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(54) **Screening bucket**

(57) A screening bucket (1) having a loading front opening (8) and a rear opening (9) facing the front opening (8) and closed by a screening group (10), which has a support frame (11) and a plurality of screening drums (18) mounted to the frame (11) to rotate about respective longitudinal axes (19) parallel to one another under the thrust of a mechanical transmission (28) of an actuating

unit (23); the frame (11) having a first support plate (14) perpendicular to the longitudinal axes (19); and the mechanical transmission (28) being mounted to the first plate (14) and having, for each drum (18), a respective power take-off (38) mounted through the first plate (14) and angularly coupled to an end of the respective drum (18) by means of an axial plug-in fast joint (37), in a releasable manner.

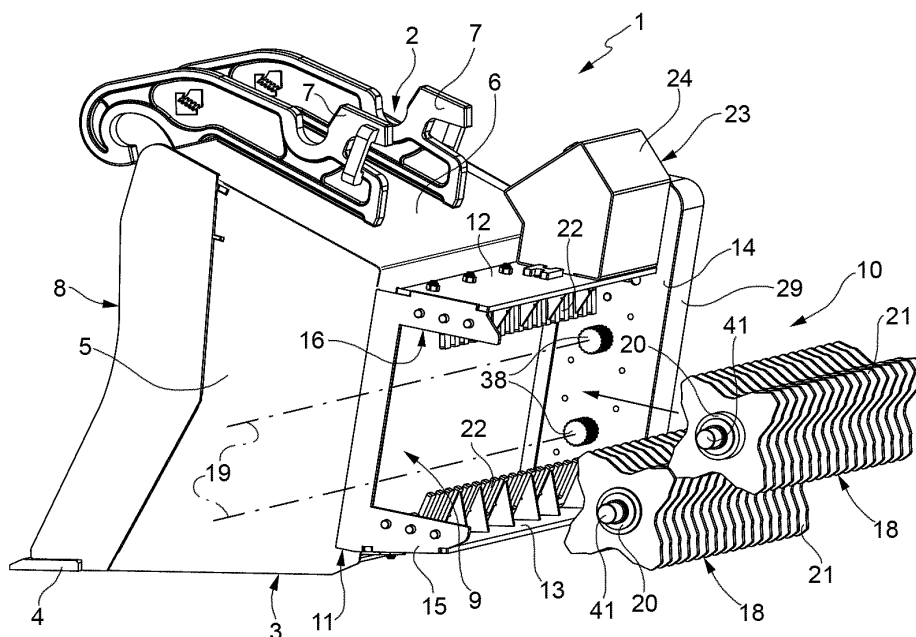


FIG. 1

Description

[0001] The present invention relates to a screening bucket of the type adapted to be applied to machines for handling loose material, in particular earth, such as excavators or loading machines, for selecting, crushing and separating scrap material resulting from demolitions, excavations or reclamation of rocky soil, for example.

[0002] As known, the screening buckets of the above-mentioned type have a front opening for loading the material and a rear opening facing the front opening and closed by a screening group consisting of a plurality of blade drums, which are arranged adjacent and parallel to one another and are supported, at the respective axial ends and with the interposition of bearings, by two fixed plates, usually the lateral walls of the bucket, in order to rotate, in use, about the respective longitudinal axes and allow the selected material to escape through the spaces between one drum and the other.

[0003] The drums are usually actuated by a hydraulic motor and a mechanical transmission, which comprises a first toothed pulley keyed onto the output shaft of the motor and a plurality of second toothed pulleys keyed onto respective ends of the drums outside said fixed plates and coupled to the first toothed pulley by means of chains. In order to prevent dirt and shocks from damaging the transmission, the latter is usually insulated from the outside by a sturdy protective shell releasably mounted to the exterior of said fixed plates.

[0004] A screening bucket of this type is described in EP2204501, for example.

[0005] The above-described screening buckets usually suffer from a drawback resulting from the fact that whenever the screening buckets need to be removed for being replaced with new, unworn drums or with different drums, the operations of removing and replacing the drums are relatively complex and require a fair accuracy of execution by the operator, as they also need the removal and replacement of the whole transmission. Such a drawback is particularly burdensome if we consider that, very often, the replacement of the screening group is carried out on site, where the operating conditions are usually difficult due to the presence of mud and dust, and certainly not adapted to work on components such as those of the transmission.

[0006] It is an object of the present invention to provide a screening bucket which allows the above-described drawback to be overcome.

[0007] According to the present invention, there is provided a screening bucket as claimed in claim 1, and preferably as claimed in any one of the subsequent claims either directly or indirectly depending on claim 1.

[0008] The present invention will now be described with reference to the accompanying drawings, which show a non-limiting embodiment thereof, in which:

- figure 1 is a perspective view, with parts removed for clarity and exploded parts, of a preferred embod-

iment of the screening bucket of the present invention;

- figure 2 is a perspective view of the screening bucket in figure 1, with exploded parts;
- figure 3 shows a perspective view of a detail of figure 1, with parts removed for clarity; and
- figure 4 shows a side elevation view of the screening bucket in figure 2.

[0009] In figures 1 and 2, reference numeral 1 indicates as a whole a screening bucket adapted to be applied to an operating machine (not shown) for handling loose material, in particular earth, such as excavators or loading machines, for selecting, crushing and separating scrap material resulting from demolitions, excavations or reclamation of rocky soil, for example.

[0010] Bucket 1 comprises a trapezoidal hollow body 2 delimited by a flat lower wall 3 having a toothed edge 4, by two lateral walls 5 transversal to the lower wall 3, and by an upper wall 6 facing the lower wall 3, which carries hooks 7 for connecting bucket 1 to the operating machine (not shown), and together with lower wall 3 and lateral walls 5, delimits a front opening 8, delimited at the bottom by the toothed edge 4, for loading the material and a rear opening 9 having a generally rectangular shape and facing the front opening 8.

[0011] Bucket 1 further comprises a screening group 10, which is arranged at the bottom of the hollow body 2, closes the rear opening 9 and is actuated, in use, once bucket 1 has been loaded, lifted off the ground and arranged with the front opening 8 upwards, for separating and possibly crushing the material loaded and letting the selected material fall outside.

[0012] As shown in figures 1 and 2, the screening group 10 comprises a support frame 11, which is firmly connected to the hollow body 2, is shaped as a rectangular frame which surrounds the rear opening 9, and comprises an upper plate 12 and a lower plate 13 parallel to each other and arranged at respective long sides of the rear opening 9, and two lateral plates 14 and 15, which are arranged at respective short sides of the rear opening 9, are parallel to each other and transversal to the lower 12 and upper 13 walls and are substantially coplanar to the respective lateral walls 5 of the hollow body 2.

[0013] The upper 12, lower 13 and lateral 14 plates are flat plates having a generally rectangular shape, while the lateral plate 15 has a rectangular recess 16 along a rear edge thereof opposite to the edge connected to the lateral wall 5, which recess imparts a C shape to the lateral plate 15 and is usually closed by a counter-plate 17 removably connected to the outer surface of the lateral plate 15.

[0014] The screening group 10 further comprises a plurality of blade drums 18, which extend adjacent to one another through the rear opening 9 and are supported by frame 11 to rotate about respective longitudinal axes 19 parallel to one another and perpendicular to the lateral plates 14 and 15.

[0015] Drums 18 are screening drums of the known type, and each of them generally comprises a shaft 20 and a plurality of suitably shaped disc blades 21, which are keyed onto shaft 20, are evenly distributed along the longitudinal axis 19 and are adapted to cooperate, in use, with the blades 21 of the other drums 18 and with two combs 22 fixed to the inner sides of the upper 12 and lower 13 plates for crushing and selecting the material within bucket 1. For simplicity reasons, the example described relates to a screening group 10 having only two drums 18 rotatable about respective longitudinal axes 19 coplanar to each other; obviously, the number of drums 18 may be greater than two and the respective longitudinal axes 19 may be offset to each other.

[0016] With reference to figures 2 and 3, the screening group 10 finally comprises a unit 23 for actuating drums 18, comprising a hydraulic actuator 24 which is mounted outside the upper plate 12 close to the lateral plate 14, is provided with couplings for the connection to the oil hydraulic circuit of the operating machine (not shown), and has an output shaft 25 which extends, with the interposition of a bearing 26, through the lateral plate 14 to rotate about a respective axis 27 perpendicular to the lateral plate 14 itself and parallel to the longitudinal axes 19.

[0017] The actuating unit 23 further comprises a mechanical transmission 28 serving the function of transferring the rotational motion from the output shaft 25 to the shafts 20 of drums 18. As shown in figures 2 and 3, transmission 28 is mounted to the outer surface of the lateral plate 14, is enclosed into a protective shell 29 fixed to the lateral plate 14, and comprises a toothed pulley 30 keyed onto the free end of the output shaft 25 and a plurality of toothed pulleys 31 angularly coupled to one another and to the toothed pulley 30 by means of chains.

[0018] In the example shown, there are four pulleys 31 which are grouped in two pairs, each of which is associated with a respective drum 18 and is keyed onto a shaft 32, which is coaxial to the longitudinal axis 19 of the related drum 18 and is rotatably mounted through the lateral plate 14 by the interposition of a respective bearing 33 fixed to the lateral plate 14 by means of a fixing plate 34.

[0019] The transmission of the rotational motion from output shaft 25 to shafts 32 is carried out by means of a first chain 35, which is wound about pulley 30 and about a pulley 31 of a first pair of pulleys 31, and by means of a second chain 36 which is wound about the other pulley 31 of the first pair and about a pulley 31 of the second pair. The other pulley 31 of the second pair remains unused and could theoretically be missing. The reason why the use of identical shafts 32, i.e. having the same number of pulleys 31, is preferred is that shafts 32 are thus interchangeable, whatever their number inside the transmission 28, with obvious advantages in terms of reduction in design costs and assembly time of transmission 18.

[0020] Each shaft 32 has a free end, which protrudes beyond the lateral plate 14 and is angularly coupled to

an axial end of the shaft 20 of a respective drum 18 by means of a releasable axial plug-in fast joint 37.

[0021] In particular, as shown in figures 3 and 4, each joint 37 is of the radial teeth type and comprises a grooved shaft 38, which is directly obtained on the free end of the respective shaft 32, or is integrally connected thereto, and engages a grooved hole 39 obtained on the axial end of shaft 20 in a position coaxial to the longitudinal axis 19.

[0022] At the opposite axial ends thereof, drums 18 are rotatably supported by counter-plate 17 through respective bearings 40, each of which is carried by counter-plate 17, is coaxial to a respective longitudinal axis 19, and is releasably engaged by a tang 41 defining the free end of a respective shaft 20.

[0023] In particular, as shown in figure 4, counter-plate 17 accommodates bearings 40 at a central bulging portion 17a thereof, which extends through recess 16 towards drums 18 and has a thickness approximately equal to the length of each grooved shaft 38, so as to axially lock the drums 18 between counter-plate 7 and lateral plate 14.

[0024] From the size point of view, it should be noted that the sum of the length of each drum 18 free from tang 41 and of the length of the respective grooved shaft 38 is lower than the distance between the lateral walls 14 and 15, and the distance between tangs 41 is lower than the height of recess 16.

[0025] In use, when drums 18 need to be replaced, it is sufficient to detach the counter-plate 17, and bearings 40 therewith, from the lateral plate 15 and axially extract the drums 18 up to causing the release of the respective joints 37, and at that point transversally remove drums 18. The assembly operation is carried out by performing the same operations in the reverse order, i.e. by arranging the drums 18 into frame 11 in axial alignment with the grooved shafts 38 (figure 4), by axially moving drums 18 towards the lateral plate 14 so as to cause the fitting of joints 37, inserting the portion 17a of counter-plate 17 through recess 16 so as to introduce the tangs 41 into the respective bearings 40, and finally locking the counter-plate 17 on the lateral plate 15.

[0026] To conclude the above description, it should be noted that according to variants not shown, the axial plug-in fast joints 37 may be of a different type from that described. For example, each joint 37 may consist of a shaft with key or of a free shaft provided with a removable pin.

[0027] Moreover, according to a variant (not shown), each grooved shaft 38 is integral with and coaxial to the respective shaft 20, and each grooved hole 39 is axially obtained on the respective shaft 32.

[0028] Finally, according to a further variant (not shown), the upper 12, lower 13 and lateral 14 and 15 plates may be integrally obtained with the hollow body 2 as extensions of the lower wall 3 and of the upper wall 6 and the lateral walls 5, respectively.

Claims

1. A screening bucket having a loading front opening (8) and a rear opening (9) facing the front opening (8), and comprising a screening group (10), which is arranged through the rear opening (9) and comprises a support frame (11) and a plurality of screening drums (18) mounted to the frame (11) to rotate about respective longitudinal axes (19) parallel to one another; the bucket (1) further comprising actuating means (23) adapted to rotate the drums (18) about the respective longitudinal axes (19) and comprising a mechanical transmission (28); the frame (11) comprising a first plate (14) and a second plate (15) perpendicular to said longitudinal axes (19) and arranged on opposite sides of the rear opening (9); and the mechanical transmission (28) being mounted to the first plate (14) and comprising, for each drum (18), a respective power take-off (38) mounted through the first plate (14); the screening bucket (1) being **characterized in that** each power take-off (38) is angularly coupled to an end of the respective drum (18) in a releasable manner by means of an axial plug-in fast joint (37).

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2. The screening bucket claimed in claim 1, comprising a counter-plate (17), which is parallel to the first plate (14), is arranged opposite to the rear opening (9) with respect to the first plate (14), is releasably coupled to the frame (11), and supports the ends of the drums (18) opposite to those coupled to the power take-offs (38), in a rotatable and releasable manner.

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3. The screening bucket claimed in claim 2, wherein the second plate (15) has a through opening (16) facing the first plate (14); the counter-plate (17) being releasably connected to the second plate (15) to close said through opening (16) and axially lock the drums (18) between the first plate (14) and the counter-plate (17) itself.

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4. The screening bucket claimed in one of the preceding claims, wherein said joint (37) is a toothed joint.
5. The screening bucket claimed in one of the preceding claims, wherein said joint (37) comprises an externally grooved shaft (38), which is coaxial to the respective drum (18) and defines a respective said power take-off (38).

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6. The screening bucket claimed in claim 5, wherein the first plate (14) and the second plate (15) are arranged at a certain distance from each other at least equal to the sum of a length of the externally grooved shaft (38) and the length of the respective drum (18).

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7. The screening bucket claimed in claims 3 and 6, wherein the counter-plate (17) is provided with a central bulging portion (17a) which carries, for each drum (18), a rotatable support (40); the central bulging portion (17a) extending through said through opening (16) and having a thickness approximately equal to the length of each externally grooved shaft (38).
8. The screening bucket claimed in one of the preceding claims, wherein the mechanical transmission (28) is mounted to a external surface of the first plate (14) and comprises a first inlet shaft (25) and, for each drum (18), a second shaft (32) rotatably mounted through the first plate (14), and chain transmission means (35, 36) interposed between the first shaft (25) and the second shaft (32).

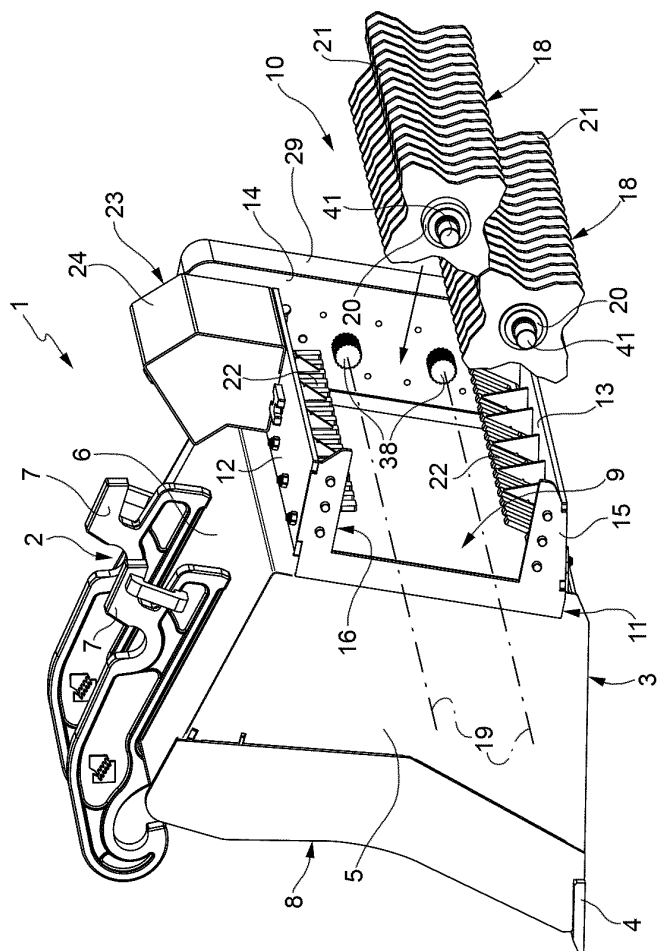


FIG. 1

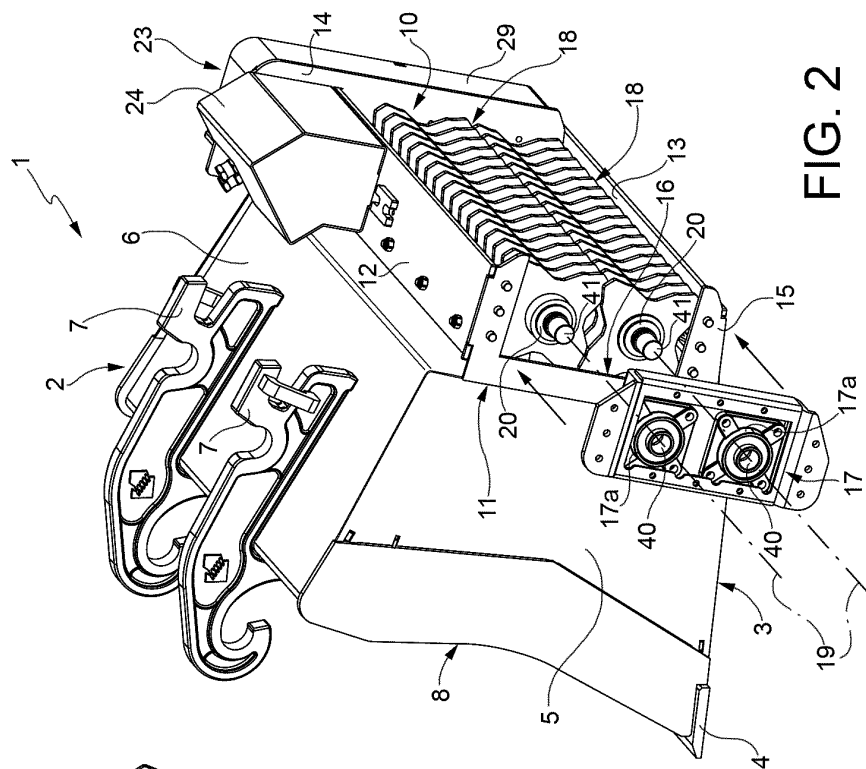
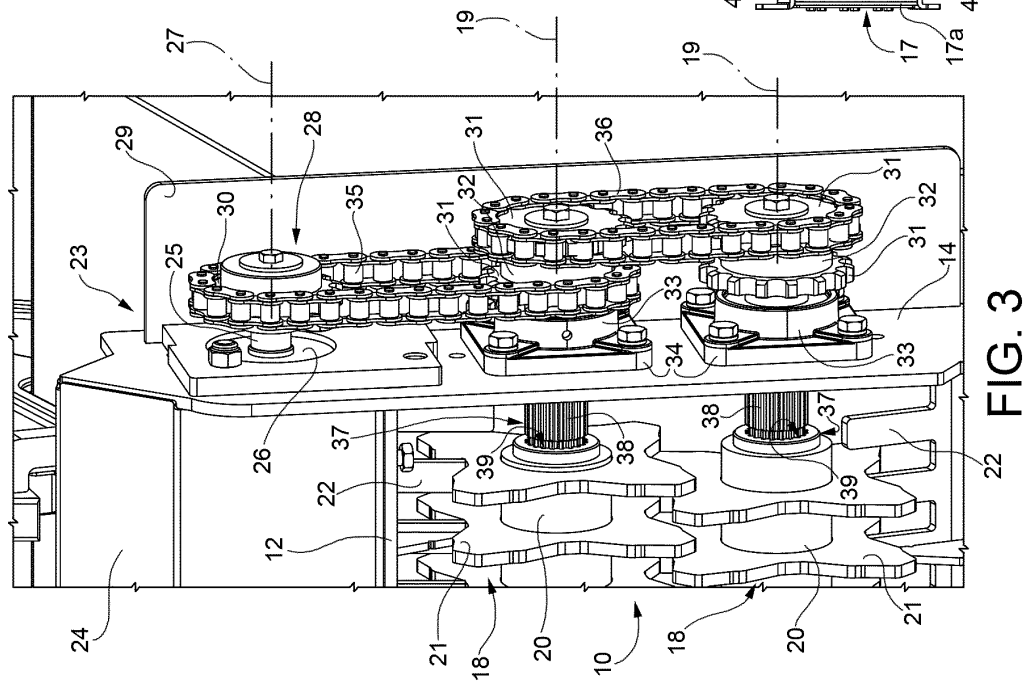
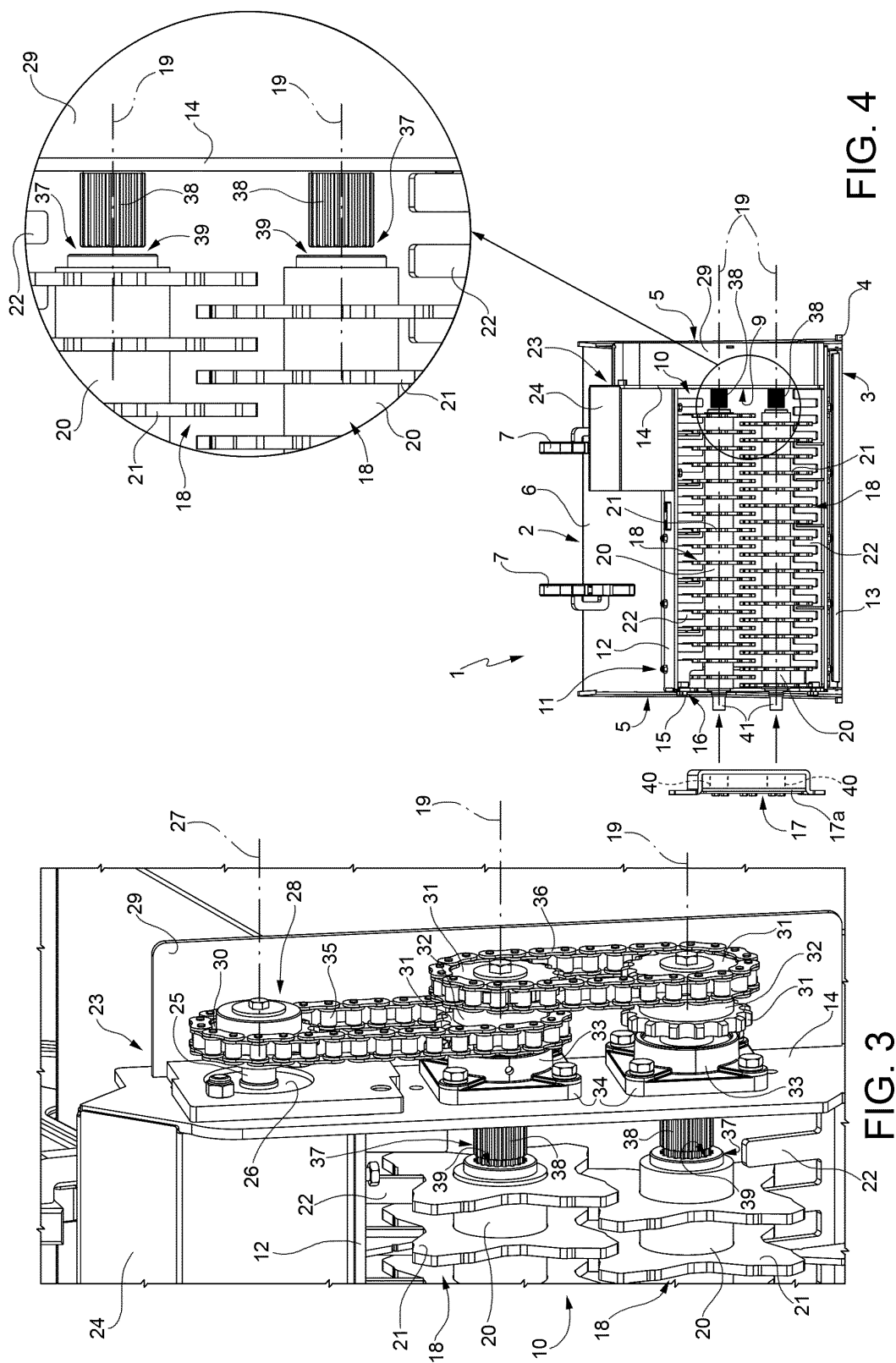


FIG. 2





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Application Number
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