

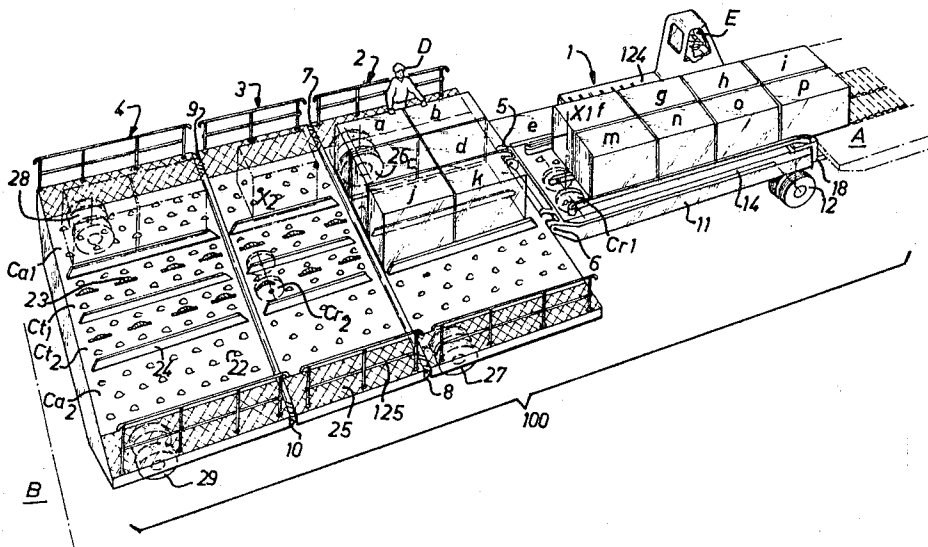
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 [33] **France**
 [31] **169,160**

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[54] **SELF-PROPELLED HANDLING TRUCK**
8 Claims, 18 Drawing Figs.
 [52] U.S. Cl..... **214/38 D,**
214/84, 214/518, 280/408
 [51] Int. Cl..... **B60p 1/52**
 [50] Field of Search..... **214/84,**
519, 518, 38.8, 41, 44; 193/39; 280/408

ABSTRACT: A self-propelled truck comprising a control cabin permitting the distribution of loads between waiting zones and transfer zones, comprising at least two elements coupled to each other by articulated coupling joints and provided with displacement devices permitting at will lateral or turning movement in situ, a skewing plate and retractable guides.



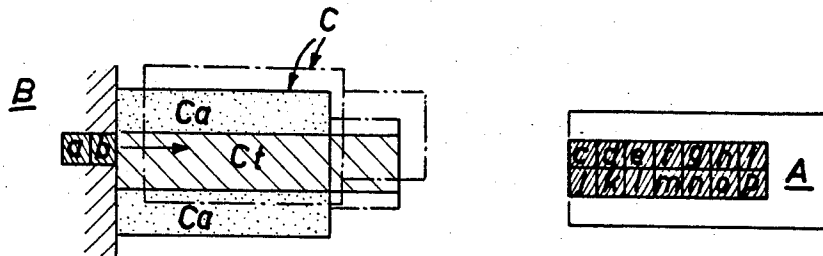


FIG. 1

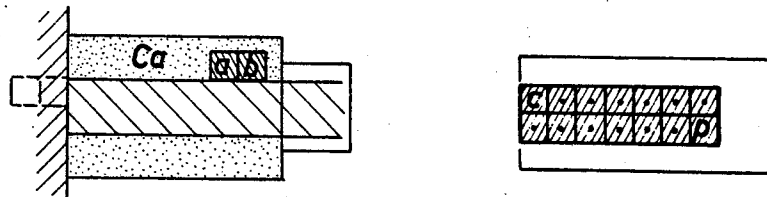


FIG. 2

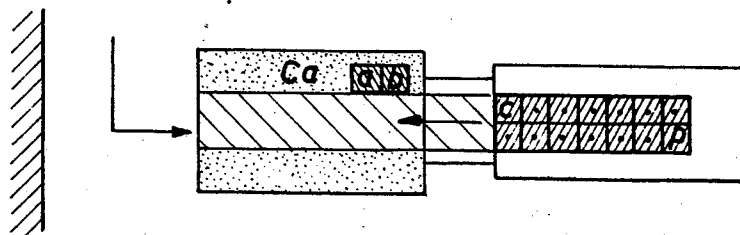


FIG. 3

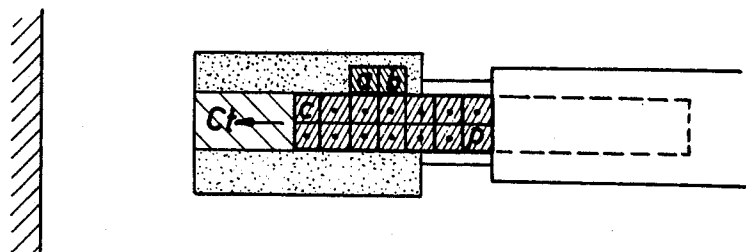


FIG. 4

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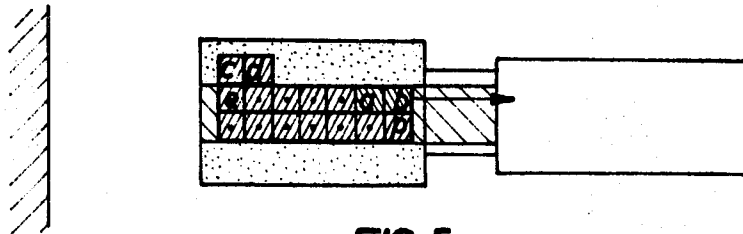


FIG. 5

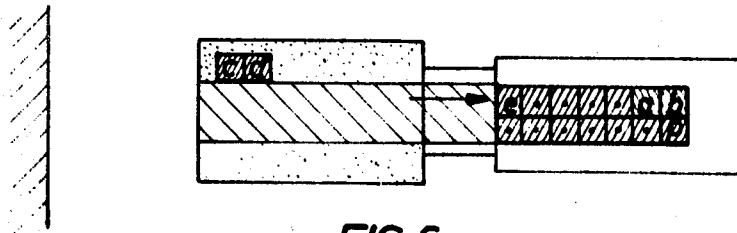


FIG. 6

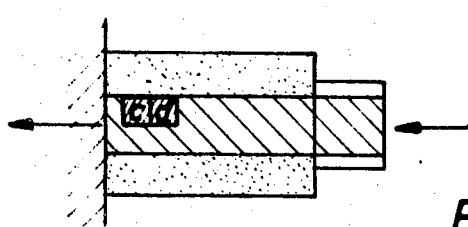


FIG. 7

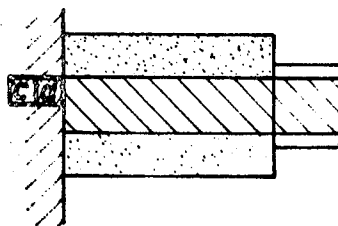
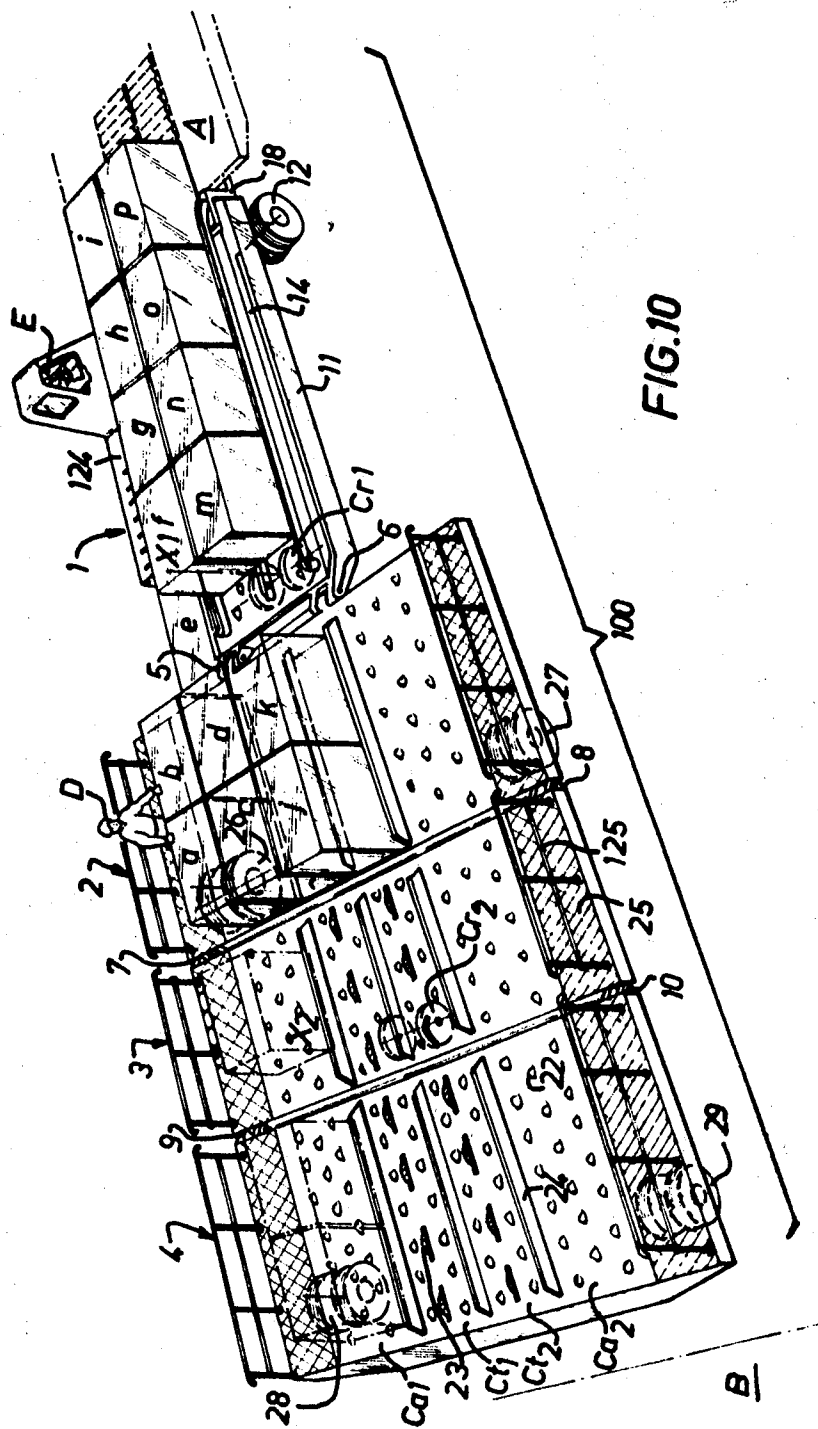
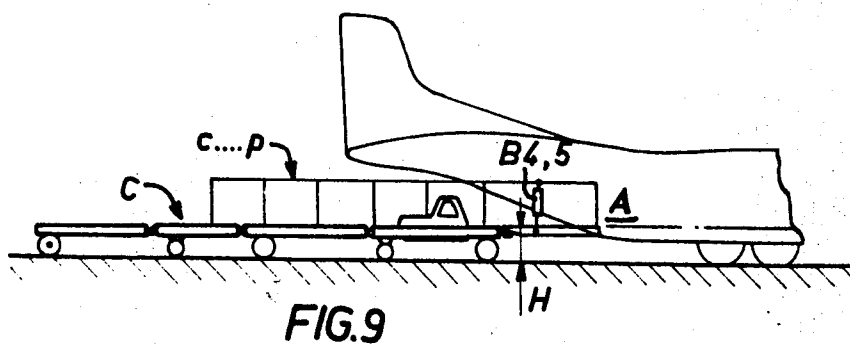
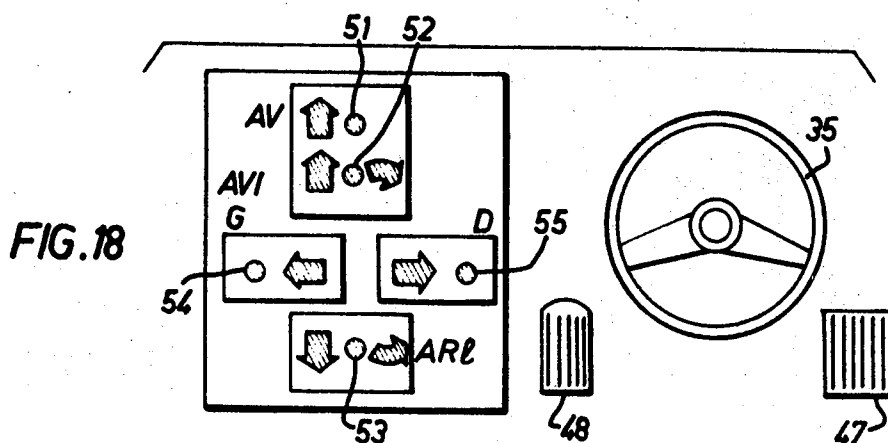
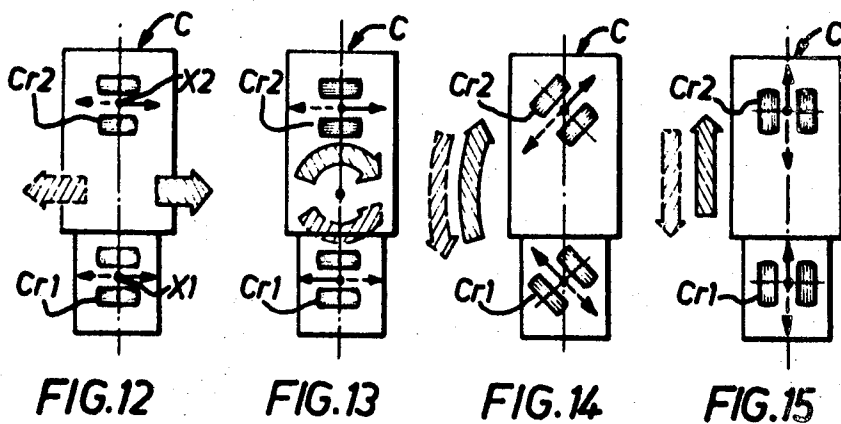


FIG. 8





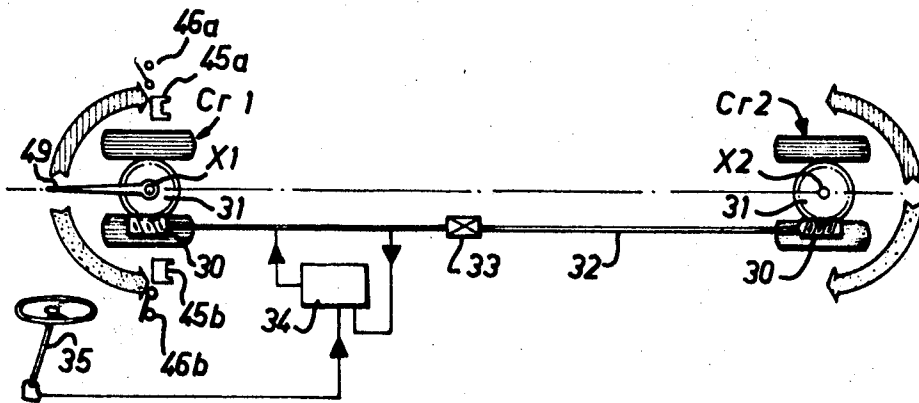


FIG. 16

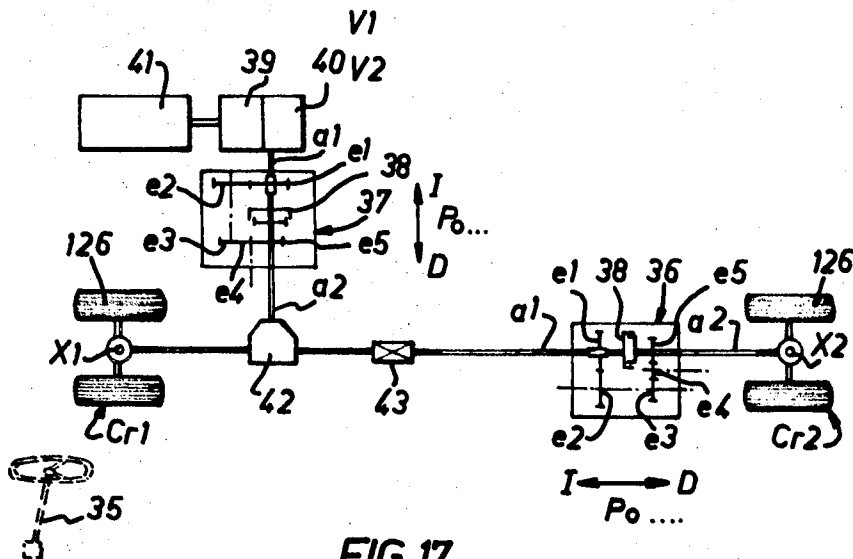
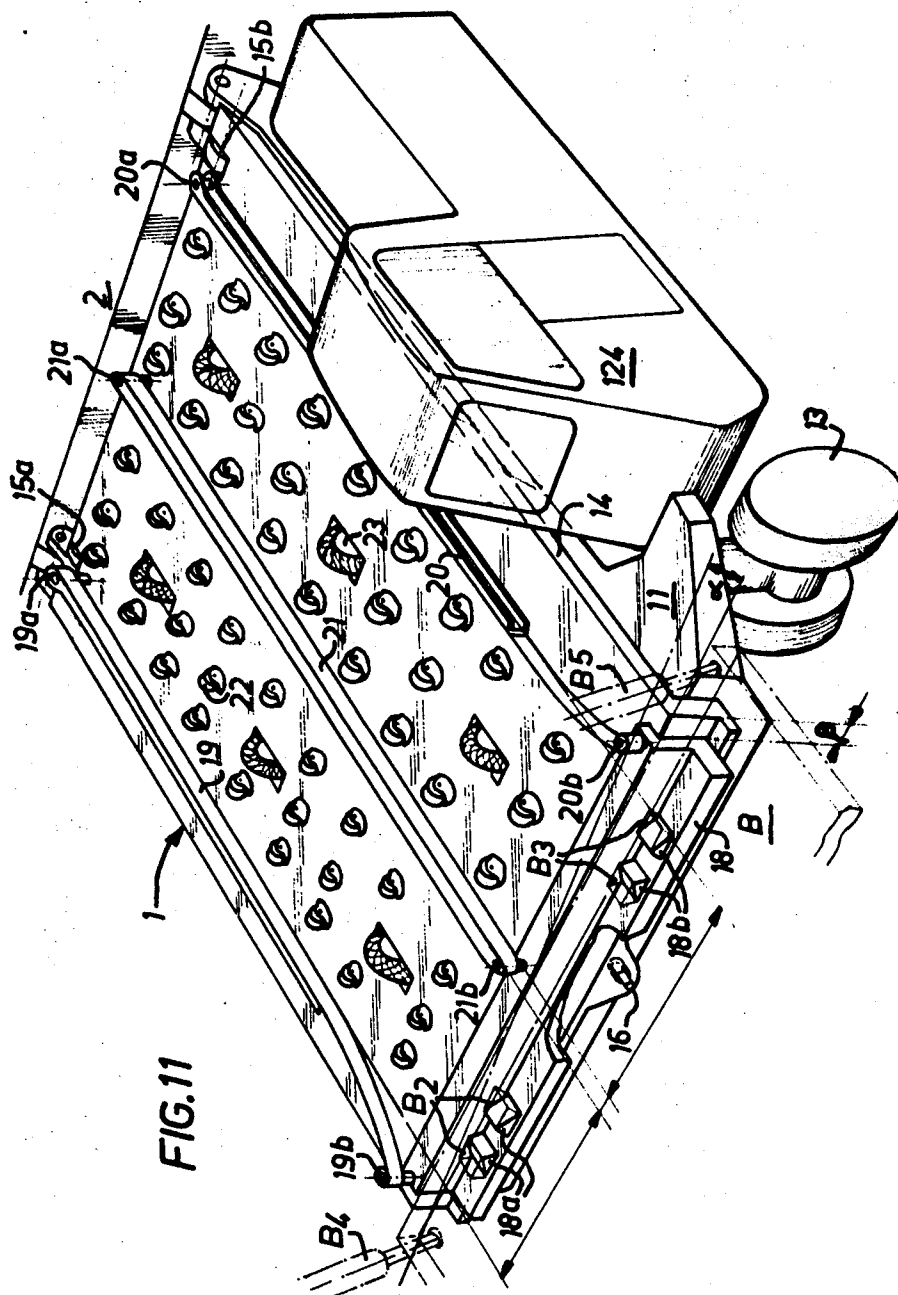


FIG. 17



SELF-PROPELLED HANDLING TRUCK

The present invention relates to a self-propelled handling truck, more particularly intended for the transshipment of mailboxes for airmail traffic.

The problem presented by the dispatch of mail which has to be centralized or distributed at points served by a rapid means of transport is already known, and it is also known that the difficulties of conveyance by aircraft are still further increased by the fact that the sorting cannot be commenced during the course of transport.

It has thus been necessary to establish a means of high efficiency for carrying out in the minimum time during stops, the transshipment of pallets carrying mailboxes or bins, on the actual parking area of the aircraft.

Handling means are of course already known for loading or unloading aircraft, but some of these utilize the frequent to-and-fro traffic of hauled tracks, which renders the operating time excessive, while others necessarily comprise very considerable fixed installations on the ground, which is not systematically suitable for all aerodromes intended to receive airmail freight.

To this end, the present invention provides an automatic handling truck which does not possess the above disadvantages, and which possess furthermore, as will be explained in more detail in the remainder of this text, a high mobility permitting easy utilization in the small spaces available, which may furthermore comprise irregular ground or interrupted slopes.

The self-propelled truck according to the invention is essentially characterized in that it comprises a plurality of elements coupled to each other so as to give the whole assembly a certain vertical flexibility, whilst retaining great horizontal rigidity; in that it possesses, by virtue of a particular arrangement of its rolling members, six degrees of freedom, namely two for longitudinal translation, two for transverse translation and two for rotation in position; in that it comprises passages for the translation and transfer of loads in waiting zones; in that it is provided with a system for drawing alongside the loading or unloading area in such manner that this latter may have variations in surface without interfering with the movement of loading in the passages; and in that it has a single operating cabin and a driving unit for the control of these evolutions and of the movement of the loads, together with the operation of the associated controlled devices.

The invention also provides a gearbox system with two ratios, which permits a normal speed of the truck (20 to 30 km./hr.) and a lower speed for maneuvering, the displacement of the loads on the truck being effected by driving rollers (retractable) and lateral guides (withdrawable).

Other characteristic features and advantages will be brought out in the description which follows below made in respect of the accompanying drawings, and giving purely by way of indication and not in any limitative sense, one form of embodiment of the invention.

In the drawings:

FIGS. 1 to 8 are diagrammatic sketches showing the advantage of the system of handling loads obtained by the use of the truck in accordance with the invention;

FIG. 9 is a diagrammatic longitudinal view showing the complete operation of the transfer of 14 mailboxes;

FIG. 10 is a perspective view of the whole of a self-propelled truck;

FIG. 11 is a perspective view showing the front element of the truck of FIG. 10, together with the boarding device;

FIGS. 12 to 15 are diagrammatic sketches showing the possible evolutions of the truck;

FIG. 16 is a diagrammatic sketch of the kinematic chain of the directional control of the rolling members of the truck shown in FIG. 1;

FIG. 17 is a diagrammatic sketch of the kinematic chain of the driving control of this same truck;

FIG. 18 is a diagrammatic sketch showing the control panel mounted in the driving cabin.

First of all, in order to facilitate understanding of the situation of the problem which the invention is intended to resolve, FIGS. 1 to 8 will explain, diagrammatically and by way of example, the case of a transfer of loads to be effected between the luggage room of an aircraft indicated A and an unloading platform indicated at B.

At B there are thus two mailboxes *a, b*, which an aircraft is to take on board, and at A there are located amongst the boxes *c* and *p* the two boxes *c* and *d* which the same aircraft is to leave on the platform.

In FIG. 1, a truck C will move transversely and longitudinally so as to come into position against the platform B.

In FIG. 2, the boxes *a* and *b* are brought on to the truck so as to be placed in a waiting zone Ca.

In FIG. 3, the truck C has moved laterally so as to come alongside the unloading ramp of the aircraft hold.

In FIG. 4, all the boxes *c* to *p* are brought in their turn on the truck C and are then placed in the transfer zone Ct.

In FIG. 5, the two boxes *c, d* are transferred to the waiting zone, while the two boxes *a, b* are placed in their turn in the transfer zone.

In FIG. 6, the boxes *a, b, c-p* are brought into the hold A of the aircraft, which may then evacuate the parking area, while the boxes *c, d* will be replaced in the transfer zone.

In FIG. 7, the truck C is put back against the platform B.

In FIG. 8, and at the end of the operation, the boxes *c, d* are moved laterally from the truck on to the platform.

Referring first to FIGS. 1 to 8 and then to FIGS. 12 to 15, it can be seen that the essential characteristics of the truck according to the invention permit essentially two particular functions, namely the possible displacement of the loads between the so-called transfer zones Ct and the so-called waiting zones Ca, these being provided in numbers following any desired arrangement, and the particular means of maneuver of the truck, which consist of arranging two pivoted driving wheels in diabolo Cr1, Cr2 in the front and rear parts of the truck.

In the preferred form of embodiment of this invention, a truck with four coupled elements including two driving and two carrier elements, is capable of transferring in a single operation the complete load of the hold of an aircraft comprising 14 frames of mailboxes.

According to this preferred form of embodiment of the invention, the truck 100 which is shown in FIG. 10 comprises essentially, in addition to two transfer zones Ct1, Ct2, two waiting zones Ca1 and Ca2, two driving diabolos Cr1, Cr2, and four elements 1, 2, 3, 4 coupled to each other at the coupling joints 5-6-7-8-9-10.

The element 1 which is shown in more detail in FIG. 11 is constituted by a carrier chassis 11 coupled to the element 2 and it receives, on the one hand, two freely pivoted rolling members 12 and 13 and, on the other hand, a plate 14 carrying guiding rails for handling devices together with a system of boarding, which will be described in detail later.

This element 1 is in fact to ensure, on the one hand, the perfect movement alongside the loading platform B, while being capable of withstanding a certain angular torsion ($\alpha \pm 2.5^\circ$ for example) resulting from changes in the position of this plate, and absorbing certain lateral movements ($\beta \pm 100$ mm. for example) which could be caused by accidental displacements due to the transfer operations. Furthermore, the compensations for differences of height of levels resulting from loading or unloading are ensured by ramp jacks B4, B5 such as shown in FIG. 9.

In order to permit these functions of the element 1, the carrier chassis 11 receives a plate 14 movable about the axes 15a and 15b and at 16 so as to be capable of taking up a skewed position on the said chassis. A boarding element 18, free for lateral movement and provided with centering lugs 18a and 18b engaging in notches B2 and B3 formed in the plate B, further receives two lateral guides 19 and 20 and a central

guide 21, pivoted at 19a, 19b, 20a, 20b, 21a and 21b, while pivoted rollers 22 and retractable driving rollers 23 ensure the lateral movement and the support of the loads following the usual practice.

In addition, this carrier chassis 11 receives the control cabin 124 and also the pivots of the free diablo wheels 12 and 13.

The elements 2, 3 and 4 (FIG. 10) which are similar to the element 1 in their handling function, comprise the transfer zones Cr1, Cr2, in which retractable guides 24 form passages, while the rollers 22 freely pivoted, and the retractable driving rollers 23 ensure the lateral movement of the loads. Working platforms 25 provided with handrails 125 enable the operators D to handle the loading easily, and the driving diablo Cr2 with its driving rollers 126 is arranged underneath the element 2, while free diabolos 26, 27, 28 and 29 pivot underneath the elements 2 and 4.

Finally, a driver E installed in the cabin 124, controls the operations of the truck and supervises the handling movements carried out by the operators D.

The particular maneuvers of the handling truck according to the invention are obtained by a certain arrangement of the rolling driver members, which have a vertical pivotal axis, and their pivotal movement is effected at a distance by means of a centralized control.

By way of example, and according to the form of embodiment chosen, FIGS. 16 and 17 illustrate the kinematic chain and the driving chain which permit the maneuvering of the truck shown in FIG. 10.

In FIG. 16 it can be seen that the diabolos Cr1 and Cr2 pivot about the vertical axis X1, X2 (associated with the elements 1 and 3 of the truck C) and the pivotal movement is effected by endless screws 30 and tangent wheels 31 coupled to each other by a shaft 32 which is self-aligned by the homokinetic joint 33. A servomotor 34 actuated by the steering wheel 35 ensures the turning of the diabolos Cr1 and Cr2 in a manner known per se.

If reference is made to FIGS. 12 to 15, it is seen that the maneuvering of the truck C necessitates the combination of two means which are, on the one hand, the angular orientation of the diabolos Cr1 and Cr2 about X1 and X2 and, on the other hand, the proper direction of rotation of the driving members. In fact, while FIGS. 12 and 13 have their rolling members turned in the same direction, it is seen however that different evolutions are obtained (a lateral or rotational movement) by simply changing the direction of rotation of the driving members Cr1 and Cr2.

In order to do this, FIG. 17 shows the kinematic chain which permits (by means of a first reversing gear with two positions I and D (reverse and direct) the reversal of the direction of rotation of the driving members Cr1 and Cr2 with respect to each other or, by means of a second reversing device 37 with two positions I and D, the simultaneous reversal of the direction of rotation of these same driving members.

It should be noted that the two reversing gears 36 and 37 operate in a conventional manner with, for example, a clutch 38 (electromagnetic or the like) permitting the two shafts a1 and a2 to be coupled together in direct engagement, in a first position D, a sliding gear e1 on a1 enabling the shaft a2 to be driven by other gears e2, e3, e4 and e5 in a second position I and by declutching of 38.

A torque converter 39 associated with a gearbox 40 with two speed variation ratios (V1 rapid speed, V2 slow speed) coupled to a motor 41 ensures the mobility of the unit, while a bevel gear 42 brings the movement on the driving shaft a1 self-aligned by the homokinetic joint 43.

The safety of the steering lock of the diabolos (which may reach 90° is ensured by a rigid finger 49 fixed on the tangent wheel 31 and coming into mechanical abutment against the stop members 45a or 45b and electric safety contacts 46a or 46b.

Generally speaking, the driving of the truck, which is effected from the desk shown in FIG. 18, comprises two possibilities: the normal maneuvers and maneuvers in situ. The nor-

mal maneuvers comprise lateral movements towards the front or towards the rear in a straight line or slightly turning, and the evolutions in situ correspond to a fully locked position of the driving diabolos.

The range of selection of the possible maneuvers is thus as follows:

1. Normal forward running (AV) (reversing gear 36 inoperative and maintained in the position of direct engagement)

Button 51→Controls reversing gear 37 (direct engagement)

←Selection of normal speed

Forward running slow (AV 1)

Button 52→Controls reversing gear 37 (Direct engagement)

←Selection of slow speed

Reverse running slow (AR 1)

Button 53→Controls reversing gear 37 (reverse position)

←Selection of slow speed

2. Maneuvers in situ (selection of slow speed—steering wheel turned)

→Pivotal movement in situ, direction counterclockwise

Button 52 controls reversing gear 37 (direct engagement) controls reversing gear 36 (direct engagement)

→Pivotal movement in situ, clockwise direction

Button 53 controls reversing gear 37 (reverse position)

controls reversing gear 36 (direct engagement)

→Lateral movement to the left

Button 54—controls reversing gear 37 (direct engagement) controls reversing gear 36 (reverse position)

→Lateral movement to the right

Button 55—controls reversing gear 37 (reverse position) controls reversing gear 36 (reverse position)

The contactors 46a and 46b furthermore carry out the functions of removing the prohibition of the reverse position of the reversing gear 36, the prohibition of the normal speed selection and of counter-order contactors for the reversing gear 37.

In the case where all these operations are effected when starting from the position "steering wheel hard over to the right," the counter order contactor then reverses the selections of the reversing gear 37.

Finally, the cases of normal maneuvers and maneuvers in situ are indicated by the lightingup of arrows placed opposite the control pushbuttons, and the mobility of the truck is ensured by means of two pedals, one an accelerator pedal 47 and the other a brake pedal 48.

It can be seen that the invention provides a self-propelled handling truck which is particularly well adapted to the traffic of airmail bags, although its utilization may be contemplated for all load-handling in general.

Its great possibilities of maneuver on the ground, coupled with its system of load transfer made possible during the course of its actual movement, ensure an extremely small transit time and permit extensive automation of the handling operations.

It will of course be understood that the present invention has been described above solely by way of indication and not in any limitative sense, and that any modification of detail may be made to it in conformity with its spirit, without thereby departing from its scope.

Thus, the mechanical transmission of the driving installation is given by way of example, but it is quite clear that any hydraulic, electrical or electrohydraulic transmission which carries out the same functions falls within the scope of the patent.

The invention is essentially concerned with the production of a vehicle of very large size, provided, by the special arrangement of its rolling, propulsion and steering members with high maneuverability, facilitating the operations of drawing alongside and maneuvers on airport areas, and is applicable to the loading and unloading of freight from aircraft with a low floor or from aircraft with a high floor, the skewing plate being then replaced by a built-in scissors-type elevator.

It is also applicable to the transport of passengers from the air station to the aircraft and vice versa. In this case, the equipment of the platform is replaced by a very large cabin capable of receiving up to 200 passengers, the skewing plate being then replaced by a device permitting access of the passengers to the level of the aircraft cabin (lift, stairway or moving staircase).

I claim:

1. A self-propelled truck comprising a control cabin permitting the distribution of loads between waiting zones and transfer zones, characterized in that said truck comprises four independent wheeled elements each of which includes a cargo handling platform, each of said elements being coupled to each other by articulated joints whose axes extend parallel to the face of said platforms so that the platforms normally present a continuous surface, displacement means in the form of two driving double pivoting rollers, angularly controlled in the pivoting plane by a motor device and loose pivoting diablo wheels disposed under said elements so as to support the loads to be handled, said elements being movable as a unit at will, with lateral or turning movements of the displacement means according to orders from said control cabin, one of said platforms including a skewing plate, and retractable guides disposed on the other of said platforms assuring continuous articulation of loads being handled by the truck.

2. A self-propelled truck according to claim 1, characterized in that said skewing plate is articulated on a frame of said one of said platforms in three points, one of which is situated on the opposite side of said coupling joints and two on the same side as said coupling joints, a boarding element being locked at will inside of said platform and resting upon said skewing plate, said one of said platforms also including lateral guides articulately secured thereto at one end on said boarding element and at the other end on the same side of said coupling joints, so as to define guiding channels for loads to be handled on said platform.

3. A truck in accordance with claim 2, characterized in that said boarding element is in the form of a crossmember free for lateral movement on the said skewing plate for engaging a

transfer floor by means of centering lugs engaging in notches provided in the transfer floor, with said lateral guides being articulated at their extremities, on the one hand, on said one of said platforms and, on the other, on the said boarding element so as to form guiding passages for the loads, the loads being displaceable by fixed retractable driving rollers.

4. A truck in accordance with claim 3, characterized in that said retractable guides are placed in the extension of the guides of another adjacent platform, and fixed, mobile and retractable rollers are arranged between the said guides in order to displace the loads laterally, while articulated diablo wheels are fitted on the whole surface of the elements, circulation passages being provided for the evacuation of the loads.

5. A truck in accordance with claim 4, characterized in that the operating mechanism of the driving diablo wheels comprises a self-aligned shaft provided with endless screws in engagement with tangent wheels keyed on the pivotal shafts of the said driving diablo wheels, and a servomotor controlled by a steering wheel mounted in the cabin which impresses at will on the said shaft, suitable movements of rotation.

6. A truck in accordance with claim 5, characterized in that the driving mechanism for the rotation of the diablo wheels comprises a first reversing gear and a bevel gear to which is coupled a second shaft interrupted by a second reversing gear and coupled to the driving motor through a gearbox.

7. A truck in accordance with claim 6, characterized in that the cabin comprises a control panel provided with pushbuttons for combining at will the lateral and rotational movements, a steering wheel, an accelerator pedal and a brake pedal.

8. A truck in accordance with claim 7, characterized in that it comprises safety devices in the form of a finger keyed on the pivotal shaft of the driving diablo, the said finger being arranged to come into abutment against two stops placed in the 90° lock position and against two electric safety contacts permitting the prohibition of engagement of the reversing position of the first reversing gear and the selection of normal speed of the truck during slow maneuvers.

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