(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 165 296 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
10.05.2017 Bulletin 2017/19

(51) Int Cl.:
B21C 43/00 *(2006.01)* ***B21B 45/04*** *(2006.01)*

(21) Application number: **16183348.8**

(22) Date of filing: **09.08.2016**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **04.11.2015 KR 20150154282**

(71) Applicant: **Park, Gilmi**
Ansan-si, Gyeonggi-do 15283 (KR)

(72) Inventor: **Park, Gilmi**
Ansan-si, Gyeonggi-do 15283 (KR)

(74) Representative: **dompatent von Kreisler Selting Werner -**
Partnerschaft von Patent- und Rechtsanwälten mbB
Deichmannhaus am Dom
Bahnhofsvorplatz 1
50667 Köln (DE)

(54) BILLET DESCALING APPARATUS

(57) The present invention relates to a billet (10) descaling apparatus, which removes a scale formed on a surface of a circular billet, including two roller units (100) disposed longitudinally spaced apart from each other and configured to rotatably support a circular billet (10); two or more cutting units (200) disposed along a lengthwise direction parallel to the longitudinal direction of the two roller units (100), and configured to perform a cutting work on the surface of the billet along equal lengths of the billet (10); and a push unit (300) configured to move the billet along said lingitudinal direction during its processing by each of the cutting units.

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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to and the benefit of Korean Patent Application No. 2015-0154282, filed on November 4, 2015, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

1. Field of the Invention

[0002] The present invention relates to a billet descaling apparatus, and more particularly, to an apparatus which removes a scale formed on a surface of a circular billet.

2. Discussion of Related Art

[0003] As a prior art which relates to an apparatus for descaling a surface of a circular billet, a billet polishing apparatus which polishes a surface of a homogenized billet includes a plurality of rotary rollers which are formed in a lengthwise direction of the billet to be rotated perpendicularly to an axial direction of the billet, and in which the billet is seated on upper surfaces thereof, a polishing brush which is formed above the rotary rollers to polish a surface of the rotated billet while being moved in the lengthwise direction of the billet, and a striking carrier which is formed at side surfaces of the rotary rollers to carry the billet to an outside of the rotary rollers.

[0004] The prior art enables the billets having various lengths to be rapidly and clearly polished. However, since one polishing brush polishes the surface of the billet while being moved in the lengthwise direction of the billet, there is a problem that it takes a long time while the billet having a long length is polished.

SUMMARY OF THE INVENTION

[0005] The present invention is directed to providing a billet descaling apparatus which is able to further rapidly process a billet having a long length.

[0006] According to an aspect of the present invention, there is provided a billet descaling apparatus including two roller units disposed to be spaced apart from each other, formed to extend forward and backward, respectively, and configured to rotatably support a circular billet; two or more cutting units disposed in lengthwise directions of the two roller units, and configured to perform a cutting work while equally diving a surface of the billet put between the two roller units in a lengthwise direction thereof; and a push unit configured to move backward the billet which is being processed by each of the cutting units.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The above and other objects, features and advantages of the present invention will become more apparent to those of ordinary skill in the art by describing in detail exemplary embodiments thereof with reference to the accompanying drawings, in which:

FIG. 1 is a front view of a billet descaling apparatus according to an embodiment of the present invention;
FIG. 2 is a plan view of the billet descaling apparatus according to the embodiment of the present invention;
FIG. 3 is a side view of the billet descaling apparatus according to the embodiment of the present invention;
FIG. 4 is a perspective view of a cutting unit in the billet descaling apparatus according to the embodiment of the present invention when being seen from a front upper side thereof;
FIG. 5 is a perspective view of the cutting unit in the billet descaling apparatus according to the embodiment of the present invention when being seen from a rear lower side thereof;
FIG. 6 is a side view of the cutting unit in the billet descaling apparatus according to the embodiment of the present invention;
FIG. 7 is a cross-sectional view of a main configuration of the cutting unit in the billet descaling apparatus according to the embodiment of the present invention;
FIG. 8 is a cross-sectional view illustrating a state in which a second guide roller is moved down in FIG. 6;
FIG. 9 is an exploded perspective view of the main configuration of the cutting unit in the billet descaling apparatus according to the embodiment of the present invention;
FIG. 10 is a front view of a transporting unit in the billet descaling apparatus according to the embodiment of the present invention; and
FIG. 11 is a side cross-sectional view of the transporting unit in the billet descaling apparatus according to the embodiment of the present invention.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0008] Exemplary embodiments of the present invention will be described in detail below with reference to the accompanying drawings.

[0009] As illustrated in FIGS. 1 to 11, a billet descaling apparatus according to an embodiment of the present invention includes a roller unit 100, a cutting unit 200, a push unit 300 and a transporting unit 400.

[0010] As illustrated in FIGS. 1 to 3, two roller units 100 are provided to be spaced apart from each other, extend forward and backward respectively, and rotatably sup-

port a circular billet 10 (referring to FIG. 3).

[0011] As illustrated in FIG. 1, each of the two roller units 100 includes a plurality of unit rollers 110 which are arranged in one row, and the unit rollers 110 are connected to each other by a coupler 120, and thus rotated together.

[0012] As illustrated in the drawings, a base frame 500 is provided under the roller units 100 so that each of the roller units 100 is installed at a predetermined height. The base frame 500 supports not only the roller units 100 but also the cutting unit 200, the push unit 300 and the transporting unit 400.

[0013] Also, a driving unit 600 for rotating the roller units 100 is connected to the two roller units 100.

[0014] The driving unit 600 includes a motor and a power transmitting device which connects between the two roller units 100 and the motor, and rotates the two roller units 100, and thus rotates the billet 10 which is put between the two roller units 100.

[0015] As illustrated in the drawings, the driving unit 600 may be connected so as to rotate both of the two roller units 100, and may be connected so as to rotate only one of the two roller units 100, if necessary.

[0016] The cutting unit 200 serves to cut a surface of the billet 10 and thus to remove a scale formed on the billet 10, and, as illustrated in FIGS. 4 to 9, may include an installation plate 210 which is installed above the two roller units 100 to be movable up and down, an up-and-down movement driving part 220 which moves up and down the installation plate 210, a first guide roller 230 which is coupled to a lower side of the installation plate 210 and comes in contact with the surface of the billet 10 put between the two roller units 100 when the installation plate 210 is moved down, and a cutter 240 which is coupled to the lower side of the installation plate 210 to be disposed at a rear of the first guide roller 230, and performs a cutting work of the surface of the billet 10 while the first guide roller 230 is in contact with the surface of the billet 10.

[0017] Also, the cutting unit 200 may further include a second guide roller 250 which is coupled to the lower side of the installation plate 210 to be disposed at a rear of the cutter 240 and also to be movable up and down, a roller driving part 260 which moves up and down the second guide roller 250, and a rotating shaft 270 which is installed to pass through centers of the first guide roller 230, the cutter 240 and the second guide roller 250.

[0018] The cutting unit 200 may include a front bearing housing 280 and a rear bearing housing 290 which are respectively coupled to a front end and a rear end of a lower surface of the installation plate 210 to rotatably support the rotating shaft 270, a rotating shaft driving part 2100 which rotates the rotating shaft 270, a pressing roller 2160 which is disposed above the billet 10 put between the two roller units 100, a pressing cylinder 2170 of which a body is coupled to the installation plate 210, and a rod is coupled to the pressing roller 2160 to move up and down the pressing roller 2160, and a cutting depth adjusting means which adjusts a cutting depth relative to the billet 10.

[0019] Two or more cutting units 200 are provided and disposed in a lengthwise direction of each of the two roller units 100. As illustrated in FIGS. 1 and 2, nine cutting units 200 may be provided and arranged in same intervals, and thus each of the cutting units 200 performs the cutting work in a state in which the surface of the billet 10 put between the two roller units 100 is equally divided in the lengthwise direction of the billet 10.

[0020] The installation plate 210 is installed above the two roller units 100, and supports other elements forming the cutting unit 200 by the up-and-down movement driving part 220.

[0021] As illustrated in FIGS. 4 to 6, the up-and-down movement driving part 220 may include a up-and-down movement frame 221 which is installed at one side of the base frame 500 to be moved up and down, a first up-and-down movement cylinder 222 of which a body is coupled to the base frame 500, and a rod is coupled to the up-and-down movement frame 221 to move up and down the up-and-down movement frame 221, and a bracket 223 which is coupled to the lower surface of the installation plate 210.

[0022] Also, the up-and-down movement driving part 220 may include a intermediate frame 224 of which a lower end is coupled to the up-and-down movement frame 221, and an upper end is hinge-coupled to the bracket 223, and a second up-and-down movement cylinder 225 of which a body is coupled to the up-and-down movement frame 221, and a rod is coupled to the installation plate 210.

[0023] Here, the bracket 223 and the intermediate frame 224 are located at a center of the lower surface of the installation plate 210 when the cutting unit 200 is seen from a side surface thereof, and the rod of the second up-and-down movement cylinder 225 is coupled to the lower surface of the installation plate 210 to be placed oppositely to a side at which the rotating shaft 270 is installed relatively to the bracket 223.

[0024] Eventually, the up-and-down movement driving part 220 enables the first guide roller 230 and the cutter 240 to approach or be spaced apart from the billet 10 put between the two roller units 100 by operating the first up-and-down movement cylinder 222 and moving up and down the installation plate 210, rotates the installation plate 210 so that the first guide roller 230 and the cutter 240 press the billet 10 by operating the second up-and-down movement cylinder 225 while the first guide roller 230 and the cutter 240 approach the billet 10, and thus the cutter 240 penetrates the surface of the billet 10, and the cutting work is performed.

[0025] The first guide roller 230, the cutter 240 and the second guide roller 250 are supported while being inserted onto the rotating shaft 270. Here, the cutter 240 is fixed to the rotating shaft 270 by a key, and rotated along with the rotating shaft 270, and each of the first guide roller 230 and the second guide roller 250 is installed to

be rotated independently of the rotating shaft 270 by bearings installed therein.

[0026] The cutter 240 includes a disc-shaped body, and a plurality of cutting blades which are arranged along a circumference of the body at same intervals, and a plurality of cutters 240 are provided and installed at the rotating shaft 270 to be overlapped with each other. However, in addition to the above-described structure, the cutter 240 may be applied in various types which perform the cutting work of the surface of the billet 10 while being rotated along with the rotating shaft 270.

[0027] As illustrated in FIGS. 7 to 9, the roller driving part 260 may include an up-and-down movement member 261 which has a cylindrical supporting portion 261a interposed between the rotating shaft 270 and the second guide roller 250, and a quadrangular flange portion 261b formed at a rear end of the supporting portion 261a, and which is fitted to the rotating shaft 270 to be moved up and down, two guide blocks 262 which are coupled to the rear bearing housing 290 to cover both sides of the flange portion 261b of the up-and-down movement member 261, and a driving cylinder 263 of which a body is coupled to an upper surface of the installation plate 210, and a rod passes through the installation plate 210 and is connected to the flange portion 261b of the up-and-down movement member 261.

[0028] The up-and-down movement member 261 may be formed so that an internal space of the up-and-down movement member 261 is formed in an elliptical shape which is rather long vertically, or a diameter of the internal space is formed rather greater than that of a portion of the rotating shaft 270 at which the up-and-down movement member 261 is located, and thus may be moved up and down while being fitted to the rotating shaft 270.

[0029] A bearing is installed at an outside of the supporting portion 261 a of the up-and-down movement member 261 to rotatably support the second guide roller 250.

[0030] The two guide blocks 262 cover both sides of the flange portion 261b of the up-and-down movement member 261, and prevent lateral movement of the up-and-down movement member 261.

[0031] Also, as illustrated in FIG. 9, a guide groove 261c which is formed to extend vertically is formed at each of both side surfaces of the flange portion 261b of the up-and-down movement member 261, and a guide protrusion 262a which enters the guide groove 261c is formed at each of the two guide blocks 262. Therefore, the guide blocks 262 may also prevent forward and backward movement of the up-and-down movement member 261, and thus may enable the up-and-down movement member 261 to be smoothly moved up and down.

[0032] Eventually, as illustrated in FIG. 7, the first guide roller 230 may support the installation plate 210 not to be further moved down while being in contact with the surface of the billet 10 by downward movement of the installation plate 210 and idling, and thus the cutter 240 may process the surface of the billet 10 while maintaining a predetermined cutting depth. At this point, the cutter 240 is rotated at a high speed by the rotating shaft 270, and thus performs the cutting work of the surface of the billet 10.

[0033] And as illustrated in FIG. 8, when a surface 11 of the billet 10 which is processed by the cutter 240 of cutting unit 200 that is disposed at a front side among two adjacent cutting units 200 reaches the first guide roller 230 of the cutting unit 200 disposed at a rear side, the second guide roller 250 is moved down by an operation of the roller driving part 260, and is in contact with a surface 12 of the billet 10 processed by the cutter 240 of the cutting unit 200 disposed at the rear side. At this point, a contact point between the second guide roller 250 which is moved down and the processed surface of the billet 10 is located on the same horizontal line as a contact point between the cutter 240 and the processed surface of the billet 10.

[0034] Accordingly, when the surface 11 of the billet 10 which is processed by the cutter 240 of cutting unit 200 that is disposed at a front side among two adjacent cutting units 200 reaches the first guide roller 230 of the cutting unit 200 disposed at a rear side, the second guide roller 250 supports the installation plate 210 so that the first guide roller 230 of the cutting unit 200 disposed at the rear side is not in contact with the surface 11 of the billet 10 processed by the cutter 240 of the cutting unit 200 disposed at the front side.

[0035] In other words, when the surface 11 of the billet 10 processed by the cutting unit 200 disposed at the front side reaches the first guide roller 230 of the cutting unit 200 disposed at the rear side, the second guide roller 250 supports the installation plate 210 in place of the first guide roller 230, and thus the cutter 240 may process the surface of the billet 10 while maintaining the predetermined cutting depth.

[0036] The rotating shaft driving part 2100 includes a motor which is installed at the upper surface of the installation plate 210, and a power transmitting device which connects the motor with the rotating shaft 270, and serves to rotate the rotating shaft 270.

[0037] The pressing roller 2160 is moved up and down by the pressing cylinder 2170, and located at a lower side further than the cutter 240 while being moved down.

[0038] Therefore, when the installation plate 210 is moved down, the pressing roller 2160 is in contact with the surface of the billet 10 before the cutter 240 does, and presses the billet 10, and thus fixes the billet 10 until the first guide roller 230 is in contact with the surface of the billet 10, such that the cutter 240 may stably penetrate the surface of the billet 10.

[0039] The pressing roller 2160 may be moved up again when the first guide roller 230 is in contact with the surface of the billet 10, and thus may be spaced apart from the billet 10.

[0040] As illustrated in FIGS. 7 to 9, the cutting depth adjusting means may include a cam member 2110 which is rotatably installed between the rotating shaft 270 and

the first guide roller 230, and has a structure in which a center of an outer circumferential surface of the cam member 2110 is eccentric to that of an inner circumferential surface of cam member 2110, an inner bearing 2120 which is interposed between the rotating shaft 270 and the cam member 2110, and an outer bearing 2130 which is interposed between the first guide roller 230 and the cam member 2110.

[0041] Also, the cutting depth adjusting means may further include a plurality of insertion holes 2140 which are formed at a side surface of the cam member 2110 to be directed toward the front bearing housing 280 and arranged in a circumferential direction of the cam member 2110, and a fixing pin 2150 which is inserted to pass through the front bearing housing 280 in a forward and backward direction and of which an end selectively enters one of the insertion holes 2140.

[0042] Here, each of the insertion holes 2140 is arranged so that a pitch circle of the insertion holes 2140 has the same center as the inner circumferential surface of the cam member 2110.

[0043] According to such a structure, a center of the outer circumferential surface of the cam member 2110 and a center of the first guide roller 230 may be moved by selectively inserting the end of the fixing pin 2150 into one of the insertion holes 2140, and thus the cutting depth in the billet 10 may be adjusted.

[0044] That is, as the center of the outer circumferential surface of the cam member 2110 and the center of the first guide roller 230 are moved upward based on a center of the rotating shaft 270, a depth in which the cutter 240 penetrates the billet 10 may be increased, and as the center of the outer circumferential surface of the cam member 2110 and the center of the first guide roller 230 are moved downward, the depth in which the cutter 240 penetrates the billet 10 may be reduced.

[0045] The push unit 300 serves to move backward the billet 10 which is being processed by each of the cutting units 200, and as illustrated in FIGS. 2 and 3, may include a forward and backward movement plate 310 which is installed at one side of each of the two roller units 100 to be movable forward and backward in a lengthwise direction of each of the two roller units 100, a plate driving part 320 which moves forward and backward the forward and backward movement plate 310, a support bar 330 which is installed at an upper surface of the forward and backward movement plate 310 to be moved forward and backward toward the two roller units 100, and to enter a front side of the billet 10 put between the two roller units 100 when being moved forward, and a support bar driving part 340 which moves forward and backward the support bar 330.

[0046] The forward and backward movement plate 310 is installed at the base frame 500 to be disposed at an opposite side to each of the cutting units 200 relatively to the two roller units 100, and a well-known linear motion (LM) guide is interposed between the forward and backward movement plate 310 and the base frame 500, and thus connects the forward and backward movement plate 310 with the base frame 500 to be moved forward and backward.

[0047] The plate driving part 320 is configured with a cylinder of which a body is fixed to the base frame 500 and a rod is connected to the forward and backward movement plate 310, and thus moves forward and backward the forward and backward movement plate 310 in the lengthwise direction of each of the two roller units 100.

[0048] The cylinder constituting the plate driving part 320 may have a stroke which is longer than a pitch formed by each of the cutting units 200.

[0049] The support bar 330 is formed in a circular bar shape, inserted into a ball bush 350 coupled to the upper surface of the forward and backward movement plate 310, and moved forward and backward toward the two roller units 100.

[0050] The support bar driving part 340 is provided so that a body of the support bar driving part 340 is fixed to the forward and backward movement plate 310 and a rod of the support bar driving part 340 is connected to the support bar 330, and thus moves forward and backward the support bar 330.

[0051] Eventually, the push unit 300 enables the support bar 330 to enter the front of the billet 10 put between the two roller units 100 by an operation of the support bar driving part 340 while the forward and backward movement plate 310 is moved forward, and then enables the support bar 330 to support a front surface of the billet 10 and thus to be moved backward along with the forward and backward movement plate 310 when the forward and backward movement plate 310 is moved backward by an operation of the plate driving part 320, and thus moves backward the billet 10 which is being processed by the cutting work.

[0052] The transporting unit 400 serves to move the billet 10 which is put between the two roller units 100 and is not being processed, and as illustrated in FIGS. 10 and 11, may include a support frame 410 which is formed to extend in the lengthwise direction of each of the two roller units 100 and installed under the two roller units 100 to be moved up and down, and a frame driving part 420 which moves up and down the support frame 410.

[0053] In addition, the transporting unit 400 may further include a plurality of support wheels 430 which are arranged in a lengthwise direction of the support frame 410, enter between the two roller units 100 when the support frame 410 is moved up, and support the billet 10 put between the two roller units 100, and a wheel driving part 440 which rotates each of the support wheels 430.

[0054] As illustrated in FIG. 3, the transporting unit 400 is installed inside the base frame 500 to be disposed under the two roller units 100.

[0055] And as illustrated in FIG. 1, a guide bar 450 which guides upward and downward movement of the support frame 410 is vertically installed at a front end and a rear end of the base frame 500 so that the support frame 410 of the transporting unit 400 is smoothly moved

up and down.

[0056] The support frame 410 includes a lower support frame 411 which is formed of two C-shaped steel beams disposed to face each other and to have a quadrangular pipe shape, an upper support frame 412 which is formed of two plates coupled and disposed at an upper surface of the lower support frame 411 to be spaced apart from each other in a width direction of the lower support frame 411, and a coupling portion 413 which is formed at each of both ends of the lower support frame 411.

[0057] Here, the coupling portion 413 is formed so that a center of the coupling portion 413 is vertically penetrated, and thus slidably inserted onto the guide bar 450.

[0058] The frame driving part 420 is configured with a cylinder of which a body is fixed to the base frame 500 and a rod is connected to the support frame 410.

[0059] Two or more cylinders each of which constitutes the frame driving part 420 may be provided along a length of the support frame 410.

[0060] Each of the support wheels 430 includes a sprocket 431 formed at a center thereof, and a disk plate 432 which is coupled to each of both sides of the sprocket 431. The support wheel 430 is rotatably installed at the upper support frame 412 so that an upper half portion of the support wheel 430 is exposed to an upper side of the upper support frame 412.

[0061] The sprocket 431 is connected to the wheel driving part 440 by a chain, and the disk plate 432 is formed to have a larger diameter than that of the sprocket 431, and supports the billet 10 put between the two roller units 100 when the support frame 410 is moved upward.

[0062] The wheel driving part 440 is configured with a geared motor, installed at the support frame 410, and connected to each of the support wheels 430 by the chain.

[0063] Eventually, as the support wheel 430 is rotated by an operation of the wheel driving part 440 while the support frame 410 is moved upward and supports the billet 10 put between the two roller units 100, the transporting unit 400 transports the billet 10. Accordingly, the billet descaling apparatus of the present invention may enable the billet 10 supplied from a loading device (not shown) installed at a front side to be easily disposed at upper portions of the two roller units 100, and may also enable the billet 10 processed by the cutting work to be easily discharged to an unloading device (not shown) installed at a rear side.

[0064] In the billet descaling apparatus according to the present invention, since the two or more cutting units divide the surface of the billet into predetermined sections in the lengthwise direction of the billet and process the surface of the billet, the surface of the billet can be further rapidly processed.

[0065] It will be apparent to those skilled in the art that various modifications can be made to the above-described exemplary embodiments of the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention covers all such modifications provided they come within the scope of the appended claims and their equivalents.

Claims

1. A billet descaling apparatus comprising:

two roller units (100) disposed to be spaced apart from each other, formed to extend forward and backward, respectively, and configured to rotatably support a circular billet (10);

two or more cutting units (200) disposed in lengthwise directions of the two roller units (100), and configured to perform a cutting work while equally diving a surface of the billet (10) put between the two roller units (100) in a lengthwise direction of the billet (10); and

a push unit (300) configured to move backward the billet (10) which is being processed by each of the cutting units (200),

wherein each of the cutting units (200) comprises:

an installation plate (210) which is installed above the two roller units (100) to be movable up and down;

an up-and-down movement driving part (220) which moves up and down the installation plate (210);

a first guide roller (230) which is coupled to a lower side of the installation plate (210), and is in contact with the surface of the billet (10) put between the two roller units (100) when the installation plate (210) is moved down;

a cutter (240) which is coupled to the lower side of the installation plate (210) to be disposed at a rear of the first guide roller (230), and performs the cutting work of the surface of the billet (10) while the first guide roller (230) is in contact with the surface of the billet (10);

a second guide roller (250) which is coupled to the lower side of the installation plate (210) to be disposed at a rear of the cutter (240) and also to be movable up and down; and

a roller driving part (260) which moves up and down the second guide roller (250), and

whrerein when the surface of the billet (10) which is processed by the cutter (240) of cutting unit (200) that is disposed at a front side among two adjacent cutting units (200) reaches the first guide roller (230) of the cutting unit (200) disposed at a rear side, the second guide roller (250) is moved down, and is in contact with the surface of the billet

(10) processed by the cutter (240) of the cutting unit (200) disposed at the rear side, and

a contact point between the second guide roller (250) which is moved down and the billet (10) is located on the same horizontal line as a contact point between the cutter (240) and the billet (10).

2. The apparatus of claim 1, wherein each of the cutting units (200) further comprises:

a rotating shaft (270) which is installed to pass through centers of the first guide roller (230), the cutter (240) and the second guide roller (250);
a front bearing housing (280) and a rear bearing housing (290) which are respectively coupled to a front end and a rear end of a lower surface of the installation plate (210) to rotatably support the rotating shaft (270);
a rotating shaft driving part (2100) which rotates the rotating shaft (270); and
a cutting depth adjusting means which adjusts a cutting depth of the billet (10), and
the cutting depth adjusting means comprises:

a cam member (2110) which is rotatably installed between the rotating shaft (270) and the first guide roller (230), and has a structure in which a center of an outer circumferential surface of the cam member (2110) is eccentric to that of an inner circumferential surface of the cam member (2110);
an inner bearing (2120) which is interposed between the rotating shaft (270) and the cam member (2110);
an outer bearing (2130) which is interposed between the first guide roller (230) and the cam member (2110);
a plurality of insertion holes (2140) which are formed at a side surface of the cam member (2110) to be directed toward the front bearing housing (280), and arranged in a circumferential direction of the cam member (2110); and
a fixing pin (2150) which is inserted to pass through the front bearing housing (280) in a forward and backward direction and of which an end selectively enters one of the insertion holes (2140).

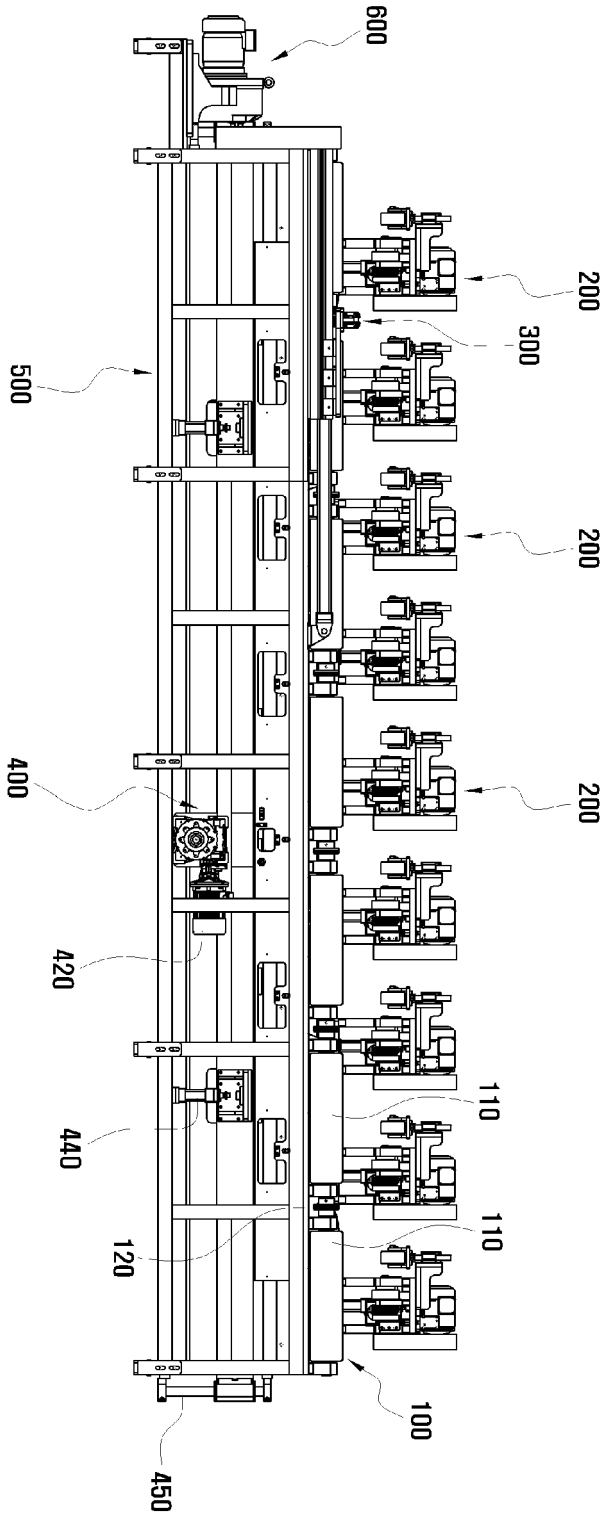
3. The apparatus of claim 1, wherein the push unit (300) comprises:

a forward and backward movement plate (310) which is installed at one side of each of the two roller units (100) to be movable forward and backward in the lengthwise direction of each of the two roller units (100);
a plate driving part (320) which moves forward and backward the forward and backward movement plate (310);
a support bar (330) which is installed at an upper surface of the forward and backward movement plate (310) to be movable forward and backward toward the two roller units (100), and to enter a front side of the billet (10) put between the two roller units (100) when being moved forward; and
a support bar driving part (340) which moves forward and the backward the support bar (330).

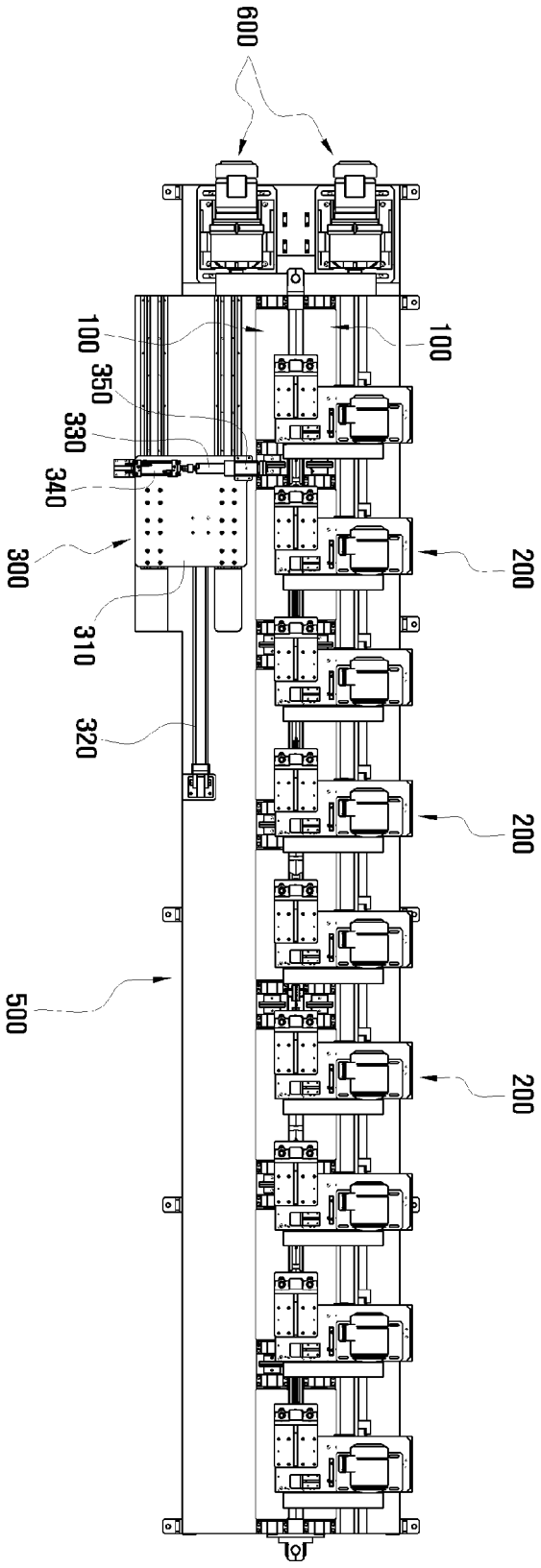
4. The apparatus of any one of claims 1 to 3, further comprising a transporting unit (400) which moves the billet 10 put between the two roller units (100) and not in a processing,
wherein the transporting unit (400) comprises:

a support frame (410) which is formed to extend in the lengthwise direction of each of the two roller units (100) and installed under the two roller units (100) to be moved up and down;
a frame driving part (420) which moves up and down the support frame (410);
a plurality of support wheels (430) which are arranged in a lengthwise direction of the support frame (410), enter between the two roller units (100) when the support frame (410) is moved up, and support the billet (10) put between the two roller units (100); and
a wheel driving part (440) which rotates each of the support wheels (430).

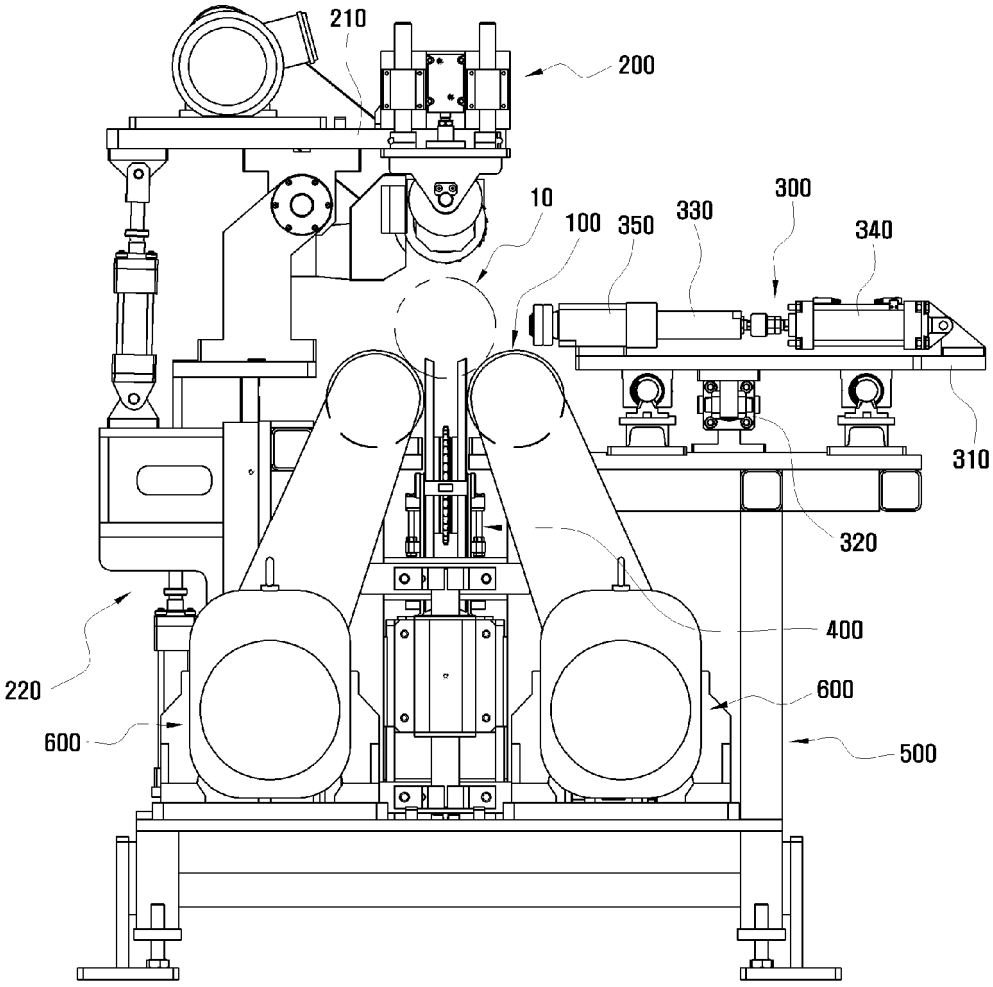
【FIG. 1】



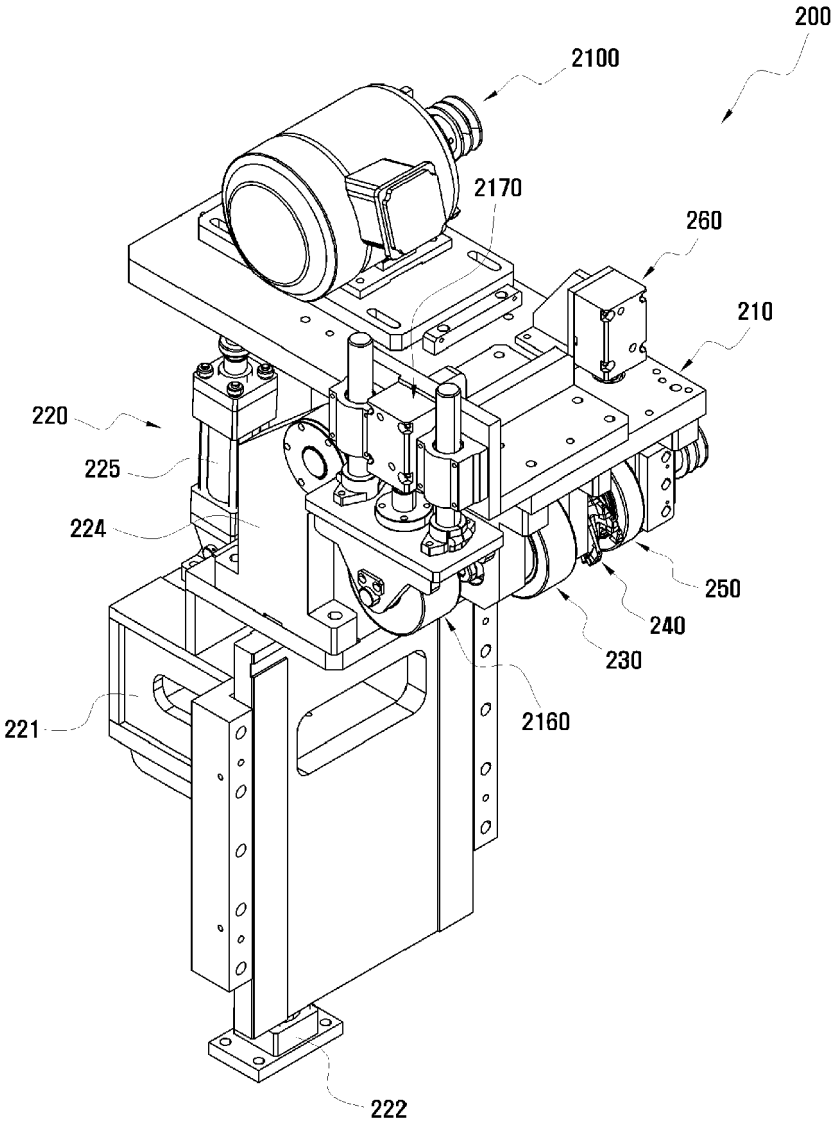
【FIG. 2】



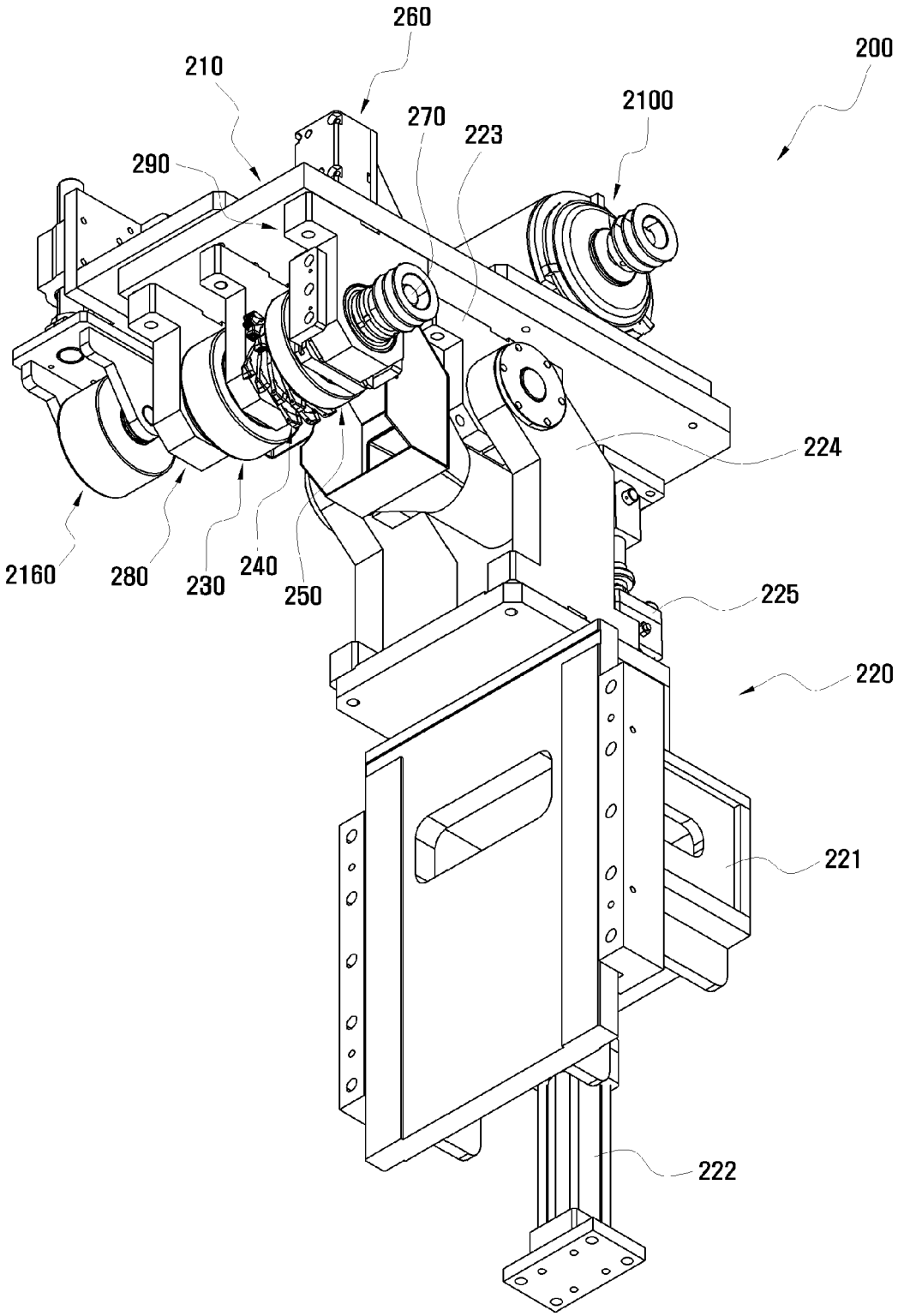
【FIG. 3】



【FIG. 4】



【FIG. 5】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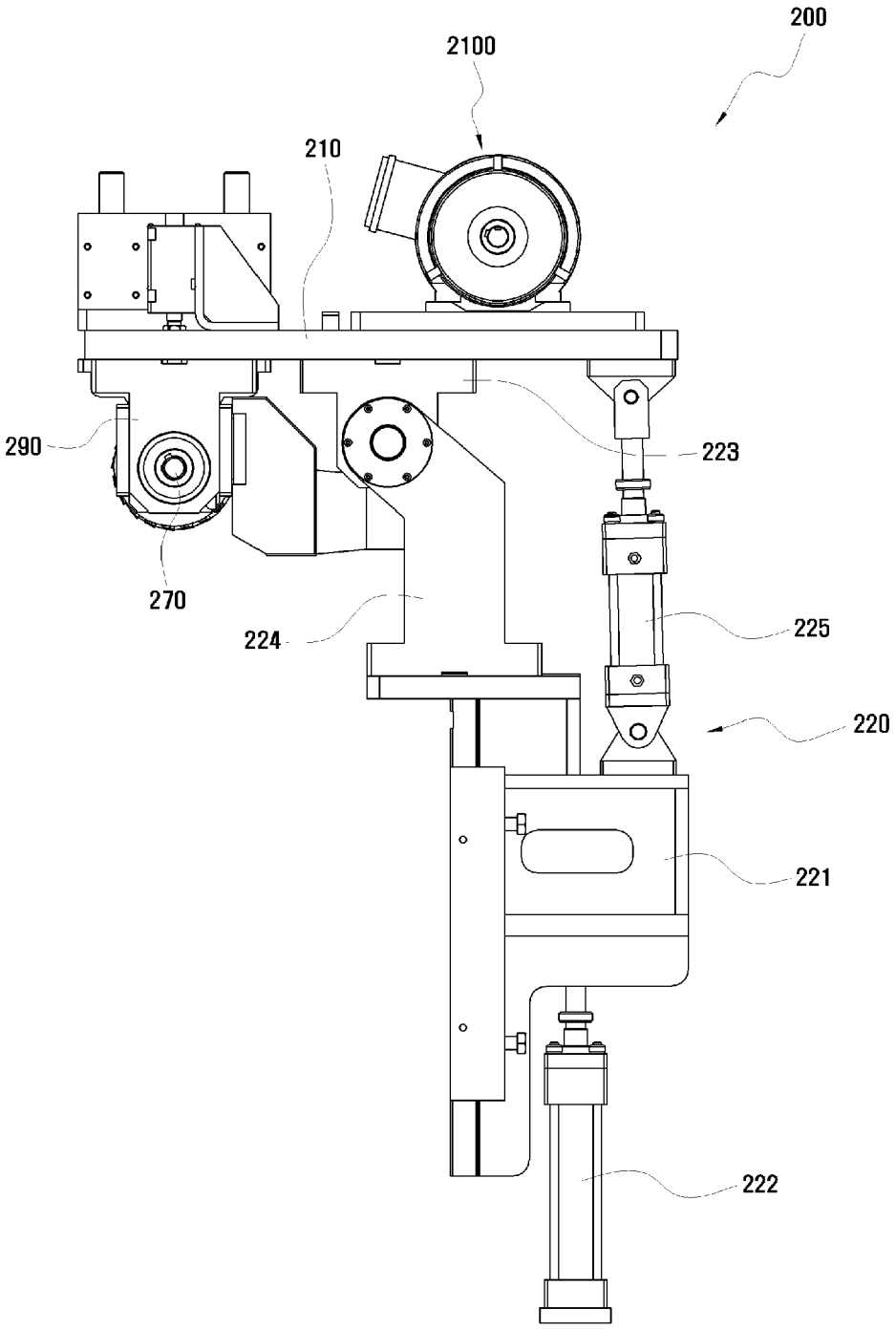
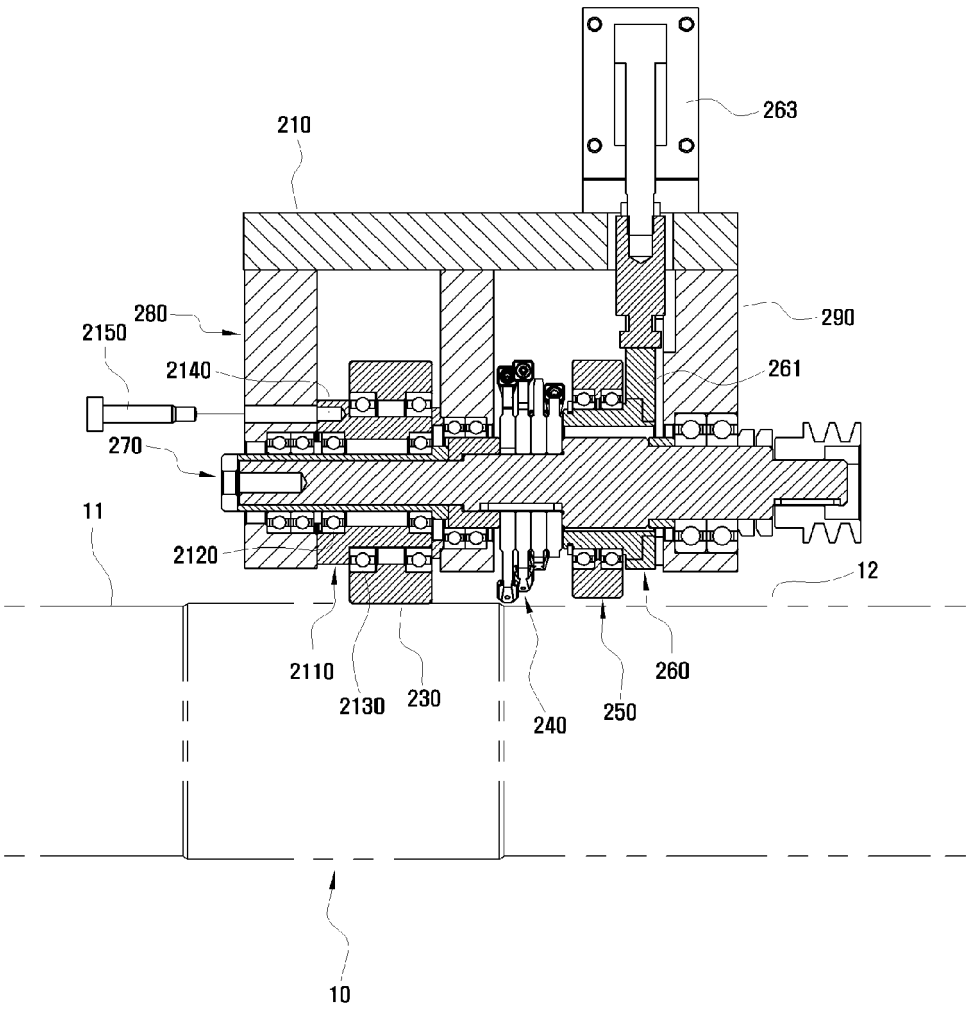
222

【FIG. 6】



【FIG. 7】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12
2110
2130
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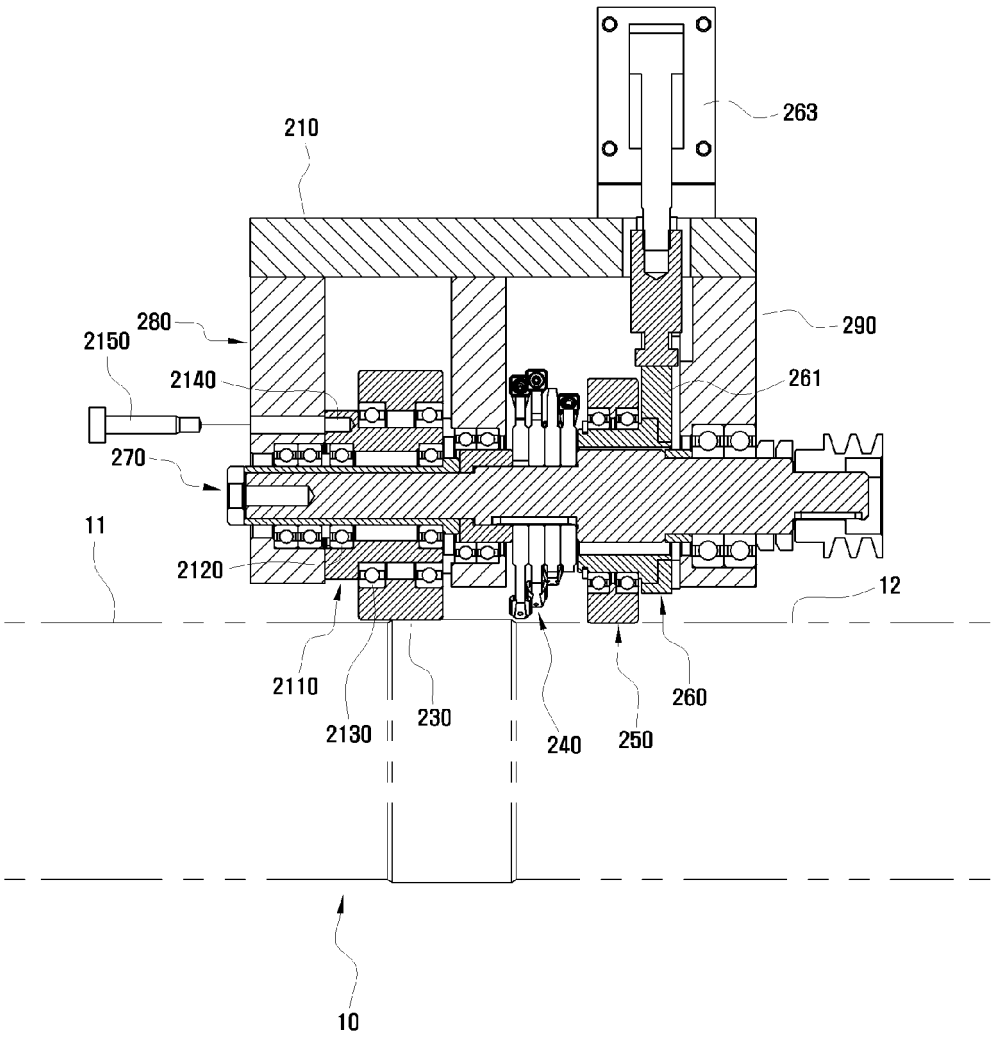
260
10

【FIG. 8】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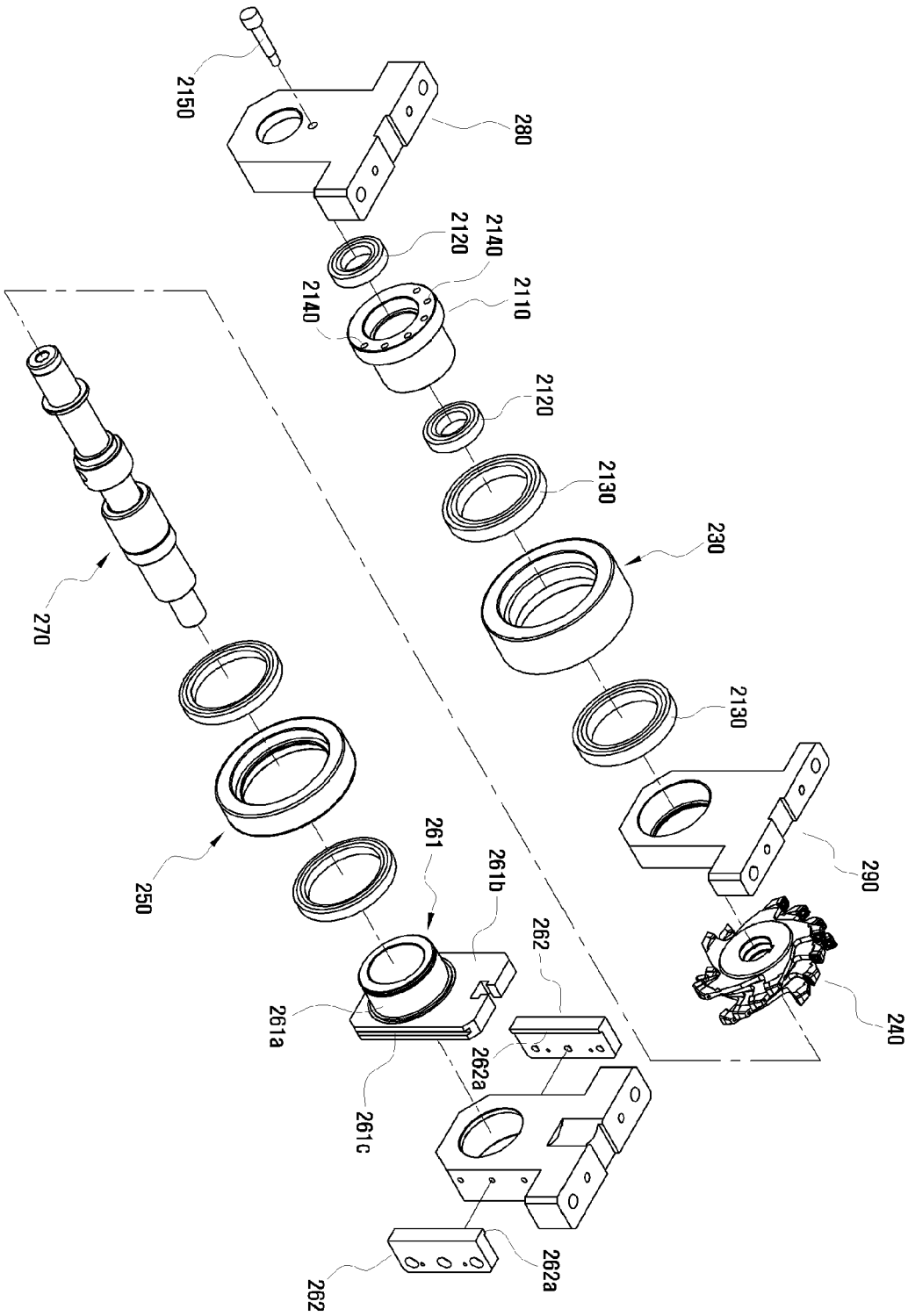
【FIG. 9】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261a
262a
261c
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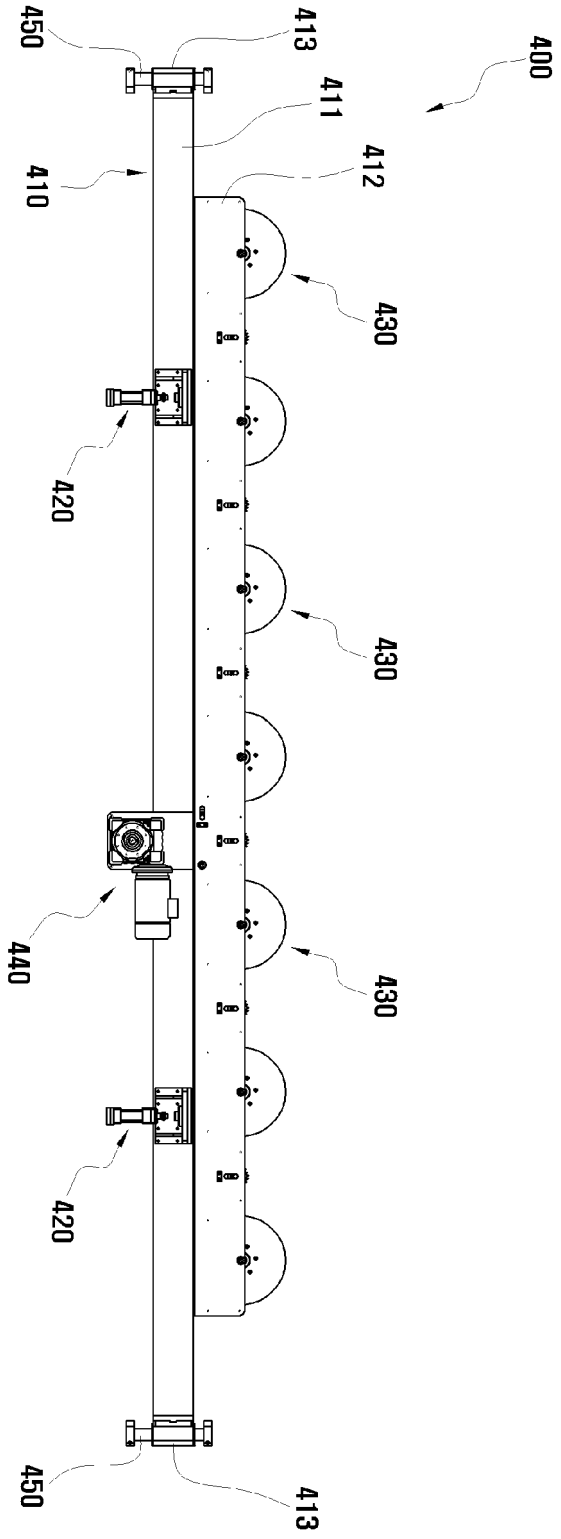
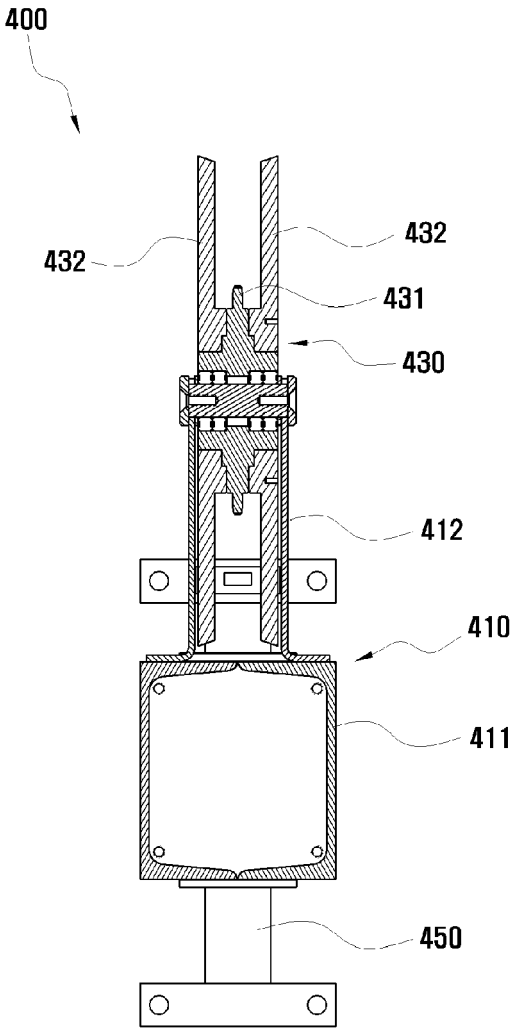
262a

【FIG. 10】



【FIG. 11】



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EUROPEAN SEARCH REPORT

Application Number
EP 16 18 3348

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A	US 1 411 474 A (BRIGHTMAN HARRISON M) 4 April 1922 (1922-04-04) * page 3, lines 57-85; figures 1-4 *	1	INV. B21C43/00 B21B45/04
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Place of search	Date of completion of the search	Examiner
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