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(54) **Packaging machine**

(57) A packaging machine is equipped with a rotation device (3) for a packaging (I) comprising at least one load (C) and an optional pallet (P) and having, in the input condition in the rotation device (3) a higher top face (V).

The rotation device 3 comprises a base means 5, nearly flat, assigned to support the face of the packaging opposite to the higher top face V, a back means 6, nearly flat, assigned to abut with a side face of the packaging I and an abutment means 7, nearly flat, fixed perpendicularly and in a manner longitudinally translating to the back means 6 and assigned to abut with said higher top face V as a result of a respective translational actuator 8.

The base means 5 and the back means 6 are independently pivotally fixed to a rotation axis means 10 and are independently rotated about the geometrical axis of

rotation of this rotation axis means 10 by rotation actuators of respectively first 11 seconds 12.

In an operative condition of the rotation device 3, and starting from its initial condition A, in which the base 5 and the back 6 means are respectively horizontal and vertical, the first rotation actuator (11) rotates the base means (5) about the rotation axis means (10) in a first direction of rotation, of a predetermined angle of rotation greater than 90° and less than 135° and vice versa and the second rotation actuator (12) rotates the back means (6) and the abutment means (7) about the rotation axis means (10) in the first direction of rotation of the predetermined angle greater than 90° and less than 135° and vice versa.

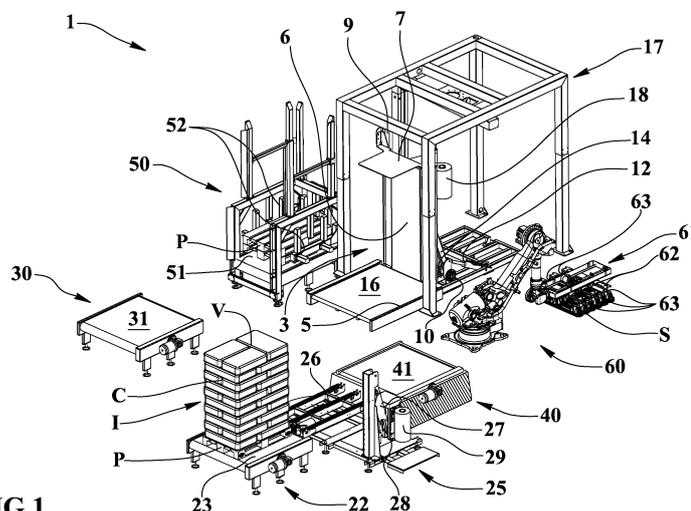


FIG.1

Description

[0001] The present invention refers to the packaging field and refers to a machine for the so-called "palletized packing" or rather for tertiary packaging, below simply indicated as packaging, composed by a base, for example a pallet or a plurality of support means, and by a load, for example a set of packages or boxes, where such machine allows to complete or to modify a packaging.

[0002] Said machine allows, for example, to wrap with film or stretchable film all the six faces, including the upper and lower, of the packaging or boxes that constitute the load of a pallet or similar, and possibly to replace such pallet with one of another type or with the support means.

[0003] There are known machines provided with planes or movable elements in mutual approaching to tighten the upper and lower faces of the packaging. These planes are interconnected to a rotating structure that allows overturning of 180° the planes and the packaging. The subsequent lifting of the plane that abuts with the pallet, which in this condition is placed above the load, allows of removing and replacing the pallet.

[0004] There are also known machines able to separate the load of a packaging from the respective pallet by the insertion between such load and pallet of thin rods that are raised together with the load, separating it from the pallet. In such way it is possible to wrap the upper and lower faces of the load with the film and reconstitute the original packaging using the pallet or other substitute.

[0005] The document no. NL1008203 discloses a packaging machine provided with a rotation device for a packaging comprising a base means, assigned to support the base face of the package, a back means assigned to abut with a side face of the packaging and an abutment means perpendicular to the back means and translating along the latter and assigned to abut with the upper face of the packaging as a result of a respective translational actuator. The base and back means are independently pivotally connected to a rotation axis and are independently rotated about the geometrical axis of the latter by rotation actuators.

[0006] One object of the present invention is to propose a packaging machine alternative to known machines.

[0007] Further object is to propose a machine able to wrap also the upper and lower faces of the packaging load and/or to replace the original packaging pallet with another pallet or other support means and/or to provide a pallet to a load that is unprovided of a pallet to make a complete composite packaging.

[0008] Other object is to propose a simple machine, and subject to less stress than those supported by the known machines and therefore lighter and cheaper.

[0009] Further object is to propose a machine extremely versatile and easily integrated into preexistent devices too.

[0010] The characteristics of the invention are below highlighted with particular reference to the accompany-

ing drawings in which:

- Figures 1-12 illustrate axonometric and partial views of the packaging machine, object of the present invention, in a sequence of respective operating steps;
- Figure 13 illustrates an axonometric and partial view of a first variant of the machine of Figure 1;
- figure 14 illustrates an axonometric and partial view of a second variant of the machine of Figure 1.

[0011] With reference to figures 1-12, 1 indicates the machine, object of the present invention, consisting of a rotation device 3 associated with a first wrapping means 17, of an input member 20 having an entry means 22 and a second wrapping means 25, of a carriage means 40, by a store means 50, of a robot arm 60 and of a glue dispenser 70 schematically shown only in Figure 9. Such rotation device 3 is able, also alone, to solve the technical problem of separating the pallet P from the load C of the packaging I. All the above elements of the machine 3, 17, 20, 30, 40, 50, 60 and 70 are placed or slide on a floor or a base of the machine 1 and are controlled and actuated in a coordinated and programmed manner by a management and control means which receives signals on their state by respective sensors and activates the actuators and motors to carry out the various functions of the handling and modification machine of the packaging I.

[0012] The packaging I, of the tertiary type also said "palletized packing", comprises a load C consisting, for example, of boxes, containers, packaging or similar, and a possible pallet P supporting the load; in fact in most cases the packaging comprises the base pallet P but it is also provided, for example coming out from a packaging line or from a store, that the load C is without the pallet; in such case the machine will be able to provide a base pallet for the load to the packaging. In the following, unless otherwise specified, the term packaging I means the load C with the respective pallet P.

[0013] The packaging I, in the input condition in the rotation device 3, has a higher top face V, opposite to the pallet and almost horizontal, and four vertical lateral faces and the base face matching the pallet P.

[0014] The rotation device 3 comprises a base means 5, nearly flat, assigned to support the face of the packaging opposite to the higher top face V, or to support the pallet if present. Such base means 5 comprises a first motorized conveyor means 16 which determines the abutment flat surface for the packaging I and translates the latter towards and away from the back means 6. The first conveyor means 16 can be of belt type, of multiple parallel belts or annular chains.

[0015] The rotation device 3 also comprises a back means 6, nearly flat, assigned to abut with a side face of the packaging I or rather a face of the packaging that, in the input condition into the rotation device 3, is vertical.

[0016] The abutment of the lateral face of the packaging with the back means 6 can be made at the moment

of deposition, for example by a mobile lift machine, of the packaging I on the base means but it is preferably provided that the lateral face of the packaging is placed in abutment with the back means 6 by a translation made by the first conveyor means 16 of the base means 5.

[0017] The rotation device 3 further comprises an abutment means 7, nearly flat, fixed perpendicularly and in a manner longitudinally translating to the back means 6 and assigned to abut with said higher top face V as a result of a respective translational actuator 8. In more detail the back means 6 is provided with a support plane for the side face of the packaging side by side placed in respect two side guides 9 along which slide respective side carriages of the abutment means 7. The translational actuator 8 can consist, for example, in one or two rotary motors fixed to the side carriages and having pinions meshing with respective racks fixed to the side rails 9, or can comprise motorized ring belts or chains, associated to the side rails 9 and fixed to the respective carriages, or such actuator 8 can comprise one or more linear actuators, for example of pneumatic cylinder type, having one end fixed to the back means and the other end attached to the abutment means 7.

[0018] The base means 5 and the back means 6 are independently pivotally fixed to a rotation axis means 10 and are independently rotated about the geometrical axis of rotation of this rotation axis means 10 by rotation actuators respectively first 11 and seconds 12, for example of linear hydraulic cylinder type or electric type. The rotation axis means 10 can comprise one or more pins or shafts rotatably engaged to bushings or bearings where such pins or shafts are fixed to a structure or base frame of the rotation device 3 and bushings or bearings are fixed to the respective base means 5 or to the back means 6 or vice versa, or the pins can be fixed to the respective base 5 or back 6 means and the bushings can be fixed to said structure. The base 5 and back 6 means are connected to the back or to the pins or bushings of said rotation axis means 10 by respective connection arm means 13, 14 consisting of structures of metallic tubular elements welded, or box arms, or welded plates or lugs. The base means 5 bears hooking and unhooking means for the pallet P of the packaging I, not shown, and, for example, of bolt or hook type actuated by respective actuators to removably lock the pallet engaging and unlatching side portions thereof

[0019] In an operative condition of the rotation device 3, and starting from its initial condition A, in which the base 5 and the back 6 means are respectively horizontal and vertical, the abutment means 7 is at the maximum height and the pallet of the packaging is placed on the base means 5 with a side face in abutment with the back means 6, the sliding actuator 8 translates the abutment means 7 downward to abut with the top face V of the packaging I, the first 11 and second 12 rotation actuators synchronously rotate the base 5 and the back 6 means in a first direction of rotation, by a predetermined angle of rotation greater than 90° and less than 135°, preferably

about 95°. In this position, the weight of the load C rests mainly on the back means 6 and partly on the abutment means 7.

[0020] The actuators of the hooking and unhooking means of the pallet P of the packaging I, actioned before or immediately after the rotation of the package I, lock the pallet P to the base means 5. A further and opposite actuation of the first rotation actuator 11 rotates again the base means 5 in the horizontal start position and the hooking and unhooking means are actuated to release the pallet P which can be removed. In this condition the face of the load opposite to the top V is exposed and accessible for example for the pallet replacement.

If the face of the load opposite to the top V must be provided with a new pallet or other support means, a further actuation of the first rotation actuator 11, by a rotation in the first direction, rotates again the base means 5 in the vertical position pressing any new pallet or other support means against the face of the load opposite to the top higher face V or, in the contrary case, directly matching such face of the load.

[0021] The first 11 and second 12 rotation actuators synchronously rotate the base 5 and the back 6 means in a direction of rotation opposite to the initial one and they rotate such means in positions respectively horizontal and vertical with said packaging I in vertical orientation again; after lifting of the abutment means 7, the drive of the first conveyor means 16 gets away the packaging from the back means and prepares it for the outlet from the rotation device 3.

[0022] The inclination of about 95° or more degrees of the loading, ensures the stability of all the packages composing it including those opposed to the top face V which otherwise could move, overturn and however change of position with disadvantageous effects. It is noted that the destabilization and/or displacement of the packaging of the load opposite to the top face, can happen even if the load is wrapped, before its rotation, or its input into the rotation device, in horizontal coils of packaging film.

[0023] The rotation device 3 can comprise or can be associated with a first wrapping means 17 of type able to wrap the packaging I with almost horizontal coils of a film for packaging 18. Such first wrapping means 17 is positioned, with respect to the rotation device, to wrap the packaging I in abutment with the back means 6 rotated of the predetermined angle of rotation, for example of 95°, and/or horizontally arranged or rather rotated of 90°.

[0024] The first wrapping means 17 wraps, together with the load C, also the abutment means 7 which is in the form of sheet or thin plate and bears, at least on its surface opposite the base means 5, a treatment or a low-friction coating for its easy extraction from the coils of the film for packaging. Alternatively it is provided that the abutment means 7 can be in the form of blades or parallel teeth, spaced apart and lying on the same geometric plane, for example of comb teeth shaped; such solution provides a convenient reduction of unthreading friction.

[0025] Preferably, the first wrapping means 17 is actuated to perform some first stabilization wrappings of the load rotated at 95°, or more, and the subsequent wrappings at a load rotation of 90°. The wrapping carried by the first wrapping means 17 stabilizes the entire load C of the packaging and protects it, for example by rain.

[0026] Finally, the packaging can enter in the rotation device 3 with a pallet and come out with the same pallet, with another pallet, with other support means, without pallet or support and in case with a wrapping of packaging film that covers the top face V and the opposite face of the load C, or only the load C of the packaging, without any pallets or other supports, can enter into the rotation device 3 and come out with a pallet, with other support means, without pallet or support and in case with a wrapping of packaging film that covers the top face V and the opposite face of the load C.

[0027] In the initial condition A of the base 5 and back 6 means, the rotation axis means 10 is in the opposite side to the base means 5 with respect to the back means 6 and is at a specified height above the support surface of the base means 5 for the packaging I and at a predetermined distance from the surface of the back means 6 assigned to abut with the packaging I. The length of the latter and/or the position of the rotation axis means 10 determine the value of the predetermined rotation angle, for example so is higher the rotation axis means 10, so greater will be the angle of rotation, except latches or interference of the rotating parts with other elements of the machine.

[0028] The machine 1 further comprises an input member 20 having an entry means 22 and a second wrapping means 25 adjacent to the entry means; the entry means 22 is provided with a second conveyor means 23 of tape, chains, belts or the like kind, whose support plane for a packaging I entering the machine 1 is horizontal and is coplanar and parallel to a third conveyor means 26, of tape, chains, belts or the like kind, of the second wrapping means 25 and rotating about a central vertical axis and associated with a parallelogram arm 27 for supporting and for vertical moving a reel 28 having vertical axis carrying a film spool 29 for packaging.

[0029] The support surfaces for the package I of the second 23 and the third 26 conveyor means are placed at the same height with respect to the horizontal floor of the installation site of the machine 1 on which they lie.

[0030] The machine comprises an output member 30 having a fourth conveyor means 31 of tape, chains, belts or the like kind, whose support plane for a packaging I coming out from the machine 1 is horizontal and at the same height of the second 23 and third 26 conveyor means.

[0031] The machine also comprises a motorized carriage means 40 having a fifth conveyor means 41 of tape, chains, belts or the like kind, whose support plane for a packaging I or for a single pallet P to be handled in the machine 1 is horizontal and at the same height of the second 23, third 26 and fourth 31 conveyor means.

[0032] The machine also comprises a motorized store means 50 having a sixth conveyor means 51 of tape, chains, belts or the like kind, whose supporting plane for a pallet P separated from the packing entered into the machine, is horizontal and at the same height of the fifth conveyor means 41, that brings to this sixth conveyor means 51 a pallet P of the packaging I entered and released from the base means 5; said store means 50 further comprises stacking means 52 and/or evacuation means of such pallets P brought to it by the carriage means 40 that picks up them from the base means 5.

[0033] The base means 5, having the hooking and unhooking means for the pallet P of the packaging I and assigned to separate the pallet P from the load C of said package I, comprises a robot arm 60 assigned to apply the support means S to the face of the load C opposite to the top face V of the rotated packaging and with such face exposed and accessible. The robot arm 60 bears and moves at least one gripping means 61, for picking a set of support means S assigned to replace the pallet P; the gripping means 61 is provided with a plurality of connecting elements 62 each of which is provided with at least one grasp means 63, for example of suction cap type, assigned to grasp and release a support means S.

[0034] At least one of such connecting elements 62 is movable and lockable with respect to other connecting elements 62.

[0035] Said device further comprises locking means to fix the support means S to the face of the load C opposite to its top face V.

[0036] Such locking means consist of a glue dispenser 70 interposed between the robot arm 60 and the rotation device 3 to apply to a surface of the support means S a glue for fixing it to the corresponding face of the load C. A possible operation of the machine provides that the packaging I, comprising the load C supported by the pallet P, is placed on the entry means 22, as shown in figure 1; said entry means allows the transfer of the packaging I on the adjacent second wrapping means 25 which, as shown in figure 2, wraps around the side faces, or rather vertical, of the packaging I with almost horizontal coils of film packaging. As shown in Figures 3 and 4, the carriage means 40 picks up the packaging from the second wrapping means 25 and transfers it to the base means 5 of the rotation device 3 which, according to the above description, rotates the packing of 95°, removes the pallet P and, in cooperation with the first wrapping means 17, wraps also the top and opposite faces of the of the load completing the film coating of all six faces of the load C as shown in Figures 4-8. As then shown in the following figures 9-10, the robot arm 60 and the glue dispenser 70 apply to the face of the load C opposite to the top V, a set of support means S reconstituting a complete packaging I comprising the load C and a set of support means S that replace the original pallet P.

[0037] To consolidate the fixing of the support means S to the face of the load C opposite to the top face V, the first wrapping means 17 carries a further wrapping of

such support means and of the load C, as shown in Figure 11.

The original pallet P of the entered packaging is brought from the carriage means 40 into the stock means 50 that accumulates it pending the final fate of such pallet as shown in Figures 6 and 7.

[0038] The packaging I completed of load C and of the set of support means S supported by the first conveyor means 16 of the base means 5 is picked up by the carriage means 40, which transfers it to the output member 30 where it can be picked up for the final routing.

[0039] The variant of Figure 13 differs from the previous embodiment in that the locking means consist in a reduced or short special configuration of the connecting element 62 which, applied to a terminal portion of the support means S, abutting with the corresponding face of the load C, leaves accessible the opposite portion allowing the wrapping with the packaging film that so locks such portions of the support means S ensuring the locking thereof to the load.

[0040] The variant of Figure 14 differs from the embodiment of Figure 1 in that the robotic arm 60 and the glue dispenser 70 are replaced by a feeding means 80 providing support means S.

[0041] Such feeding means 80 comprises a support means S magazine, an applicator or activator of adhesive means into appropriate faces of the support means S and a handling and storage means, assigned in the condition in which the load is rotated of 95° and it is free from the respective pallet P and the base means 5 is horizontal and free, to lay down a set of support means S, with the glue arranged for their fixing, on the base means 5 which is provided with respective removable locking means. The rotation of 95° of the base means 5 carries the surfaces of the support means S bearing the glue in contact with the load face opposite to the top face V, before or after the wrapping of the same with the packaging film.

[0042] An advantage of the present invention is to provide a packaging machine alternative to known machines.

[0043] Further advantage is to provide a machine able to wrap also the upper and lower faces of the packing load and/or to replace the original packing pallet with another pallet or other support means and/or to provide with pallet a load that is devoid of it to make a complete composite packaging.

[0044] Other advantage is to provide a simple machine, and subject to less stress than those affects the known machines and therefore lighter and more economical.

[0045] Further advantage is to provide an extremely versatile and easily integrated machine which can be integrated into also preexisting installations.

Claims

1. Packaging machine equipped with a rotation device

(3) for a packaging (I) comprising at least a load (C) and a possible pallet (P) and having, in an input condition of the packaging (1) into the rotation device (3), a higher top face (V); the rotation device (3) comprises a base means (5), almost plane, assigned to support the face of the packaging (1) opposite to the top face (V), a nearly flat back means (6) assigned to abut with a side face of the packaging (I) and a nearly flat abutment means (7) connected perpendicularly the back means (6) and longitudinally translating along the latter (6), said abutment means (7) is assigned to match with said top face (V) by means of a respective translational actuator (8), the base means (5) and back means (6) are independently rotatably connected to a rotation axis means (10) and are independently rotated about this rotation axis means (10) by rotation actuators respectively first (11) second (12), in an operation condition of the rotation device (3) and from its initial condition (A) in which the base means (5) and the back means (6) are respectively horizontal and vertical, the first rotation actuator (11) rotates the base means (5) about the rotation axis means (10) in a first direction of rotation, of a predetermined angle of rotation greater than 90° and less than 135° and vice versa and the second rotation actuator (12) rotates the back means (6) and the abutment means (7) about the rotation axis means (10) in the first direction of rotation of the predetermined angle greater than 90° and less than 135° and vice versa; the rotation device (3) comprises a first wrapping means (17), of the type to wrap a packaging (1) with almost horizontal coils of a film for packaging (18), and positioned to wrap the packaging (I) in abutment with the back means (6) rotated of the predetermined angle of rotation and/or horizontally arranged; said machine is **characterized in that** the abutment means (7) is in the form of sheet or thin plate and at least its surface opposite to the base means (5) is equipped with a low-friction coating or treatment for easy extraction from the coils of film for packaging; or the abutment means (7) is in form of parallel and spaced apart blades or teeth laying on the same plane.

2. Machine according to claim 1, **characterized in that** in the initial condition (A) of the base means (5) and of the back means (6), the rotation axis means (10) is on the opposite side of the base means (5) in respect to the back means (6) and it is at a specified height above the support surface for the packaging (I) of the base means (5) and at a predetermined distance from the surface of the back means (6) that is assigned to abut with the packaging (I), the base means (5) and the back means (6) are connected to said rotation axis means (10) by means of respective connection arm means (13, 14), the length of the latter and/or the position of the rotation axis means (10) contribute to determine the amplitude of the pre-

determined angle of rotation.

3. Machine according to claim 1 or 2 **characterized in that** the base means (5) comprises a motorized first conveyor means (16) which release the abutment surface for the packaging (1) of the base means (5) and moves the packaging (1) towards and away from the back means (6). 5
4. Machine according to any one of the preceding claims **characterized in that** it comprises an input member (20) having an entry means (22) and a second wrapping means (25) adjacent to the entry means (22); the entry means (22) is provided with a second conveyor means (23) of tape, chains, belts or the like kind, whose support plane for a packaging (1) entering the machine (1) is horizontal and coplanar and parallel to a third conveyor means (26) of the second wrapping means (25) and rotating about a central vertical axis and associated with a parallelogram arm (27) provided to support and to vertical move a reel (28) having a vertical axis carrying a film spool (29) for packaging; the resting surfaces for the packaging (1) of the second (23) and third (26) conveyor means are placed at the same height with respect to the horizontal floor of the installation site of the machines (1) on which they lie. 10 15 20 25
5. Machine according to claim 4, **characterized in that** it comprises an output member (30) having a fourth conveyor means (31) of tape, chains, belts or the like kind, whose support plane for a packaging (1) outgoing from the machine (1) is horizontal and at the same height of the conveyor means second (23) and third (26). 30 35
6. Machine according to claim 5 **characterized in that** it comprises a motorized carriage means (40) having a fifth conveyor means (41) tape, chains, belts or the like kind, whose support plane for a packaging (1) or for a single pallet (P) to be handled in the machine (1) is horizontal and at the same height of the conveyor means second (23), third (26) and fourth (31), and **in that** it comprises a motorized store means (50) having a sixth conveyor means (51) tape, chains, belts or the like kind, whose support plane for supporting a pallet (P) separated from the packaging (1) entered into the machine, is horizontal and at the same height of the fifth conveyor means (41) that brings to this sixth conveyor means (51) a pallet (P) of the packaging (1) entered and released from base means (5), said store means (50) further comprises stacking means (52) and/or evacuation means for such pallets (P). 40 45 50 55
7. Machine according to any one of the preceding claims **characterized in that** the base means (5) has hooking and unhooking means of the pallet (P) of the packaging (1) assigned to separate the pallet (P) from the load (C) of said packaging (1) and comprises a robot arm (60) having at least a gripping means (61) for picking a set of support means (S) assigned to replace the pallet (P), the gripping means (61) is equipped with a plurality of connecting elements (62) each of which is equipped with at least one grasp means (63) assigned to grasp and release a support means (S), at least one of these connecting elements (62) is movable and lockable with respect to the other connecting elements (62), said device further comprises locking means for locking the support means (S) to the face of the load (C) opposite to the top face (V). 5
8. Machine according to claim 7 **characterized in that** the locking means consist of a glue dispenser (70) interposed between the robot arm (60) and the rotation device (3) assigned to apply to a surface of the support means (S) a glue for fixing the latter (S) to the corresponding face of the load (C) and/or consist of a reduced or short configuration of the connecting elements (62) which leaves an accessible portion of the support means (S) abutting with the corresponding face of the load (C) allowing the application of the film wrapping on those portions of the support means (S) allowing the fixing thereof to the load (C). 10 15 20 25 30 35 40 45 50 55

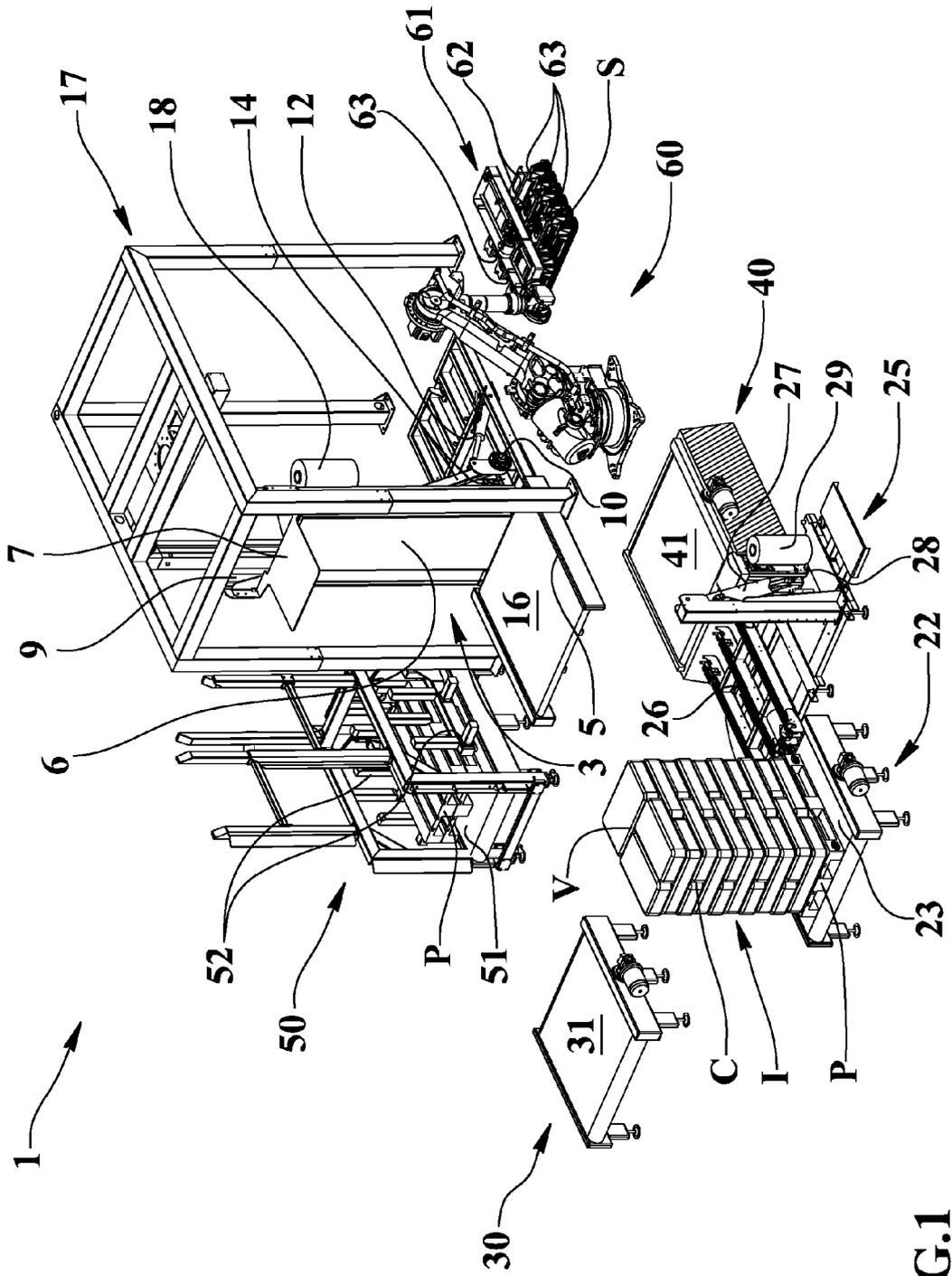


FIG.1

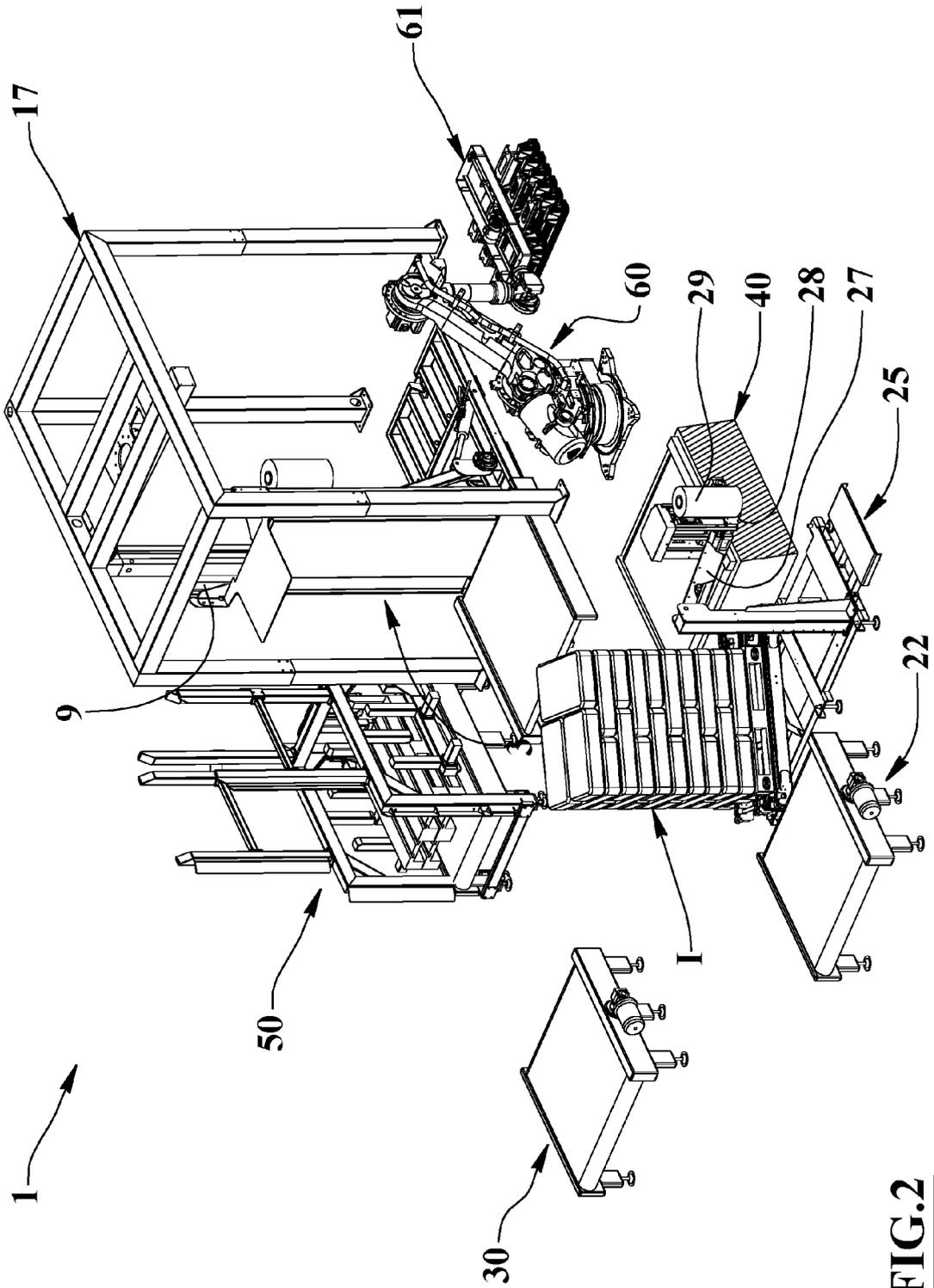


FIG. 2

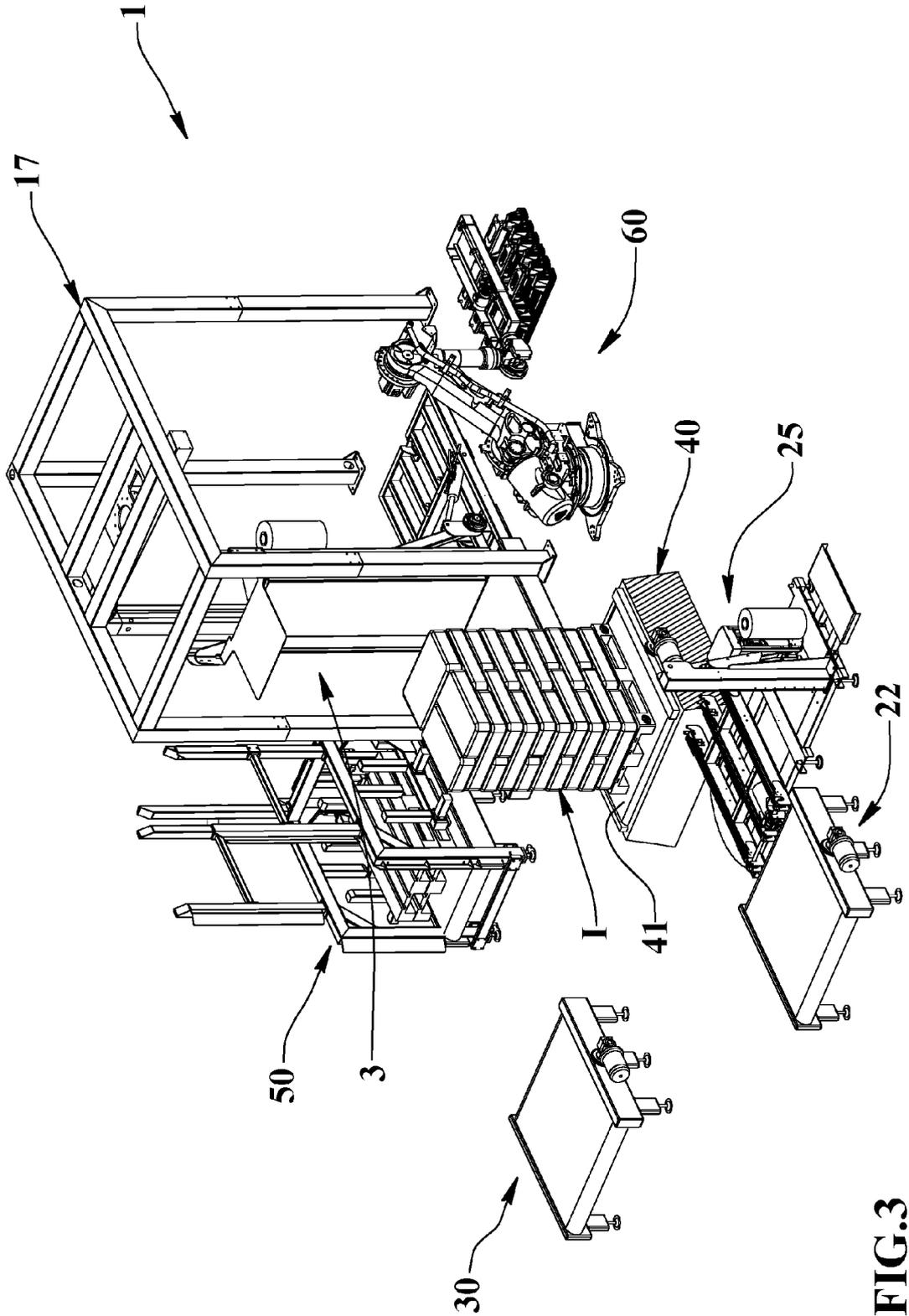


FIG.3

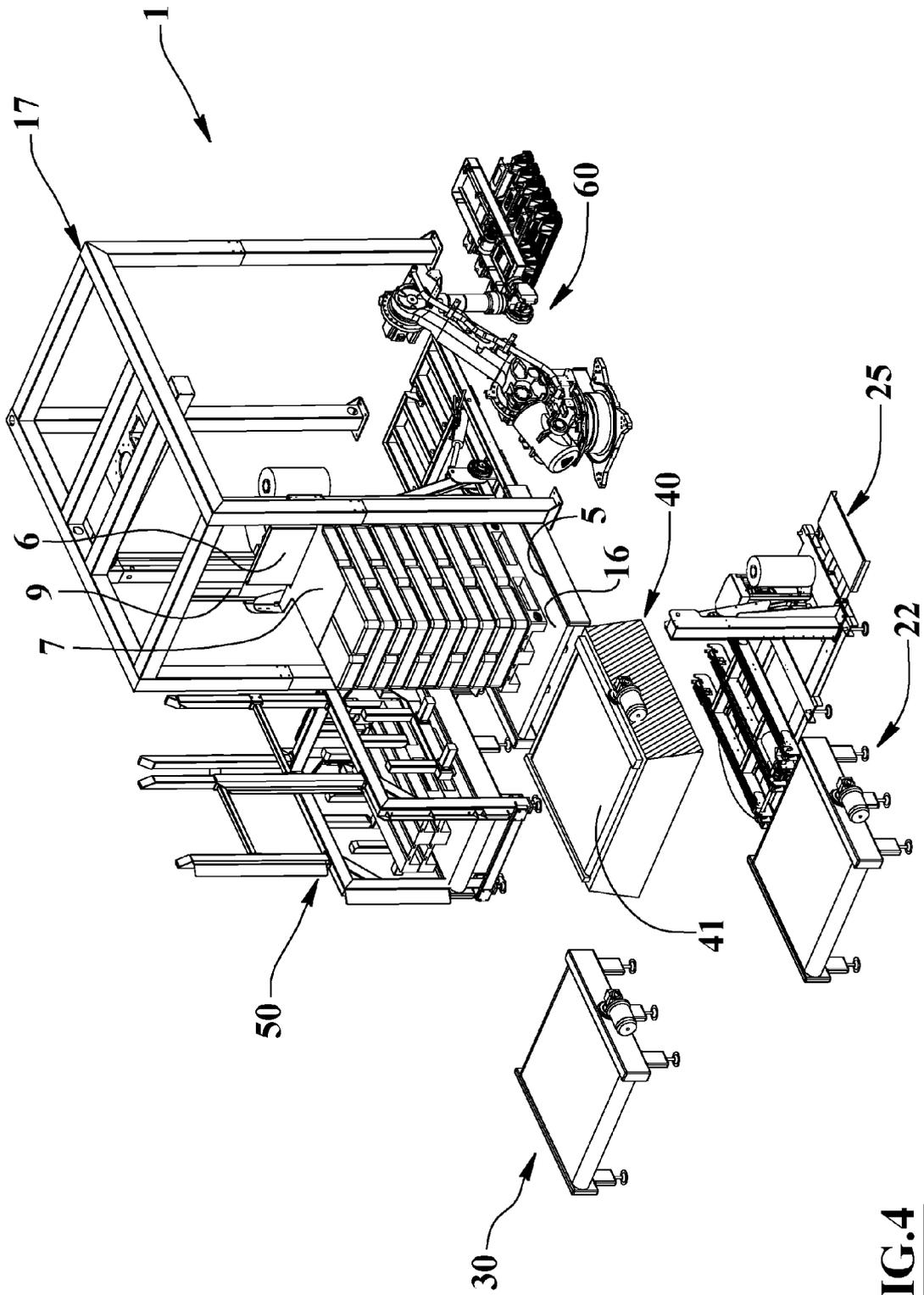
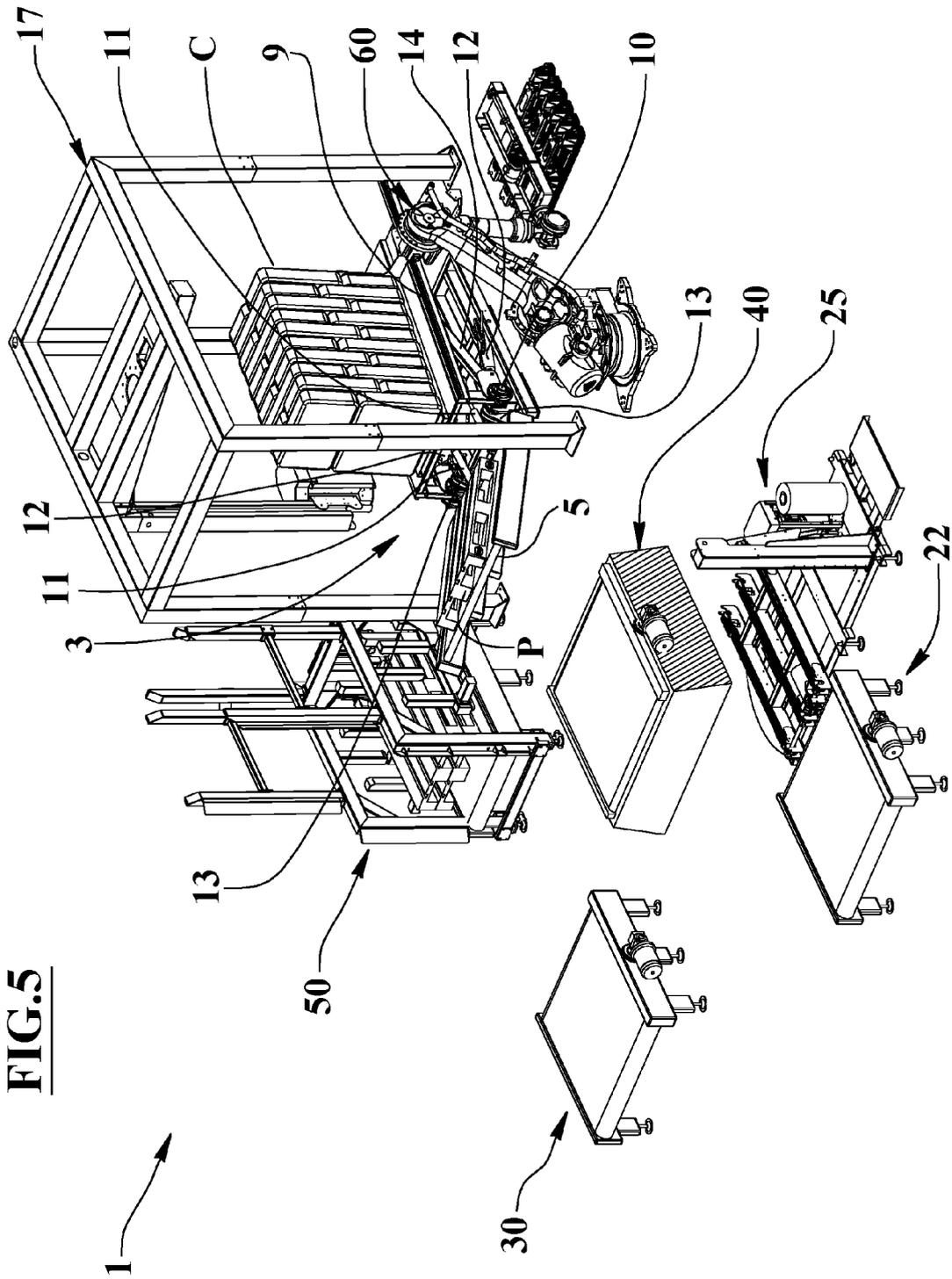


FIG.4



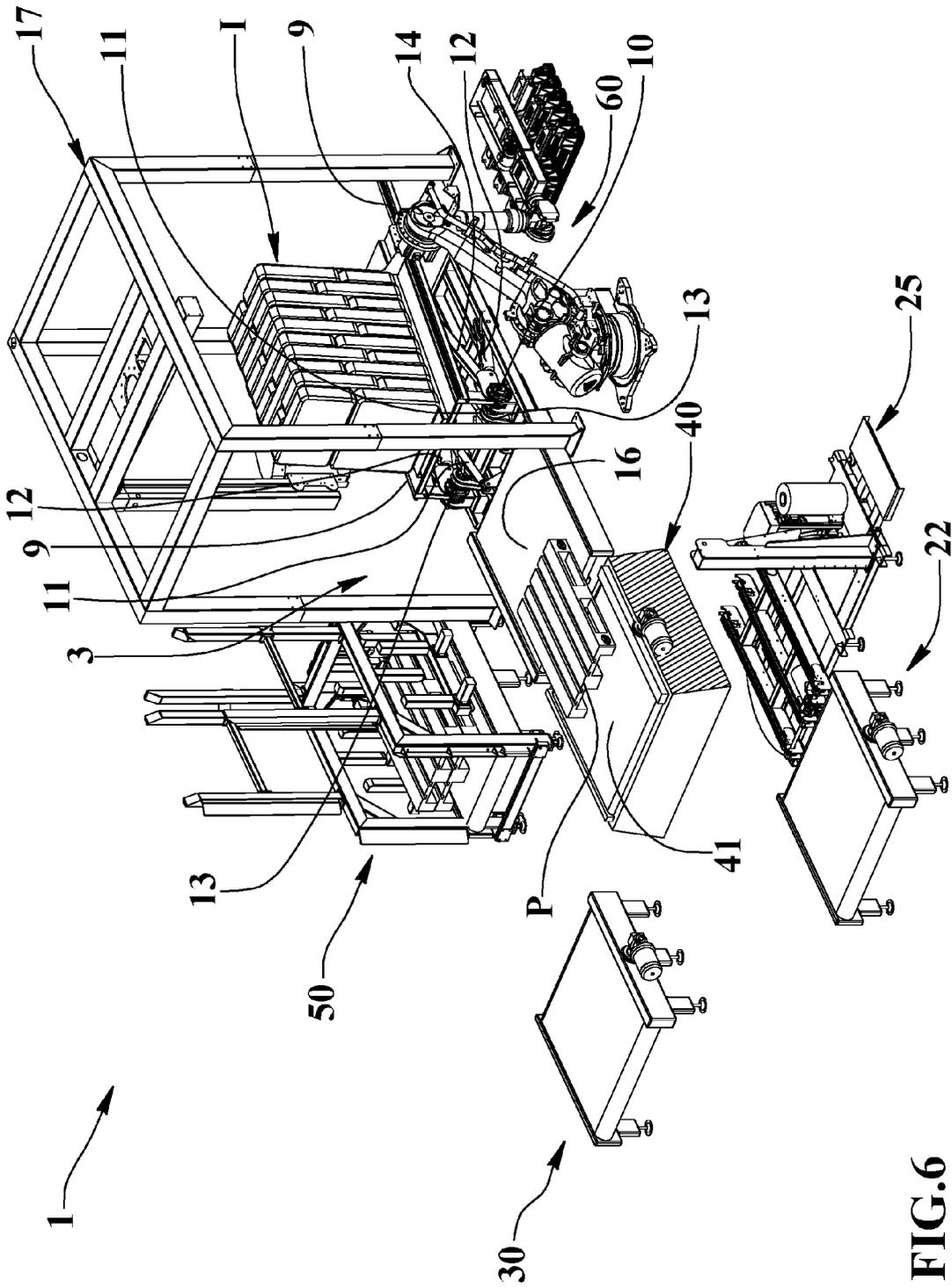


FIG.6

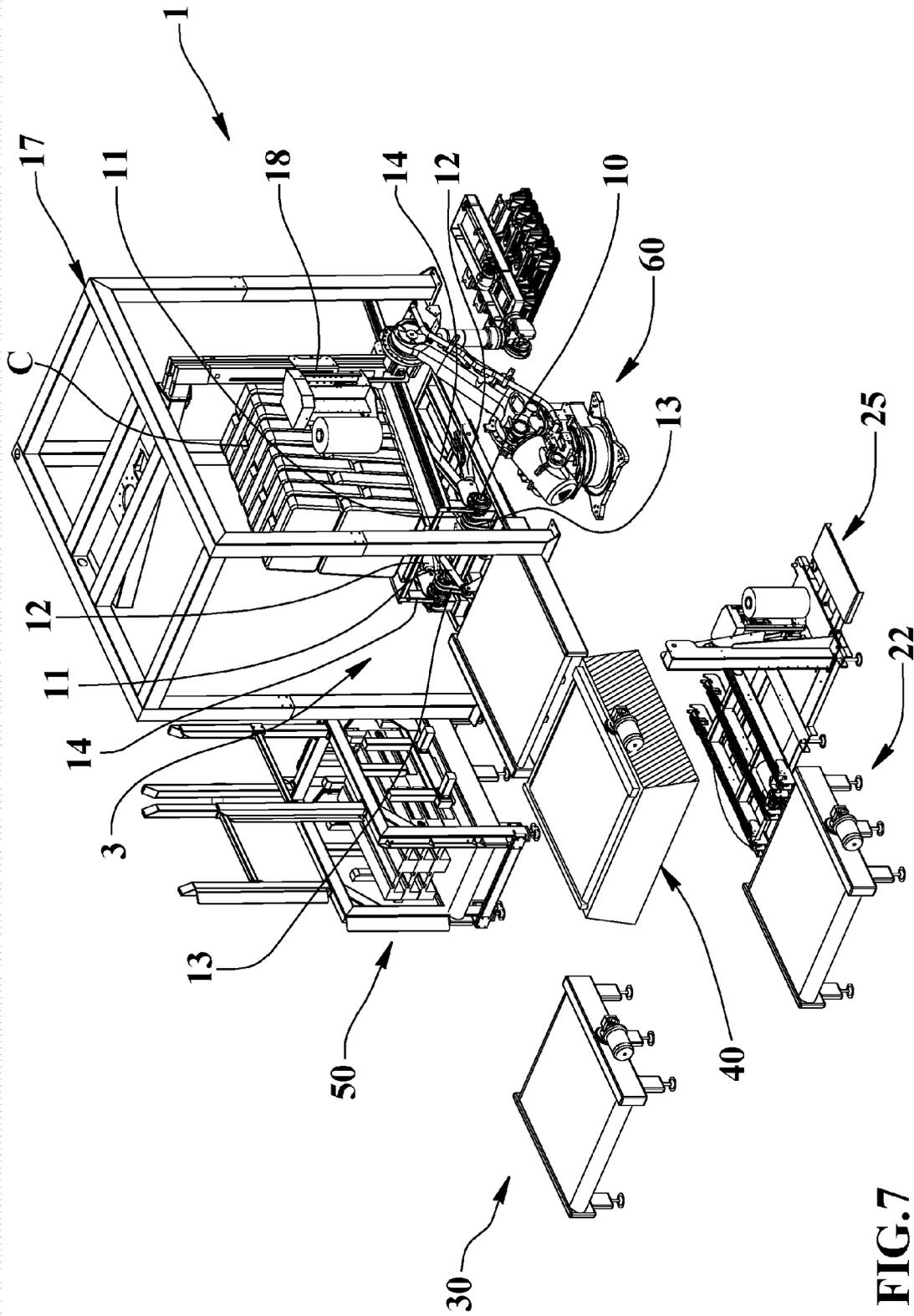


FIG.7

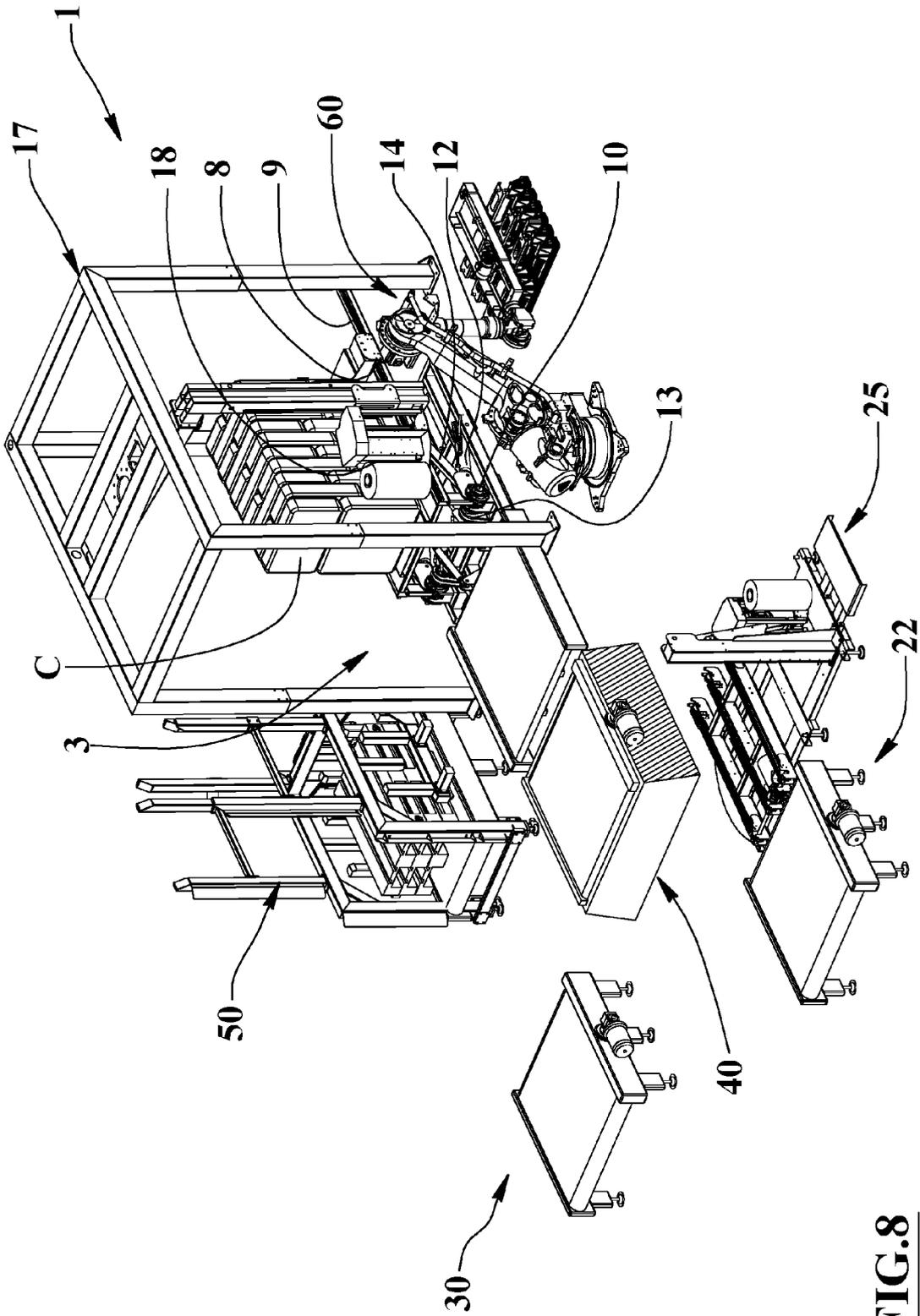


FIG.8

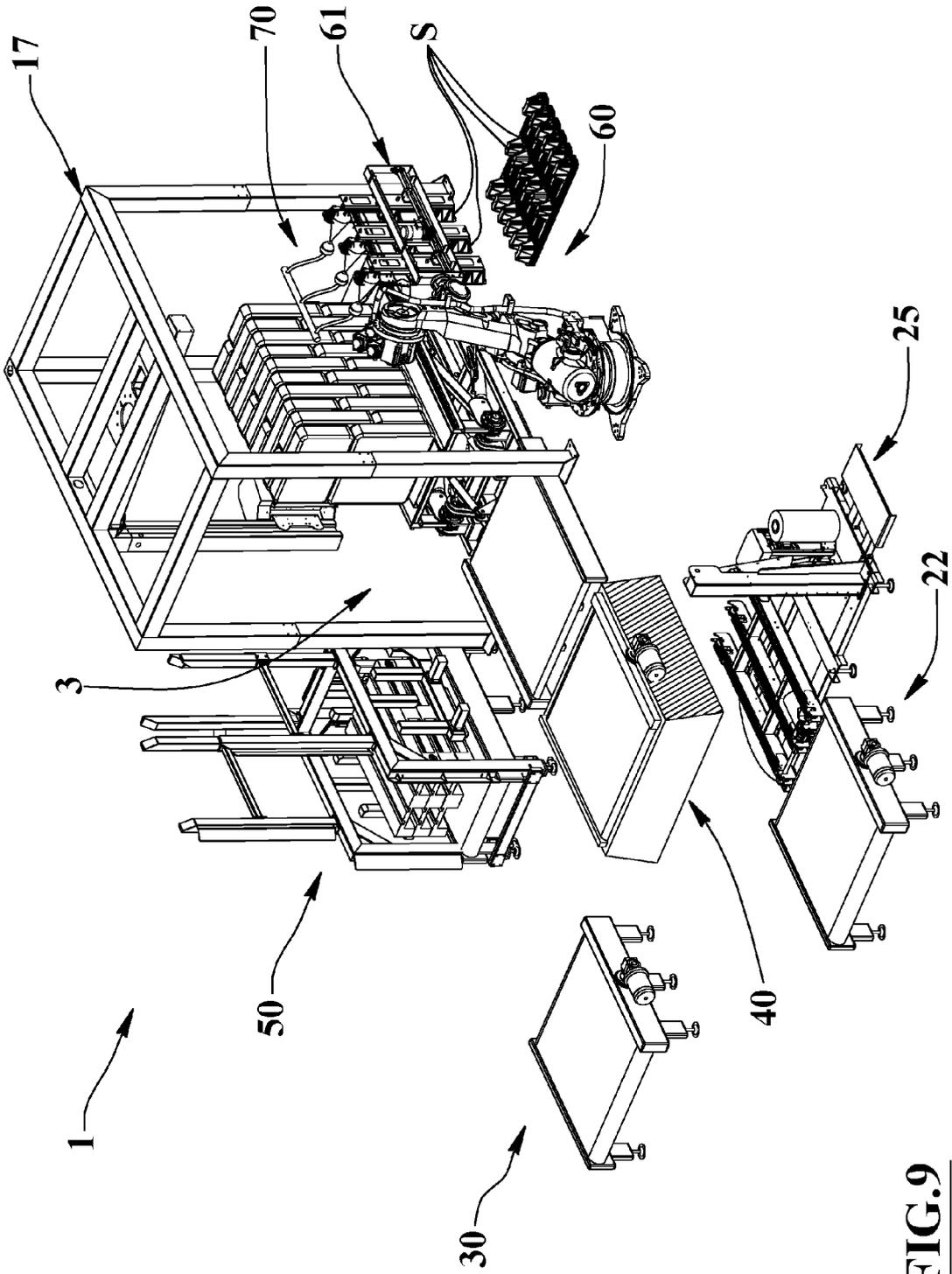


FIG.9

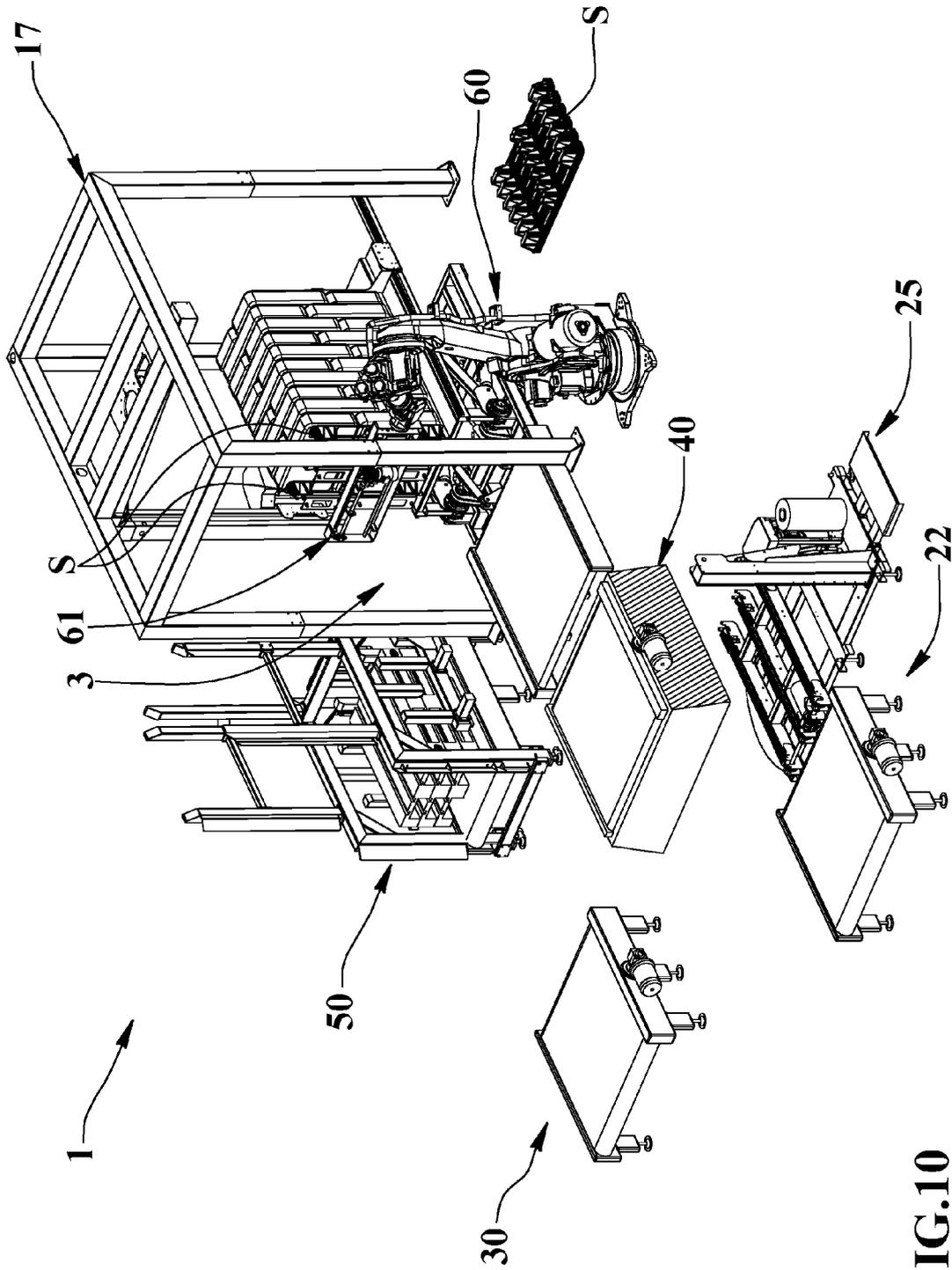


FIG.10

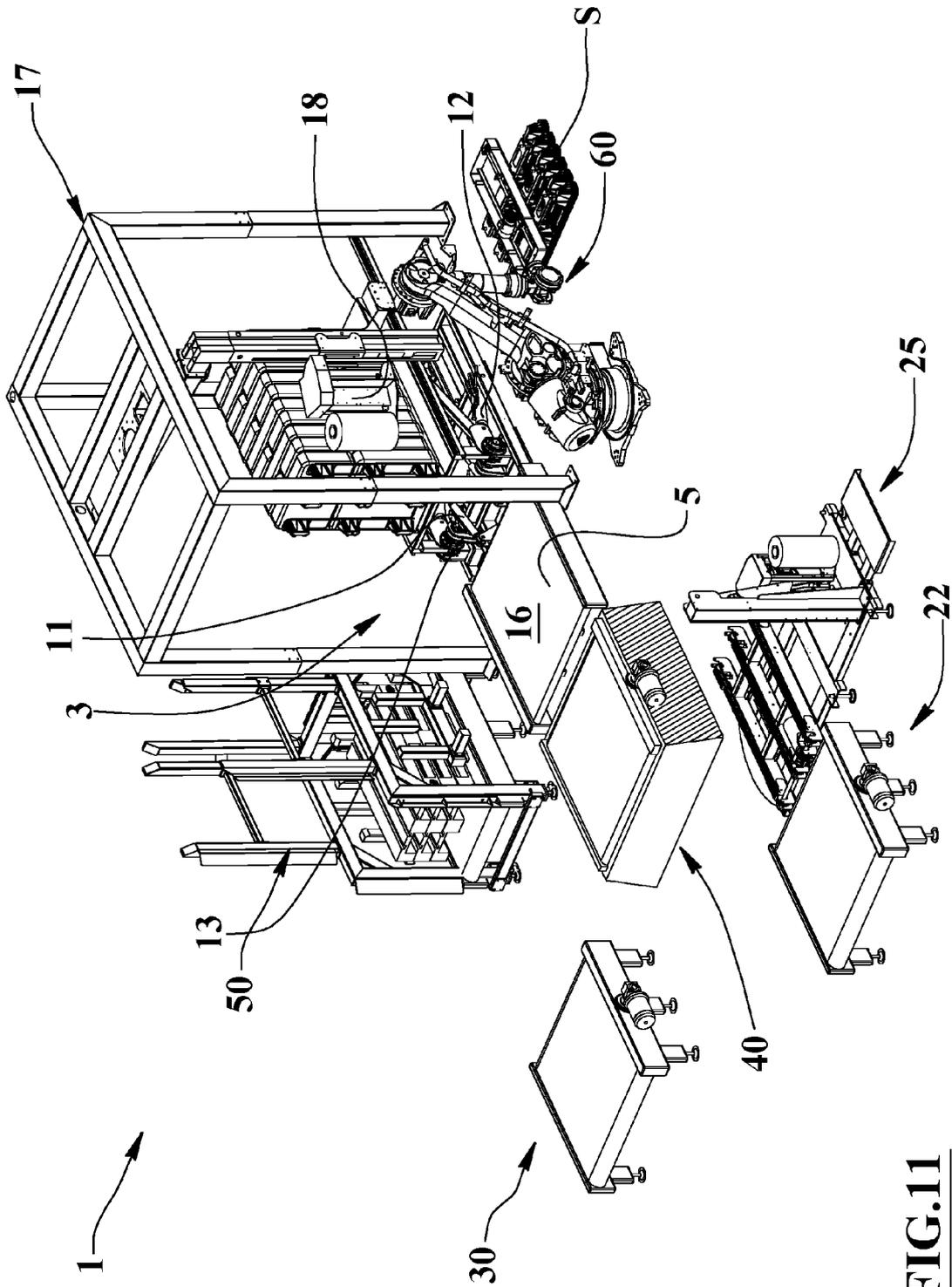


FIG.11

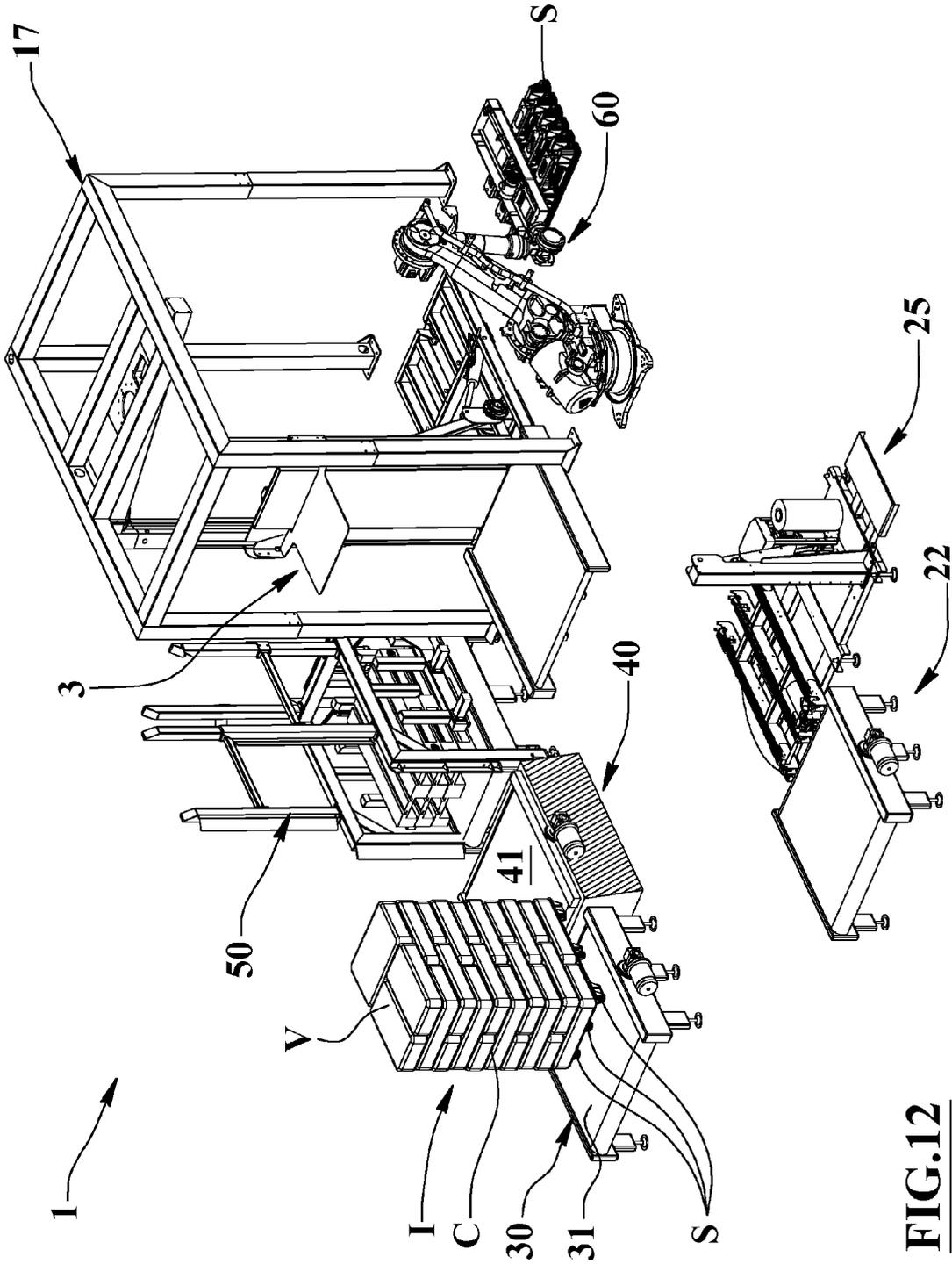


FIG.12

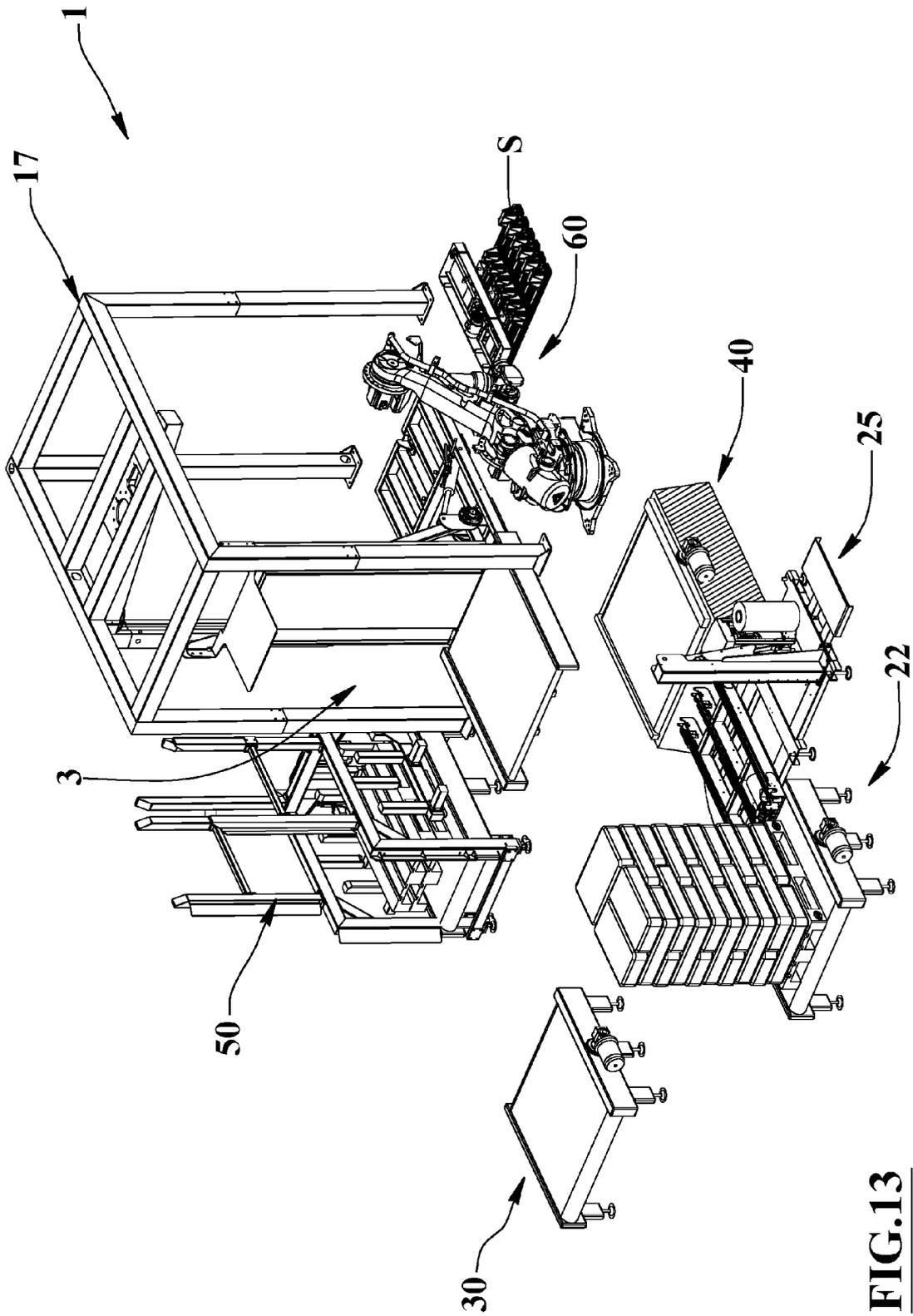


FIG.13

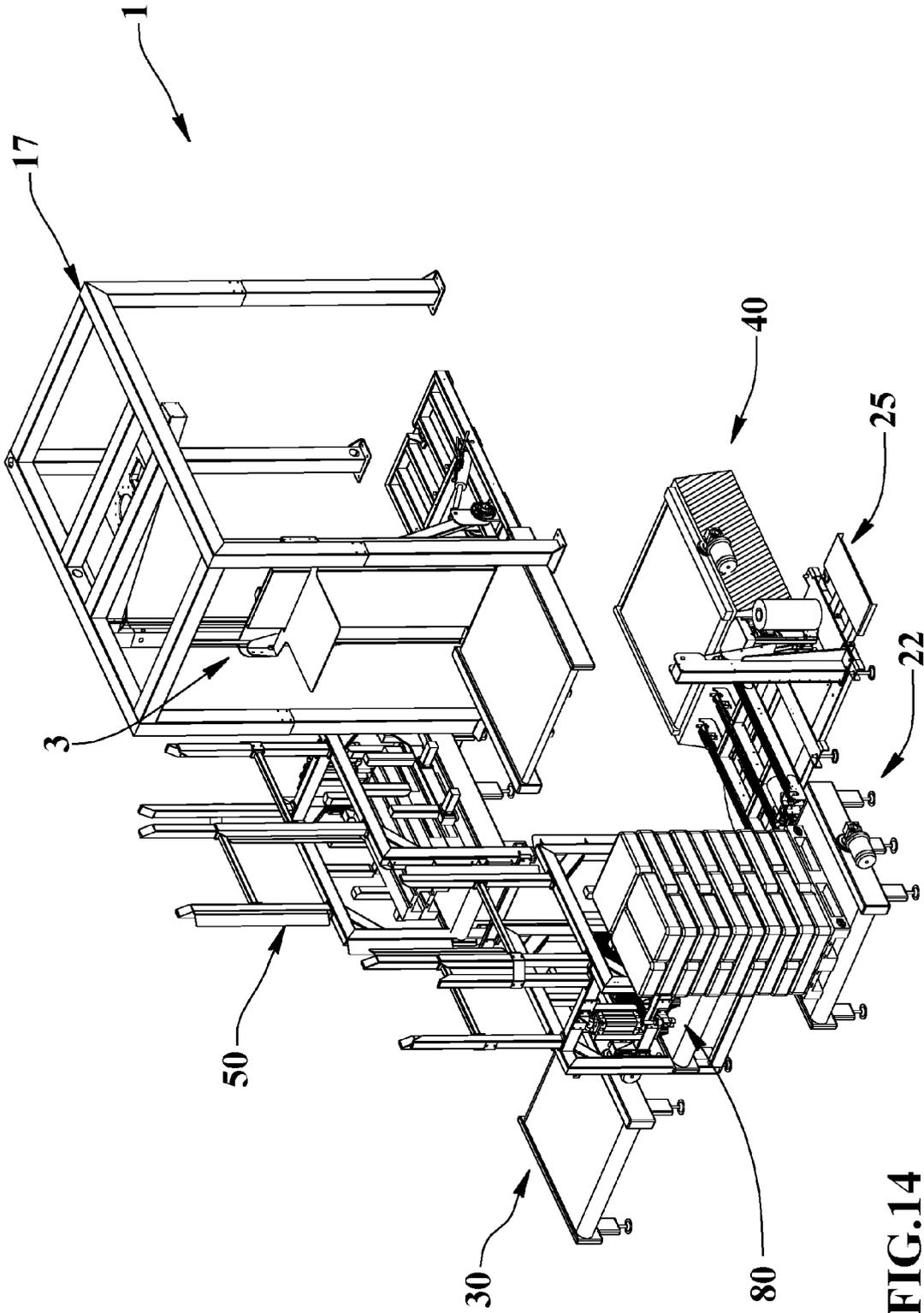


FIG.14



EUROPEAN SEARCH REPORT

Application Number
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