly M100 from a tire mold C, and the preheating apparatus 202 is in a state of preheating.

[0032] FIG. 2 also shows the mold opening/closing and vulcanizing stations 300 (300a, 300b) of a first embodiment and mold opening/closing and vulcanizing stations 300A of a second embodiment. The mold opening/closing and vulcanizing station 300 of the first embodiment on the left-hand side is in a state of vulcanization, and that on the right-hand side is in a state in which green tire GT is being supplied. The mold opening/closing and vulcanizing stations 300b of the first embodiment on both sides are in a state of vulcanization.

[0033] On the other hand, all of the mold opening/closing and vulcanizing stations 300A of the second embodiment are in a state of vulcanization.

[0034] As shown in FIG. 3, the mold opening/closing and vulcanizing station 300 comprises a pillar 306 erected at the central portion of a base frame 305 disposed independently, an elevating cylinder 307 disposed in the pillar 306, an upper movable plate (upper movable beam) 310 provided elevatably via guide rollers 309 which slide on guide rails 308 on the pillar 306, a split mold operating device 311 capable of being connected and disconnect- ed, a connecting/disconnecting device 312 for the upper plate assembly M100 of the mold assembly M and the upper movable plate 310, a sliding/guiding device 313 for the mold assembly M, which is disposed at an appropriate place on the base frame 305 so as to be perpen- dicular to the carriage rails 102 of the mold transportation apparatus 100, a mold assembly positioning device 316 consisting of a V block 316a, which freely enters a V block M200b provided at an appropriate place of a lower plate assembly M200 of the mold assembly M by means of a cylinder 316b (see FIG. 5), a bladder operating/driving device 314 for performing the operation of a bladder assembly M300 incorporated in the tire mold assembly M, a heating/pressurizing medium supply device 315 for supplying a heating/pressurizing medium into a heating chamber C1a for the tire mold C of the tire mold assembly M, upper and lower heating plates M100A and M200A, and a bladder BL, the green tire loader 302 which is not shown in the figure but is well known, the well-known vulcanized tire unloader 302, the well-known tire cooling apparatus 303, and the well-known cooled tire unloader 304.

[0035] For the detailed construction of the aforementioned split mold operating device 311, Japanese Patent No. 1853184 or Japanese Patent Publication No. 5-62046 (No. 62046/1993) filed by the applicant of the present invention should be referred to. Also, for the detailed construction of the aforementioned connecting/disconnecting device 312, Japanese Patent Provisional Publication No. 9-29746 (No. 29746/1997) filed by the applicant of the present invention should be referred to. Further, the aforementioned sliding/guiding device 313 is constituted of a roller group disposed so as to hold, between the rollers, a sliding rail M700 provided on the lower surface of the mold assembly M and a support roller group for supporting the load.

[0036] For the detailed construction of the aforementioned bladder operating/driving device 314, Japanese Patent Provisional Publication No. 8-238626 (No. 238626/1996) filed by the applicant of the present invention should be referred to. Also, for the detailed construction of the aforementioned heating/pressurizing medium supply device 315, Japanese Patent Provisional Publication No. 8-238626 (No. 238626/1996) filed by the applicant of the present invention should be referred to.

[0037] The tire mold assembly M comprises the upper plate assembly M100, an upper half mold C1 and a lower half mold C2 of the well-known split mold C, the lower plate assembly M200, the bladder BL, the bladder assembly M300, a bracket M400 fixed to the upper plate assembly M100, a plurality of sets of check valves M500 for the upper heating plate M100A fixed to the bracket M400 and the heating chamber C1a of the upper half mold C1, a pressurizing piston plate M200B provided on the lower plate assembly M200, a check valve M600 for the lower heating plate fixed at an appropriate place of the lower plate assembly M200, and the rails M700 on the lower surface of the lower plate assembly M200 (for the details, refer to Japanese Patent Provisional Publication No. 9-29746 (No. 29746/1997)).

[0038] The upper movable plate 310 at the tire mold opening/closing and vulcanizing station 300 is moved vertically at the right and left sides at the same time. On the other hand, the green tire loader 301, the vulcanized
tire unloader 302, the tire cooling apparatus 303, the cooled tire unloader 304, the split mold operating device 311, the connecting/disconnecting device 312 on the upper movable plate 310, the bladder operating/driving device 314, and the heating/pressurizing medium supply device 315, which are provided at each of the right and left sides, can be operated individually on the right and left sides.

[0039] On the other hand, the mold opening/closing and vulcanizing station 300A of the second embodiment only differs from that of the first embodiment in that the base frame 305 of the mold opening/closing and vulcanizing station 300 is provided continuously, and the plurality of pillars 306 are erected on the base frame 305. According to this configuration, a main pipe for supplying a heating/pressurizing medium, a main pipe for hydraulic equipment, etc. can be provided in the base frame, which offers an advantage that the equipment work in the factory can be made easy.

[0040] The mold opening/closing apparatus 201 and the preheating apparatus 202 of the mold changing/preheating station 200 differ from the mold opening/closing and vulcanizing station 300 in the following respects.

[0041] The mold opening/closing apparatus 201 and the preheating apparatus 202 are not provided with the green tire loader 301, the vulcanized tire unloader 302, the tire cooling apparatus 303, the unloader 304 for the tire cooling apparatus 303, and the bladder operating/driving device 314, and is provided with the upper movable plate 310 on the opening/closing apparatus side only. Further, since the loading and unloading of tire are unnecessary, the travel amount of the upper movable plate 310 is small, so that the height of the pillar 306 is low as shown in FIG. 2.

[0042] For the mold transportation apparatus 100, the transportation carriage 101, and the carriage rail 102, Japanese Patent Provisional Publication No. 8-192429 (No. 192429/1996) filed by the applicant of the present invention should be referred to. (1) Description of the operation of tire vulcanization at the mold opening/closing and vulcanizing station 300 in the following respects.

[0043] Although the mold assembly M is configured so as to be movable, it is at a standstill at each of the mold opening/closing and vulcanizing stations 300 during the tire production.

[0044] The operation will be described with reference to FIG. 3.

(a) When vulcanization is finished in the right-hand tire mold C, the heating/pressurizing medium in the bladder BL is discharged through the bladder operating/driving device 314.

(b) The operation will be described with reference to FIG. 3.

(d) After the mold is fully closed, the connecting plate 312 is not performed.

(c) When the loading of the green tire is finished, the upper half mold C1 having been closed temporarily is opened again by the split mold operating device 311. Subsequently, the upper movable plate 310 lowers, by which the mold is fully closed while the green tire is preformed.

On the other hand, the connecting operation of the left-hand devices 311 and 312 is not performed.

[0045] During this time, the right-hand split mold operating device 311 located on the upper movable plate 310 and the right-hand connecting/disconnecting device 312 operate to connect the upper plate assembly M100 of the mold assembly M to the upper movable plate 310.

(b) The connecting operation of the left-hand devices 311 and 312 is not performed.

[0046] At the same time as the connecting/disconnecting device 312 operating, a tie rod head M200a of the lower plate assembly M200 is disconnected from a connecting plate M100a of the upper plate assembly M100 to make preparation for opening the mold.

(c) When the loading of the green tire is finished, the upper half mold C1 having been closed temporarily is opened again by the split mold operating device 311. Subsequently, the upper movable plate 310 lowers, by which the mold is fully closed while the green tire is preformed.

(d) After the mold is fully closed, the connecting plate M100a is driven by a driving unit (not shown) to be disconnected from the connecting/disconnecting device 312 and at the same time to be connected to the tie rod head M200a of the lower plate assembly M200.

(e) The preparation and loading of a green tire are performed as described below.

[0047] When the upper movable plate 310 is raised, the split mold operating device 311 performs the well-known operation to separate the tire from the tire mold C, and rises to a predetermined height. Then, as shown in FIG. 3, by the well-known operation of the split mold operating device 311, the upper half mold C1 is closed temporarily, and subsequently the vulcanized tire is taken out and a green tire is loaded by the well-known procedure.

[0048] Also, the upper heating plate M100A and the heating chamber C1a are disconnected from the heating/pressurizing medium supply device 315 and the check valve M500 during the time when the mold is located at the upper position. However, the heating medium in the upper heating plate M100A and the heating chamber C1a is in a state of being sealed by the check valve M500, so that the supply of heat is continued.

[0049] Subsequently, a pressurizing medium is supplied to the pressurizing piston plate M200B of the lower plate assembly M200 to pressurize the tire mold with a predetermined force, by which the mold is fastened so as not to be opened by the force of the heating/pressurizing medium in the bladder BL. (e) The pressurizing medium is supplied to the pressurizing piston plate M200B of the lower plate assembly M200 to pressurize the tire mold with a predetermined force, by which the mold is fastened so as not to be opened by the force of the heating/pressurizing medium in the bladder BL. (e) The preparation and loading of a green tire are performed as described below.

[0050] When the vulcanization in the right-hand tire mold is finished, the green tire loader 301 for the right-hand mold rises to an appropriate height while holding an upper bead portion of a green tire GT stored on the green tire stand 502 on the base 501. The loader 301 extends to above the lower half mold C2 of the tire mold assembly M having already been opened, and supplies...
the green tire GT to the portion of the waiting bladder assembly M300.

[0051] The green tire stand 502 from which the green tire GT has been transferred moves from the position II to the position I, and waits at the position I until it receives the next green tire GT supplied by the aerial carrier 503.

[0052] After receiving the next green tire GT, the green tire stand 502 moves again to the position II, where it waits until the green tire loader 301 receives the green tire. Thereafter, the green tire stand 502 repeats the same operation.

(f) When the vulcanization nears completion, the vulcanized tire in the tire cooling apparatus 303 is taken out by the unloader 304, and is discharged onto the tire carry-out conveyor 400, and the tire cooling apparatus 303 makes preparation for receiving the next vulcanized tire.

[0053] On the other hand, the vulcanized tire unloader 302 takes out the tire T, and places it in the tire cooling apparatus 303, where the tire cooling operation is started through the well-known operation.

(2) Description of the operation of tire mold change

[0054]

(a) When the vulcanization of the final tire in the mold to be changed nears completion, the mold transportation carriage 101 moves to receive the mold assembly M, and stops there.

(b) After the final tire is carried out by the unloader 302, the mold assembly M is closed without the loading of a green tire, and the upper movable plate 310 is disconnected from the upper plate assembly M100 of the mold assembly M.

[0055] Moreover, the bladder assembly M300 of the mold assembly M is disconnected from the bladder operating/driving device 314, and also the upper and lower heating plates M100A and M200A of the tire mold assembly M and the check valves M500 and M600 for the heating chamber C1a of the upper half mold C1 are disconnected from the heating/pressurizing medium supply device 315.

(c) At an appropriate point of time, an arm for receiving the tire mold assembly M is extended from the side of the mold transportation carriage 101 and connected to the mold assembly M, and then the arm is operated reversely to deliver the mold assembly M to the side of the mold transportation carriage 101.

[0056] Also, the mold assembly positioning device 316 is disconnected, so that the mold assembly M becomes in a state of being capable of moving on the sliding/guiding device 313 of the base frame 305.

(d) The mold transportation carriage 101 moves and stops in front of the mold opening/closing apparatus 201 of the mold changing/preheating station 200, and the aforementioned arm is extended to deliver the mold assembly M to the mold opening/closing apparatus 201.

(e) Next, the mold transportation carriage 101 moves to the front of the preheating apparatus 202 to receive the preheated mold assembly M, and returns the mold assembly M to the mold opening/closing and vulcanizing station 300 from which the mold assembly M has been taken out. The mold assembly M is connected to the devices on the side of the mold opening/closing and vulcanizing station 300, whereby the tire vulcanizing production is started.

(f) On the other hand, the operator removes connecting bolts for connecting the tire mold C to the upper plate assembly M100 of the mold assembly M carried into the mold opening/closing apparatus 201.

[0057] Subsequently, the upper movable plate 310 of the mold opening/closing apparatus 201 lowers, and the upper plate assembly M100 of the mold assembly M is connected to the upper movable plate 310. When the upper movable plate 310 rises, the tire mold C is left on the lower plate assembly M200.

(g) During this time, the mold transportation carriage 101, which has finished the transportation operation of the preheated mold assembly M, returns to the front of the mold opening/closing apparatus 201 and waits.

[0058] The mold transportation carriage 101 receives the mold assembly M from which the upper plate assembly M100 is removed, and moves to the position of the hoist 204 for re-stacking the tire mold C, at which position the upper half mold C1, the bladder assembly M300, and the lower half mold C2 are re-stacked.

[0059] On the table 203, the upper half mold C1, the bladder assembly M300, or the lower half mold C2 is placed. (h) The mold assembly M into which a new tire mold C and a new bladder assembly 300 have been loaded is brought into the mold opening/closing apparatus 201. After the upper plate assembly M100 is attached to the mold assembly M, the mold assembly M is brought into the preheating apparatus 202, and is connected to the pressurizing medium supply device 315, by which heating operation is started.

[0060] During this heating operation, a pressurizing medium (its pressure can be lower than that at the time of tire vulcanization) is supplied to the pressurizing piston plate M200B provided in the lower plate assembly M200 to bring the parts of the mold into close contact with each other, thereby improving the heating effect.

[0061] The preheated mold is transported by the mold transportation carriage 101 at a necessary point of time as described above.

[0062] In this case, if the mold transportation carriage 101 can carry two mold assemblies M at the same time, when the carriage 101 goes to receive the tire mold C in which the final tire has been vulcanized, it can transport the mold assembly M which has already been preheated and is to be used next. Therefore, the used mold assem-
bly M is received at the position of the mold opening/closing and vulcanizing station 300, and can immediately be replaced with the next new mold assembly, so that the tire can be produced more efficiently.

[0063] The above is a description of the embodiments of the present invention. The present invention is not limited to the above-described embodiments, but is defined by the following claims.

INDUSTRIAL APPLICABILITY

[0064] As described above in detail, the present invention provides a tire vulcanizing system and a mold opening/closing and vulcanizing station therefor, in which tires can be produced efficiently without the decrease in the rate of operation of the mold opening/closing and vulcanizing station even if the frequency of mold change increases.

Claims

1. A tire mold opening/closing and tire vulcanizing station (200, 300) comprising a base frame (305) capable of receiving at least one pair of tire mold assemblies (M), at least one pillar for elevation and guidance (306) erected on said base frame, tire mold assemblies being capable of being disposed on said base frame to the right and left sides of said pillar an upper movable beam (310) which can freely be moved vertically relative to the pillar which provides guidance for said beam, said upper movable beam being provided with connecting/disconnecting means (311, 312) on the right and left sides thereof for connecting and disconnecting said upper movable beam to and from said at least one pair of the mold assemblies disposed on the right and left sides of said pillar characterized in that the upper movable beam (310) is moved vertically at the right and left sides of the pillar (306) at the same time whereas the connecting/disconnecting means (311, 312) provided thereon are capable of being individually operated on the right and left sides of said pillar.

2. A tire mold opening/closing and tire vulcanizing station (200, 300) according to claim 1 characterized in that the upper movable beam (310) is moved vertically at the right and left sides of the pillar (306) at the same time whereas the connecting/disconnecting means (311, 312) provided thereon are capable of being individually operated on the right and left sides of said pillar (306).

3. A tire mold opening/closing and tire vulcanizing station (200, 300) according to claim 2 characterized in that the upper movable beam (310) is moved vertically at the right and left sides of the pillar (306).
dadurch gekennzeichnet, daß
der obere, bewegliche Träger (310) auf der rechten und der linken Seite des Pfeilers (306) gleichzeitig vertikal bewegt wird, während die Ankopplungs-/Abkopplungs-Mittel (311, 312), die auf ihm vorgesehen sind, dazu eingerichtet sind, einzeln auf der rechten und der linken Seite des Pfeilers (306) betätigt zu werden.

2. Eine Station (200, 300) zum Öffnen/Schließen von Preßformen für Reifen und zum Vulkanisieren von Reifen nach Anspruch 1, dadurch gekennzeichnet, daß der obere, bewegliche Träger (310) auf der rechten und der linken Seite des Pfeilers (306) gleichzeitig vertikal bewegt wird, während die Ankopplungs-/Abkopplungs-Mittel (311, 312), die auf ihm vorgesehen sind, dazu eingerichtet sind, einzeln auf der rechten und der linken Seite des Pfeilers (306) betätigt zu werden.


4. Eine Station (200, 300) zum Öffnen/Schließen von Preßformen für Reifen und zum Vulkanisieren von Reifen nach einem vorhergehenden Anspruch, dadurch gekennzeichnet, daß der obere, bewegliche Träger (310) auf dem Grundgestell (305) auf der rechten und der linken Seite des Pfeilers (306) vertikal bewegt wird.

5. Eine Station (200, 300) zum Öffnen/Schließen von Preßformen für Reifen und zum Vulkanisieren von Reifen nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die im oberen, beweglichen Träger (310) vorgesehenen Ankopplungs-/Abkopplungs-Mittel (311, 312) Mittel (311) zum Öffnen/Schließen von Reifenpreßform-Baugruppen umfassen, die so ausgebildet sein können, daß sie Reifenpreßform-Baugruppen (M) auf beiden Seiten des Pfeilers (306) gleichzeitig oder einzeln öffnen und schließen.

Revendications

1. Station d’ouverture/fermeture de moule de pneu et de vulcanisation de pneu (200, 300), comprenant :

un châssis de base (305) pouvant recevoir au moins une paire d’ensembles de moule de pneu (M), au moins un pilier pour l’élévation et le guidage (306) érigé sur ledit châssis de base, les ensembles de moule de pneu pouvant être disposés sur ledit châssis de base sur les côtés droit et gauche dudit pilier,

une poutre mobile supérieure (310) qui peut être déplacée librement verticalement par rapport au pilier qui fournit le guidage pour ladite poutre, ladite poutre mobile supérieure étant prévue avec des moyens de raccordement/déconnexion (311, 312) sur ses côtés droit et gauche pour raccorder et déconnecter ladite poutre mobile supérieure à et de ladite au moins une paire d’ensembles de moule de pneu disposés sur les côtés droit et gauche dudit pilier, caractérisée en ce que :

la poutre mobile supérieure (310) est déplacée verticalement au niveau des côtés droit et gauche du pilier (306) en même temps, alors que les moyens de raccordement/déconnexion (311, 312) prévus sur ce dernier peuvent être actionnés individuellement sur les côtés droit et gauche dudit pilier (306).

2. Station d’ouverture/fermeture de moule de pneu et de vulcanisation de pneu (200, 300) selon la revendication 1, caractérisée en ce que la poutre mobile supérieure (310) est aménée à se déplacer verticalement par rapport au pilier au moyen d’un cylindre d’élévation (307).

3. Station d’ouverture/fermeture de moule de pneu et de vulcanisation de pneu (200, 300) selon la revendication 2, caractérisée en ce que le cylindre d’élévation (307) est disposé dans le pilier (306).

4. Station d’ouverture/fermeture de moule de pneu et de vulcanisation de pneu (200, 300) selon l’une quelconque des revendications précédentes, caractérisée en ce que les moyens de positionnement (313, 316) sont prévus sur ledit châssis de base (305) au niveau des côtés droit et gauche dudit pilier (306).

5. Station d’ouverture/fermeture de moule de pneu et de vulcanisation de pneu (200, 300) selon l’une quel-
conque des revendications précédentes, caractérisée en ce que des moyens d'actionnement/entraînement de vessie (314) sont prévus dans le châssis de base (305) au niveau des côtés droit et gauche du pilier (306), sur lequel un ensemble de vessie (BL) prévu dans les ensembles de moule de pneu (M) peut être déconnecté et raccordé.

6. Station d’ouverture/fermeture de moule de pneu et de vulcanisation de pneu (200, 300) selon la revendication 5, caractérisée en ce que le châssis de base (305) est prévu avec des moyens d’alimentation de milieu de chauffage/pressurisation (315) qui peuvent être raccordés à et déconnectés des ensembles de moule de pneu (M).

7. Station d’ouverture/fermeture de moule de pneu et de vulcanisation de pneu (200, 300) selon l’une quelconque des revendications précédentes, caractérisée en ce que les moyens de raccordement/déconnexion (311, 312) prévus sur la poutre mobile supérieure (310) comprennent des moyens d’ouverture/fermeture d’ensemble de moule de pneu (311) qui peuvent être configurés afin d’ouvrir et de fermer les ensembles de moule de pneu (M) des deux côtés du dit pilier (306) simultanément ou individuellement.
REFERENCES CITED IN THE DESCRIPTION

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