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(54) OPEN-END TYPE OF SPINNING APPARATUS WITH IMPROVED DEVICE FOR LOADING A NEW TUBE IN THE DOFFING CYCLE AND METHOD FOR LOADING A NEW TUBE IN THE DOFFING CYCLE OF THE OPEN-END TYPE SPINNING APPARATUS

(57) A spinning apparatus comprising at least one spinning head having a spinning unit and a reel winding unit, wherein the reel winding unit wraps a reel of yarn obtained from the underlying spinning unit on a tube, a tube-holder basket housing a plurality of tubes on which the yarn is wound, a doffing tray positionable on the spinning unit and provided with devices for picking up and transporting a tube from the tube-holder basket to a pair of tailstocks on the reel winding unit. The doffing tray comprises a tube separator device having a support arm which supports two blades, movable, so as to intercept a number of tubes contained in the tube-holder basket and to separate them at least partially from a tube destined to be grasped by the pick-up and transport device and placed between the tailstocks. Advantageously, the tube separator device and the pick-up and transport device are mechanically independent of each other, so that they may be operated separately from each other.

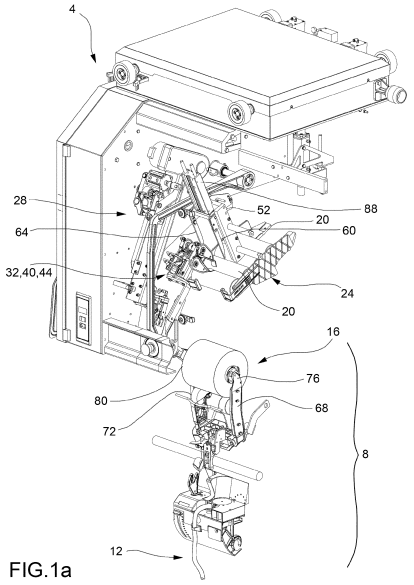

FIG.1a

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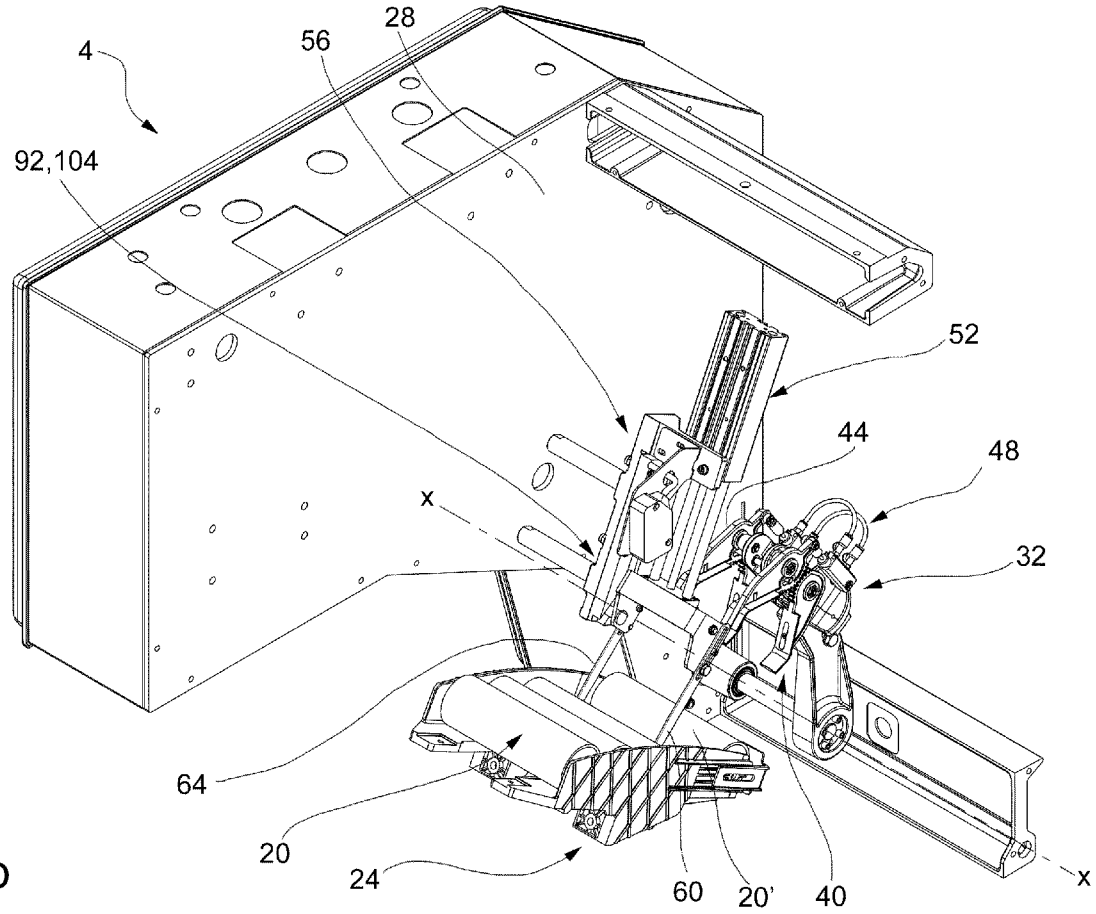


FIG.1b

Description

SCOPE

[0001] The present invention relates to an open-end type of spinning apparatus with an improved device for loading a new tube in the doffing cycle and the method for loading a new tube in the doffing cycle of said open-end type spinning apparatus.

PRIOR ART

[0002] As is known, the tube restraint system in a spinning apparatus intervenes in the phase of loading a new tube in the doffing cycle, i.e. after an already formed reel has been removed from the tips of the reel-holder arm to be taken away, and a new empty tube must be positioned between the same tips to serve as support for the yarn, so as to wind and form a new reel thereon.

[0003] In this step the empty tubes are taken from a special basket positioned above the winding unit; in this basket there are four or five empty tubes lying for example horizontally; the basket is positioned slightly inclined to ensure that at least one tube is at the lower end of the basket itself at all times.

[0004] In this step, the doffing tray, which is provided on the spinning apparatus, grasps the lower tube by means of suitable pincers to position it between the tailstocks of the reel-holder arm. Because of gravity and the inclination of the basket, all the tubes will lean against each other.

[0005] For this reason, tube restraint devices are known in the art which have the purpose of separating the tubes from each other so as to facilitate the step of automatically capturing them by means of special pincers: in the absence of such restraint devices, the pincers would not easily be able to pick up the empty tube and, inserting themselves forcefully between the tubes, could also damage the empty tubes.

PRESENTATION OF THE INVENTION

[0006] The known solutions described above have drawbacks and limitations, essentially due to the fact that they provide for the use of complex, expensive, and not very flexible devices for carrying out the loading of a new tube in the doffing cycle.

[0007] These devices, in effect, provide for the use of complex mechanisms which must coordinate a plurality of components so that they may unload the reel formed, separate the new tubes, pick up a new tube and load the latter between the tailstocks without jams or collisions among the various moving parts.

[0008] Often, such devices are also slow because the corresponding operations are sequential and therefore the various steps are carried out according to a precise and rigid succession.

[0009] The need is therefore perceived to resolve the drawbacks and limitations cited with reference to the known art.

[0010] This requirement is satisfied by an open-end type spinning apparatus according to claim 1 and by a method for loading a new tube in the doffing cycle of said open-end type spinning apparatus according to claim 12.

DESCRIPTION OF THE DRAWINGS

[0011] Further features and advantages of the present invention will become more understandable from the following description of the preferred and non-limiting embodiments thereof, wherein:

figure 1a shows a perspective view of an open-end type spinning apparatus according to an embodiment of the present invention;
figure 1b shows a partial perspective view of the apparatus of figure 1a;
figure 2 shows a side view, partially in section, of the spinning apparatus of figure 1b, in the initial configuration of not picking up a new tube;
figure 3 shows a side view, partially in section, of the spinning apparatus of figure 1b, in a configuration of separating and picking up a new tube from the other tubes contained in the tube-holder basket;
figure 4 shows a side view, partially in section, of the spinning apparatus of figure 1b, in a configuration of delivering the tube just picked up between the related tailstocks;
figure 5 shows a side and top view of a pair of tailstocks in an open configuration, suitable to receive a new tube;
figure 6 shows a side view of the pair of tailstocks of figure 5 in a closed configuration suitable to rotatably support a new tube.

[0012] The elements or parts of elements in common between the embodiments described hereinafter will be indicated at the same numerical references.

DETAILED DESCRIPTION

[0013] With reference to the aforementioned figures, a total schematic view of an open-end type spinning apparatus according to the present invention is collectively indicated at 4.

[0014] In particular, the spinning apparatus 4 comprises at least one spinning head 8 having a spinning unit 12 and a reel winding unit 16, wherein the reel winding unit 16 winds, onto a tube 20, a reel of yarn obtained from the underlying spinning unit 12.

[0015] The spinning apparatus 4 comprises a tube-holder basket 24 housing a plurality of tubes 20 on which to wind the yarn.

[0016] For example, such tubes 20 are arranged in a horizontal position and stacked on each other in direct contact with each other.

[0017] The spinning apparatus 4 further comprises a doffing tray 28 which may be positioned at the spinning unit 12 and provided with pick-up and transport devices 32 for a tube 20 from the tube-holder basket 24 to a pair of tailstocks 76,80 (figures 6-7) of the reel winding unit 16.

[0018] For example, the pick-up and transport device 32 comprises a pair of pincers 40,44 suitable to grip a tube 20, provided with respective actuation means 48.

[0019] Advantageously, the doffing tray 28 comprises a tube separator device 52 having a support arm 56 which supports two blades 60,64 which are movable so as to intercept a number of tubes 20 contained in the tube-holder basket 24 and to separate them at least partially from a tube 20' destined to be grasped by the pick-up and transport device 32 and placed between the tailstocks 76,80.

[0020] Preferably, the support arm 56 comprises a pair of levers 68,72 which support left and right tailstocks 76, 80, suitable to support a tube 20, hinged one to the other and with an elastic means 84, for example a spring, interposed in order to mechanically connect the levers 68,72 to each other, allowing the simultaneous opening and closing thereof by acting on only one of said levers.

[0021] The doffing tray 28 is also provided with actuating devices of at least one of said levers 68, 72, so as to control the opening and closing thereof.

[0022] Said tailstocks 76,80 are mounted floating on the respective levers 68,72 so as to automatically center the tube 20 on the tailstocks 76,80, during the closing step thereof.

[0023] Advantageously, the tube separator device 52 and the pick-up and transport device 32 are mechanically independent of each other, so that they may be operated separately.

[0024] In particular, the pincers 40,44 are provided with actuation means 48 which are mechanically independent from the movement means 88 of the tube separator device 52.

[0025] According to one embodiment, the tube separator device 52 comprises a pair of blades 60,64 retractable so as to reach, in the extracted position (figure 3), the tube-holder basket 24, intercepting a group of tubes 20 and separating them from a tube 20' destined to be gripped by the pick-up and transport device 32.

[0026] Preferably, the tube separator device 52 is provided with movement means 88, which permit the passage from a retracted configuration to an extracted configuration according to a substantially rectilinear movement, and with tilting means 92, which allow the tilting of the blades 60,64 according to a tilting axis X-X substantially parallel to a horizontal lying axis of the tube 20' to be picked up.

[0027] For example, the movement means 88 comprise a piston 94 to which a joint 96 is attached with a peg, to the joint 96 of which are integral the separator blades 60,64 and a cam 100 attached to the doffing tray 28.

[0028] According to one embodiment, the tilting means 92 comprise a skate 104, integral with said blades 60,64 and engaged in a cam 100 provided with a groove 108 which defines a curvilinear path suitable to allow said tilting movement of the blades 60,64.

[0029] Preferably, the open-end type spinning apparatus 4 comprises a control unit programmed for:

- monitoring the formation step of a reel being formed around a relative tube 20,
- checking the presence of a plurality of tubes 20 in the tube-holder basket 24,
- providing for the unloading of a formed reel from a pair of tailstocks 76,80,
- moving, independently of each other, the tube separator device 52 so as to separate the plurality of tubes 20 from a chosen tube 20' to be picked up, and the pick-up and transport device 32 so as to grasp the chosen tube 20' and position it next to said pair of tailstocks 76,80.

[0030] The control unit is programmed to operate, via the support arm 56, at least one of said tailstocks 76,80 to automatically grasp and center the tube 20'.

[0031] The operation of an open-end type spinning apparatus according to the present invention will now be described.

[0032] In particular, the apparatus according to the present invention allows a method for unloading a reel to be carried out comprising the steps of:

- monitoring the formation step of a reel being formed around a relative tube 20,
- checking the presence of a plurality of tubes 20 in the tube-holder basket 24,
- providing for the unloading of a formed reel from a pair of tailstocks 76,80,
- moving, independently of each other, the tube separator device 52, so as to separate the plurality of tubes 20 from a chosen tube 20' to be picked up, and the pick-up and transport device 32, so as to grasp the chosen tube 20' and position it in proximity to said pair of tailstocks 76,80.

[0033] According to one embodiment, the method of loading a new tube 20' in the doffing cycle of a spinning apparatus 4 comprises the step of actuating, via the support arm 56, at least one of said tailstocks 76, 80 to automatically grasp and center the tube 20'.

[0034] As may be appreciated from the foregoing, the open-end type spinning apparatus and the method for unloading a reel from an open-end type spinning apparatus according to the invention allows the drawbacks presented in the prior art to be overcome.

[0035] Advantageously, the solution of the present invention provides for the independence of the two movements, i.e. the step of separating the tubes and the step of picking up and transporting the tube between the tailstocks.

[0036] In this way it is possible to obtain a better control of the devices because the tube arrives at the centering step on the tailstocks without having interfered with guide or thrust blades as in the solutions of the prior art. These possible contacts could in fact compromise the correct grip of the tube holder.

[0037] Moreover, the tube separator device, being independent of the tube-holder arm, may be operated at different times; for example, it is allowed to return with reduced speed so that the tubes made to withdraw redescend in contact with the separator and in an orderly manner, avoiding incorrect positioning of the tubes on the respective guides.

[0038] Furthermore, the arm itself, as needed, may be opened not only by the tray of the open-end machine but also by hand.

[0039] A person skilled in the art, in the object of satisfying contingent and specific requirements, may make numerous modifications and variations to the apparatuses and methods of the present invention, all of which are within the scope of the invention as defined by the following claims.

Claims

1. Open-end type spinning apparatus (4) comprising at least one spinning head (8) having a spinning unit (12) and a reel winding unit (16), wherein the reel winding unit (16) winds onto a tube (20) a reel of yarn obtained from the underlying spinning unit (12),

- a tube-holder basket (24) housing a plurality of tubes (20) to wind the yarn onto,
- a doffing tray (28) which can be positioned at the spinning unit (12) and fitted with pick-up and transport devices (32) of a tube (20') from the tube-holder basket (24) to a pair of tailstocks (76,80) of the reel winding unit (16),
- the doffing tray (28) comprises a tube separator device (52) having a support arm (56) which supports two blades (60) movable so as to intercept a number of tubes (20) contained in the tube-holder basket (24) and to separate them at least partially from a tube (20') destined to be grasped by the pick-up and transport device (32) and placed between the tailstocks (76,80),

characterized in that
the tube separator device (52) and the pick-up and transport device (32) are mechanically independent of each other, so that they can be operated separately.

2. Open-end type spinning apparatus (4) according to claim 1, wherein the tube separator device (52) comprises a pair of retractable blades (60) so as to reach, in an extracted position, the tube-holder basket (24), intercept a group of tubes (20) and separate them from a tube (20') destined to be grasped by the pick-up and transport device (32).

3. Open-end type spinning apparatus (4) according to claim 2, wherein the tube separator device (52) is fitted with movement means (88), which permit the passage from a retracted configuration to an extracted configuration according to a substantially rectilinear straight movement, and with tilting means (92) which allow the tilting of the blades (60) according to a tilting axis (X-X) substantially parallel to a horizontal lying axis of the tube (20') to be picked up.

4. Open-end type spinning apparatus (4) according to claim 3, wherein said movement means (88) comprise a piston (94) to which a joint (96) is attached with a peg, to such joint (96) the separator blades (60) and a cam (100) attached to the doffing tray (28) being integral.

5. Open-end type spinning apparatus (4) according to claim 3 or 4, wherein said tilting means (92) comprise a skate (104) integral with said blades (60) and engaged in a cam (100) provided with a groove (108) which identifies a curvilinear path suitable to allow said tilting movement of the blades (60).

6. Open-end type spinning apparatus (4) according to any of the preceding claims, wherein the pick-up and transport device (32) comprises a pair of pincers (40,44) suitable to grasp a tube (20), fitted with actuation means (48) mechanically independent of the movement means (88) of the tube separator device (52).

7. Open-end type spinning apparatus (4) according to any of the preceding claims, wherein said support arm (56) consists of a pair of levers (68,72) which support left and right tailstocks (76,80), suitable to support a tube (20), hinged one to the other and with an elastic means (84) interposed, in order to mechanically connect the levers (68,72) to each other, allowing simultaneous opening and closing by acting on only one of said levers (68,72).

8. Open-end type spinning apparatus (4) according to claim 7, wherein the doffing tray (28) is fitted with actuator devices of at least one of said levers (68,72) so as to control the opening and closing thereof.

9. Open-end type spinning apparatus (4) according to claim 7 or 8, wherein the tailstocks (76,80) are mounted floating on the levers (68,72) so as to realize automatically the centering of the tube (20) on the tailstocks (76,80), during the closing thereof.

10. Open-end type spinning apparatus (4) according to

any of the preceding claims, comprising a control unit programmed to:

- monitor the formation step of a reel in formation around a relative tube (20),
- check the presence of a plurality of tubes (20) in the tube-holder basket (24),
- provide for the unloading of a reel formed by a pair of tailstocks (76,80),
- move, independently of each other, the tube separator device (52) so as to separate the plurality of tubes (20) from a chosen tube (20') to be picked up, and the pick-up and transport device (32) so as to grasp the chosen tube (20') and position it next to said pair of tailstocks (76,80).

11. Open-end type spinning apparatus (4) according to claim 10, wherein the control unit is programmed to operate, via the support arm (56), at least one of said tailstocks (76,80) to automatically grasp and center the tube (20').

12. Method of loading a new tube (20') in the doffing cycle of an open-end type spinning apparatus (4) according to any of the preceding claims, comprising the steps of:

- monitoring the formation step of a reel in formation around a relative tube (20),
- checking the presence of a plurality of tubes (20) in the tube-holder basket (24),
- providing for the unloading of a reel formed by a pair of tailstocks (76,80),
- moving, independently of each other, the tube separator device (52) so as to separate the plurality of tubes (20) from a chosen tube (20') to be picked up, and the pick-up and transport device (32) so as to grasp the chosen tube (20') and position it next to said pair of tailstocks (76,80).

13. Method of loading a new tube (20') in the doffing cycle of an open-end type spinning apparatus (4) according to claim 12, comprising the step of actuating, via the support arm (56), at least one of said tailstocks (76,80) to automatically grasp and center the tube (20').

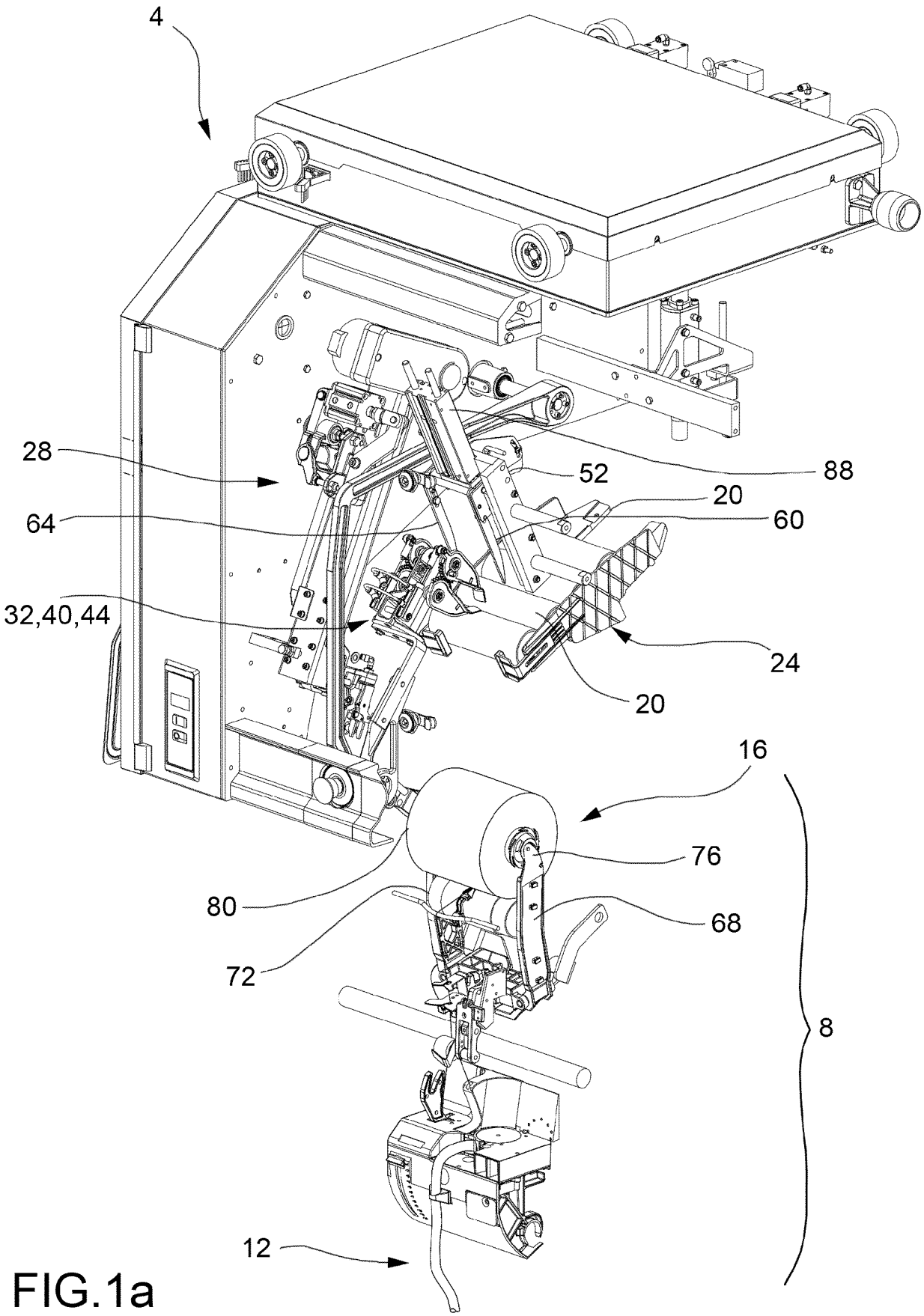


FIG.1a

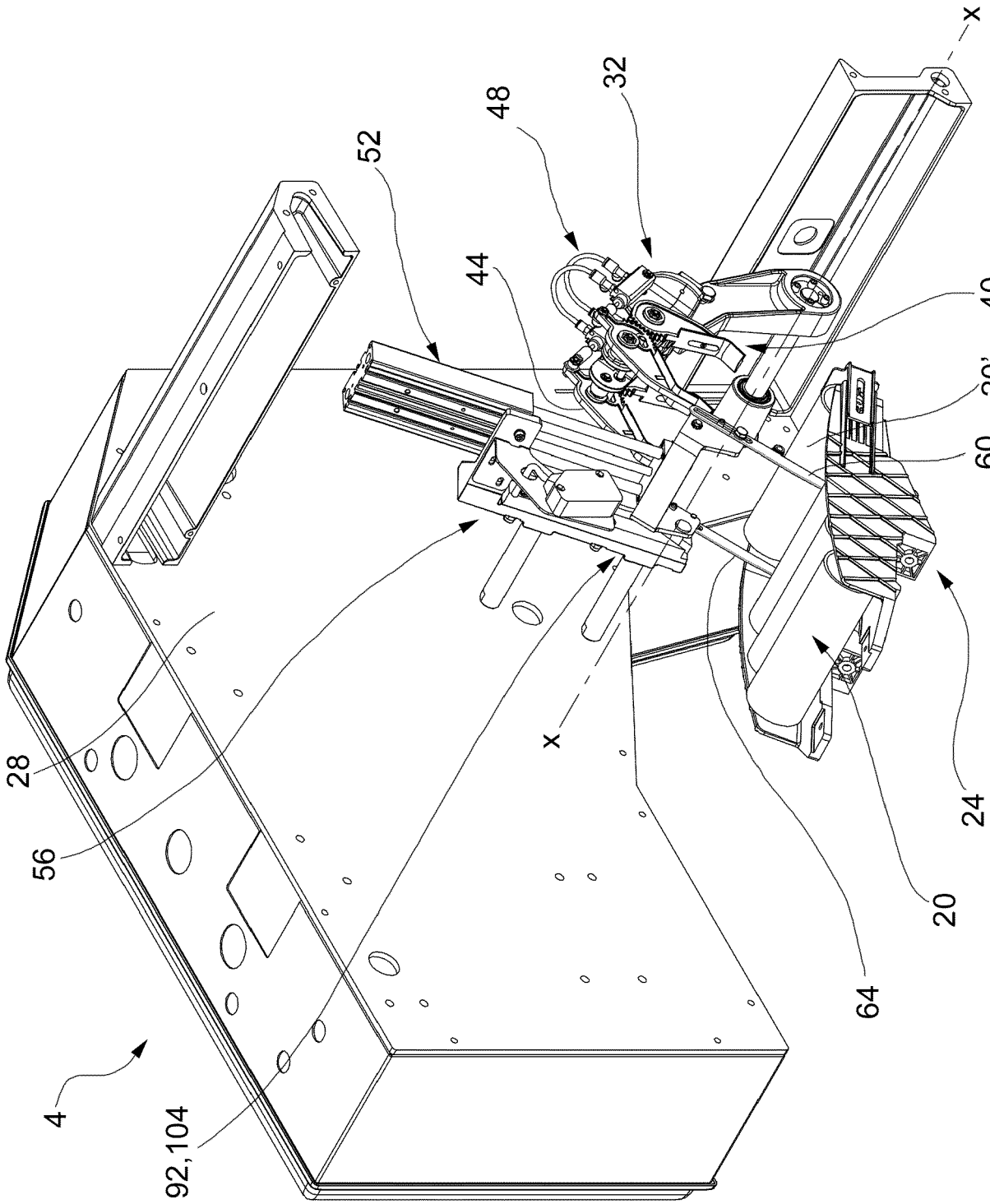


FIG.1b

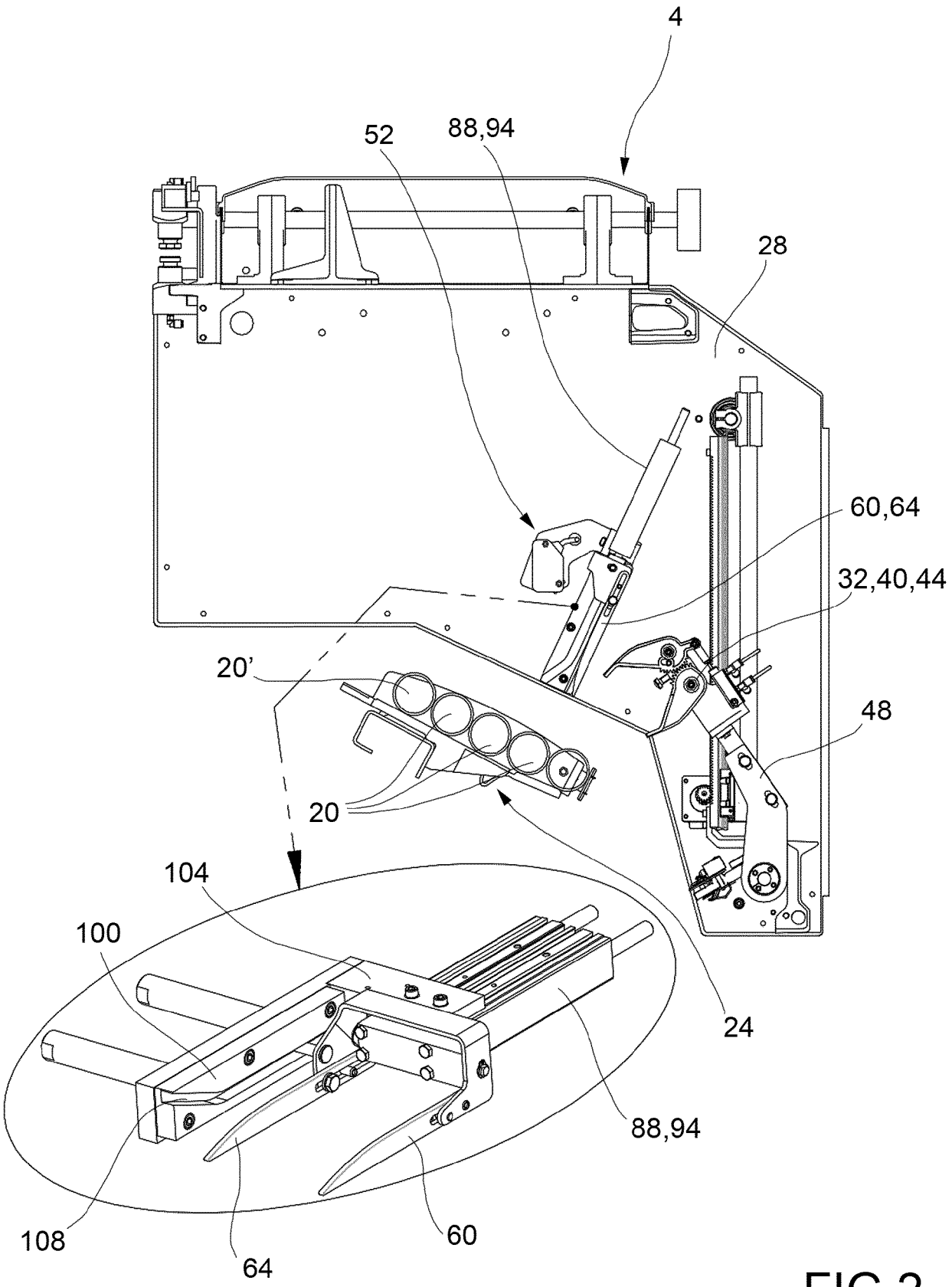


FIG.2

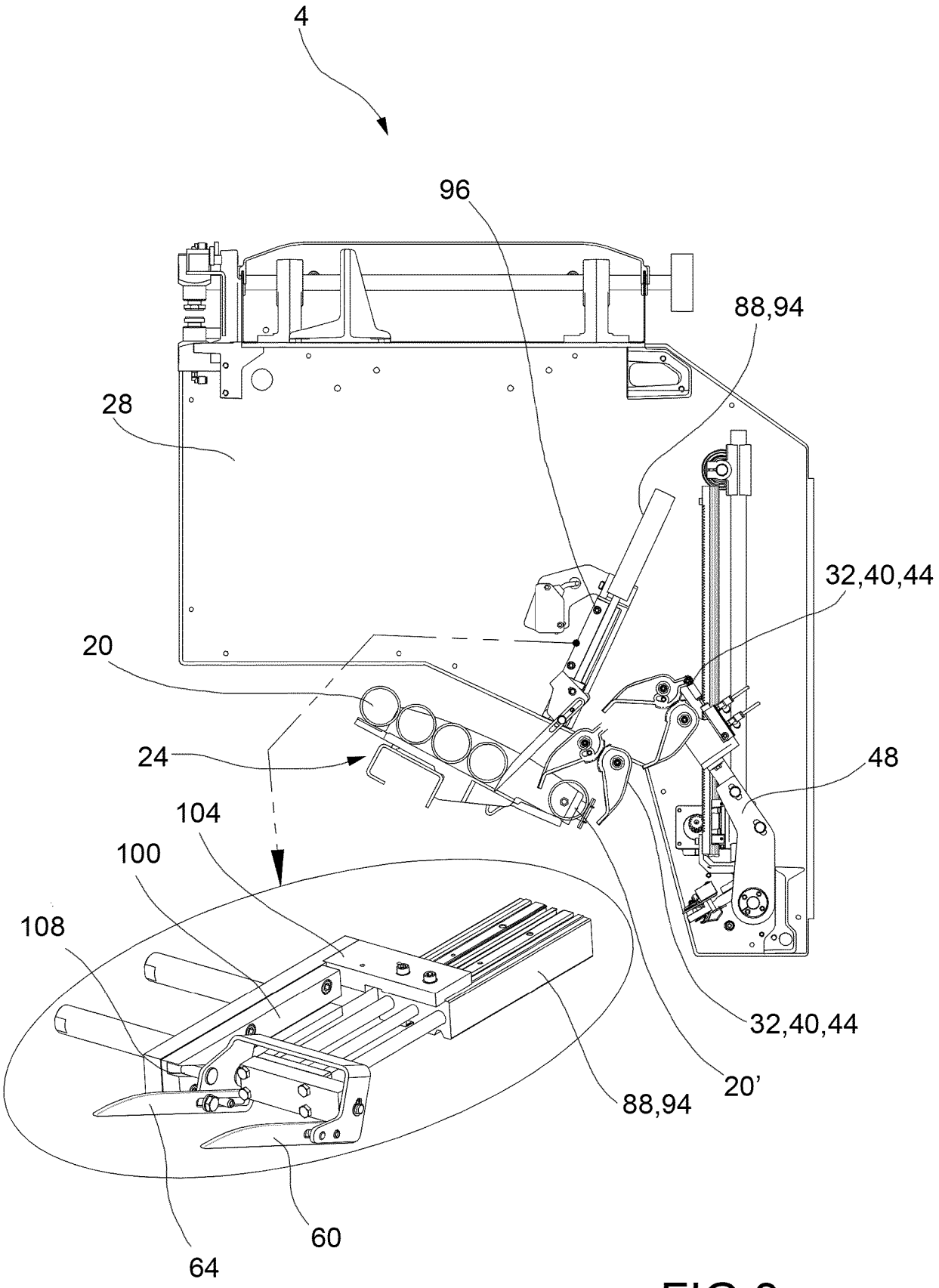


FIG.3

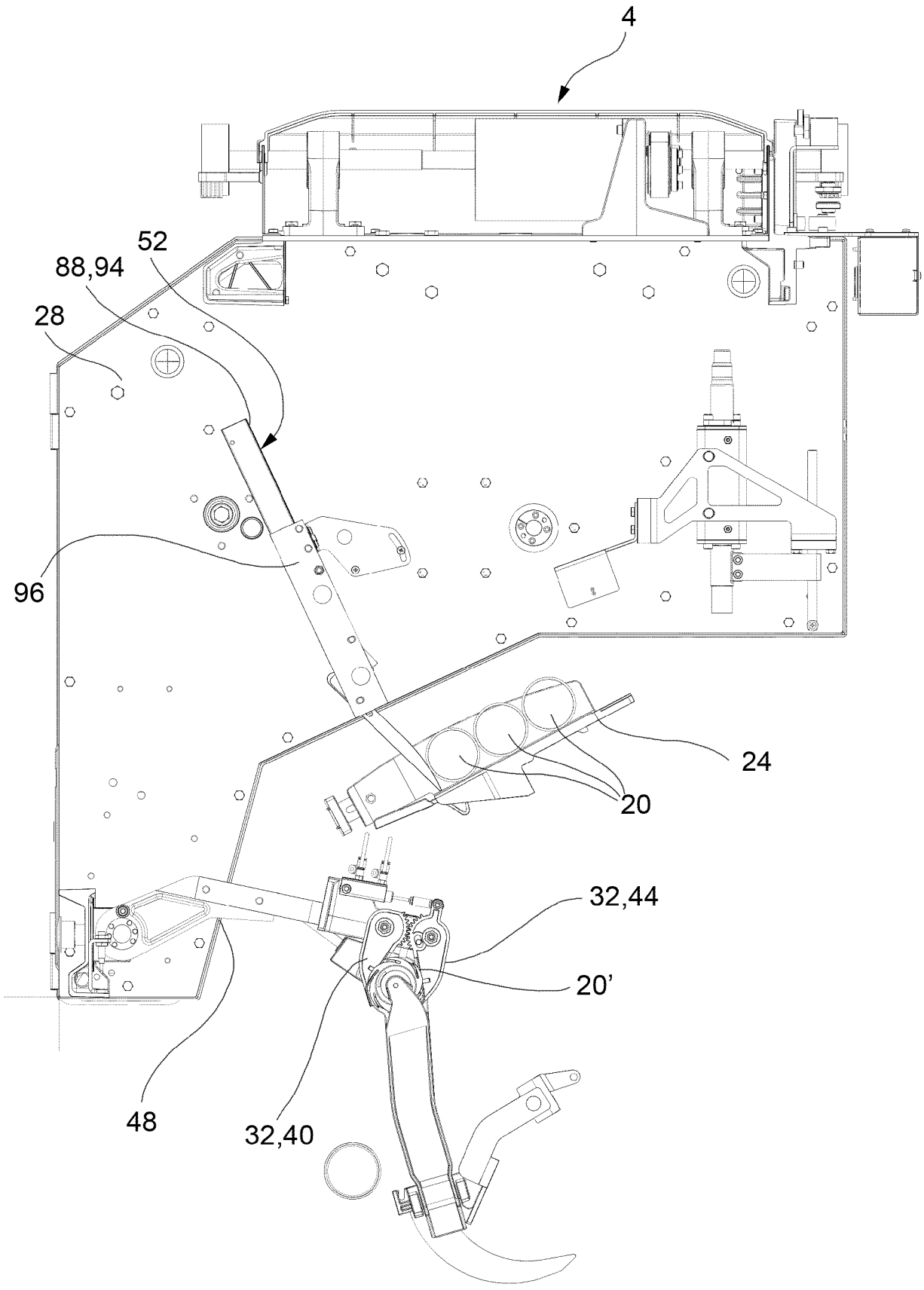


FIG.4

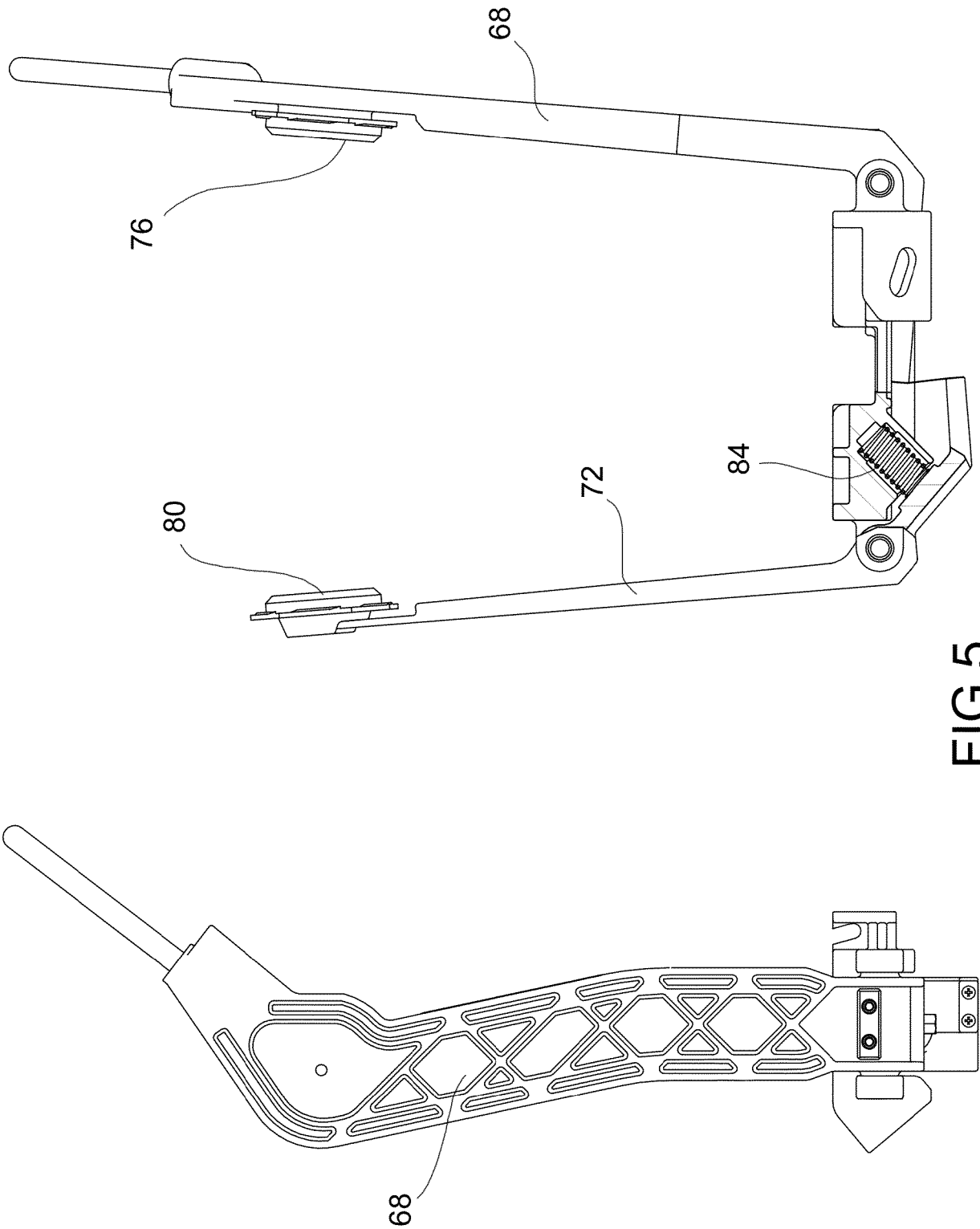


FIG.5

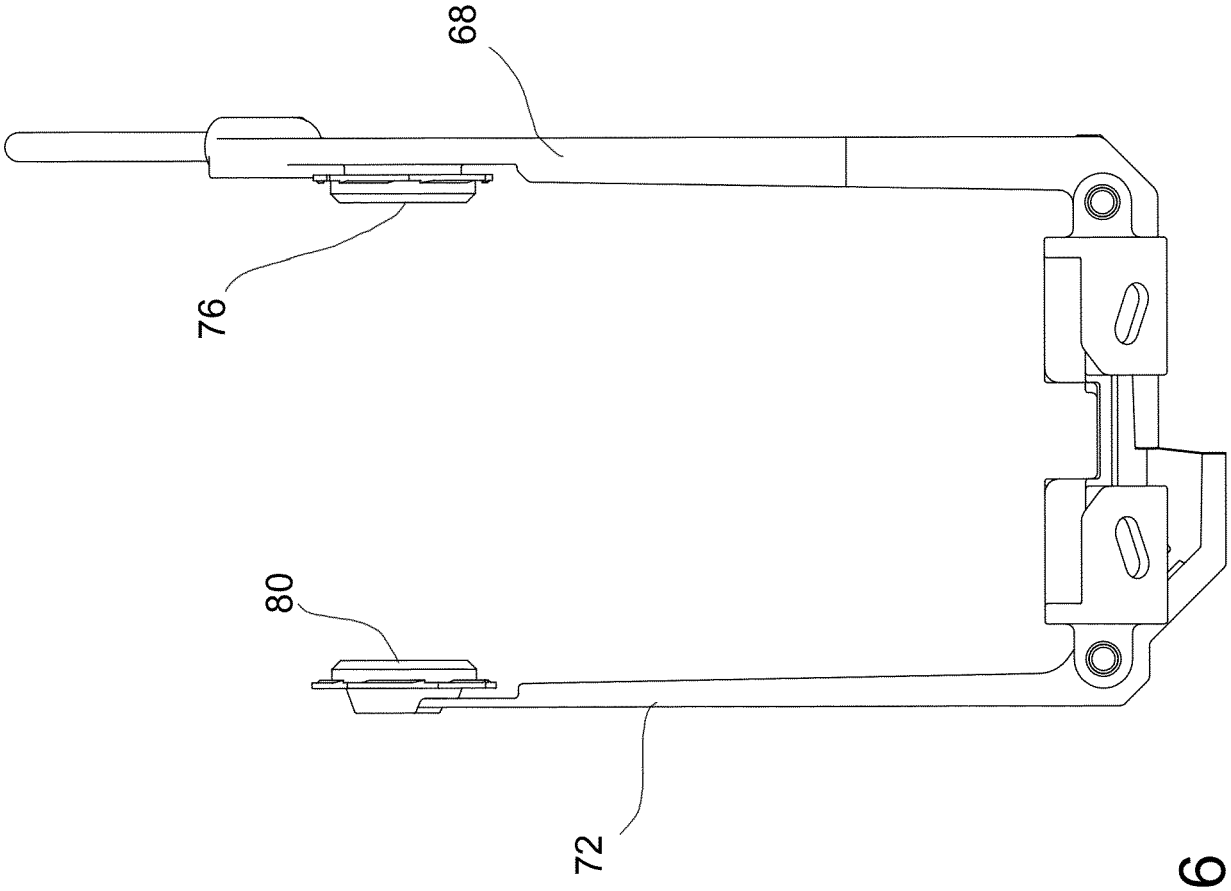
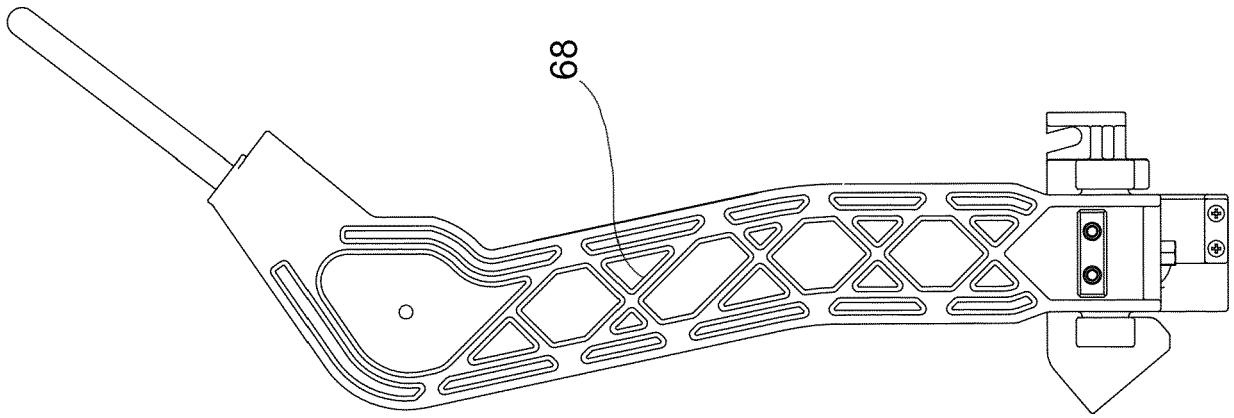


FIG.6



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EUROPEAN SEARCH REPORT

Application Number
EP 18 15 3503

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TECHNICAL FIELDS SEARCHED (IPC)

D01H
B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 May 2018	Humbert, Thomas

CATEGORY OF CITED DOCUMENTS

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