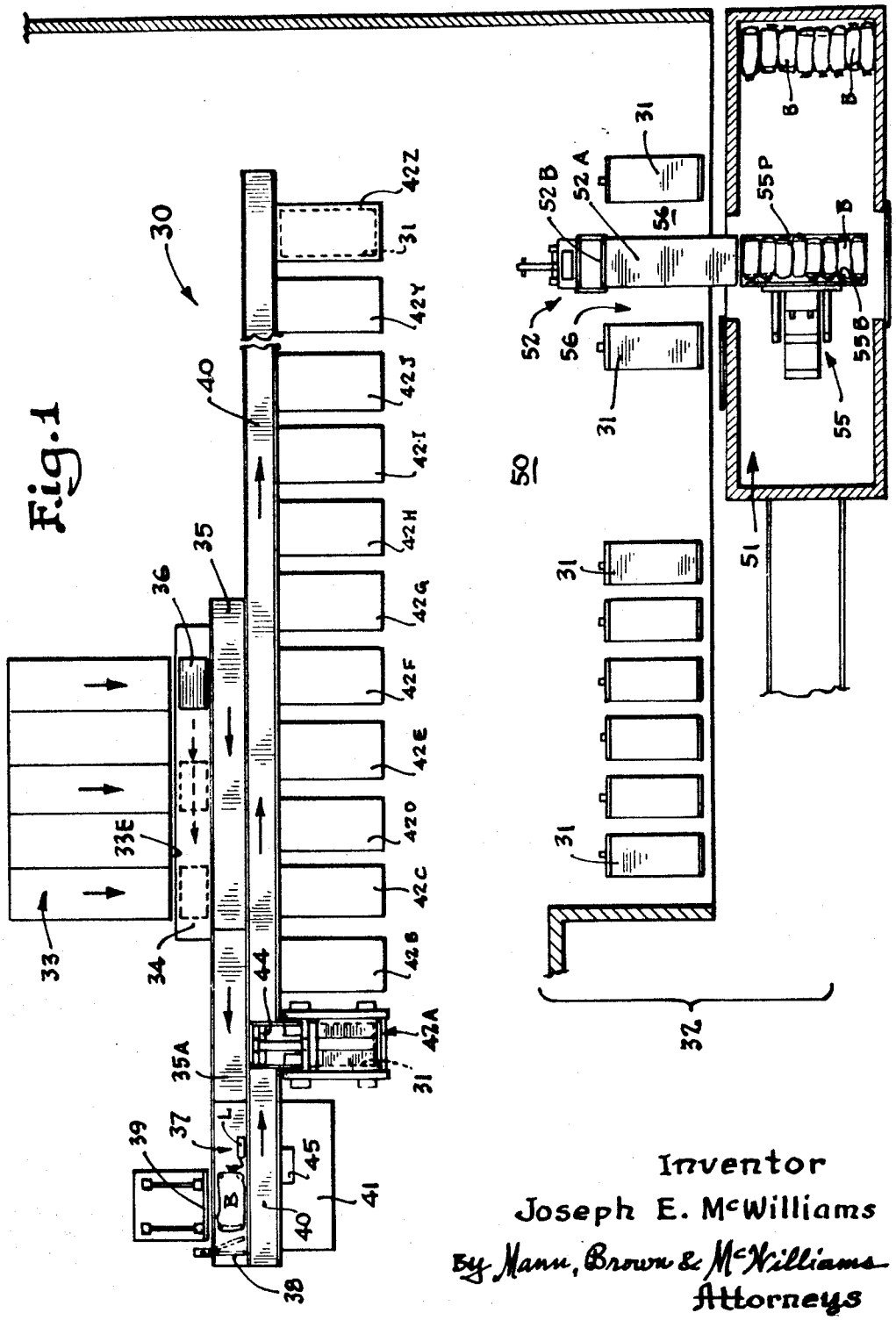
Aug. 16, 1966 J. E. McWILLIAMS 3,266,645

SYSTEM FOR HANDLING BAGGED MAIL

Filed Oct. 4, 1965 5 Sheets-Sheet 1

Fig. 1



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SYSTEM FOR HANDLING BAGGED MAIL

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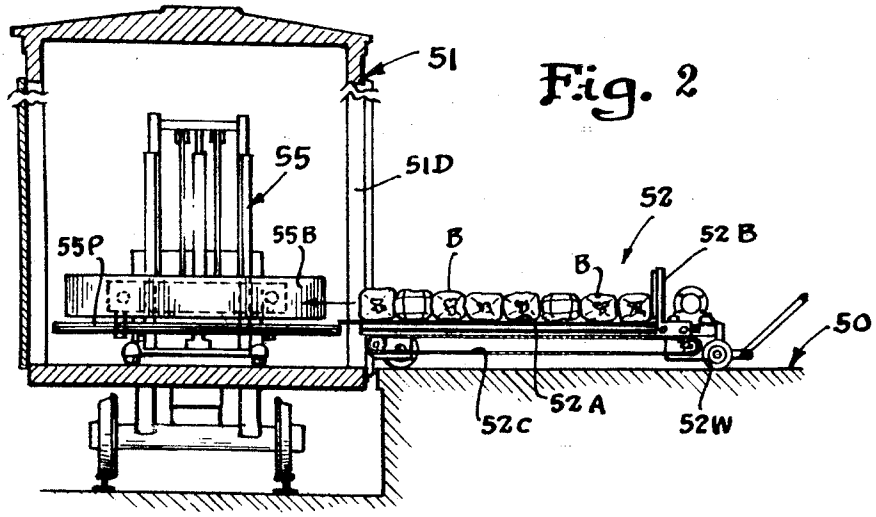


Fig. 2

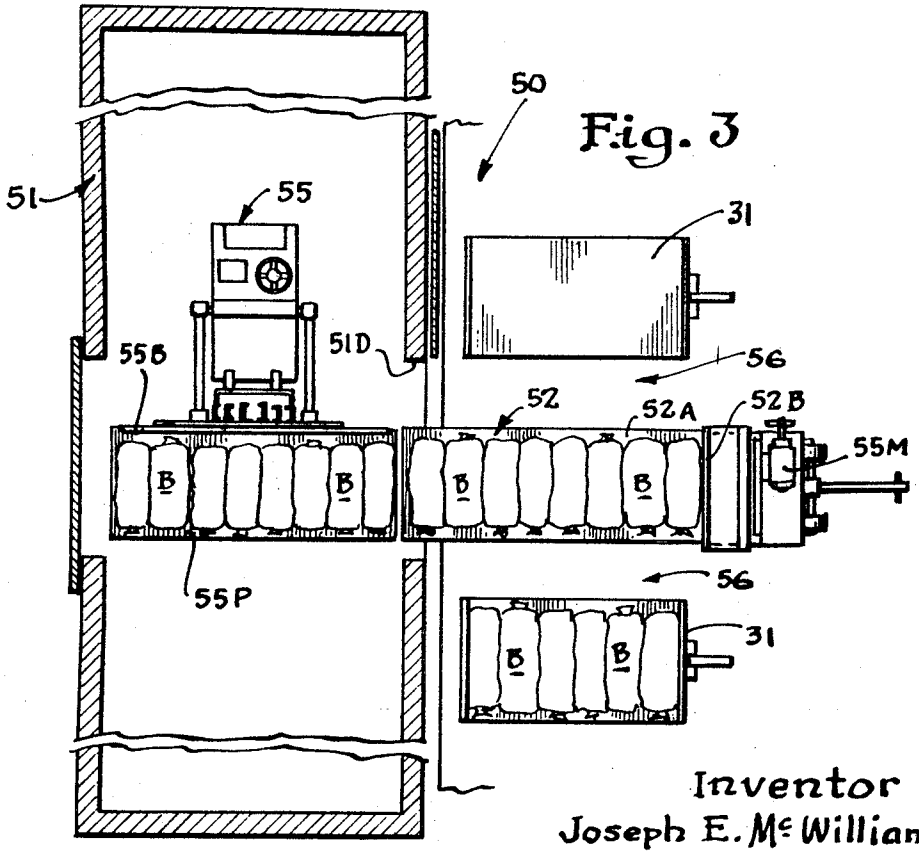


Fig. 3

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SYSTEM FOR HANDLING BAGGED MAIL

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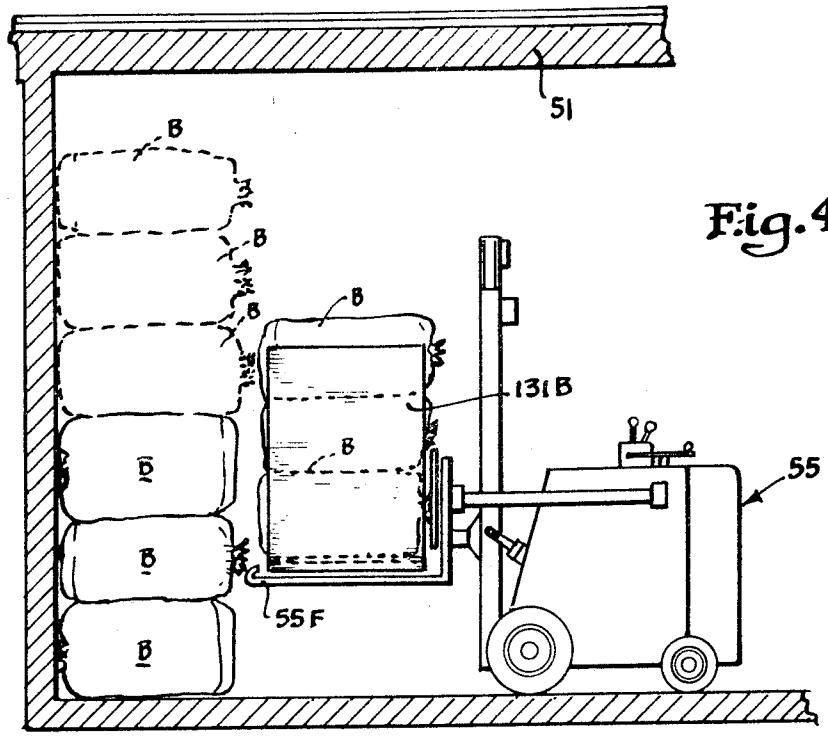


Fig. 4

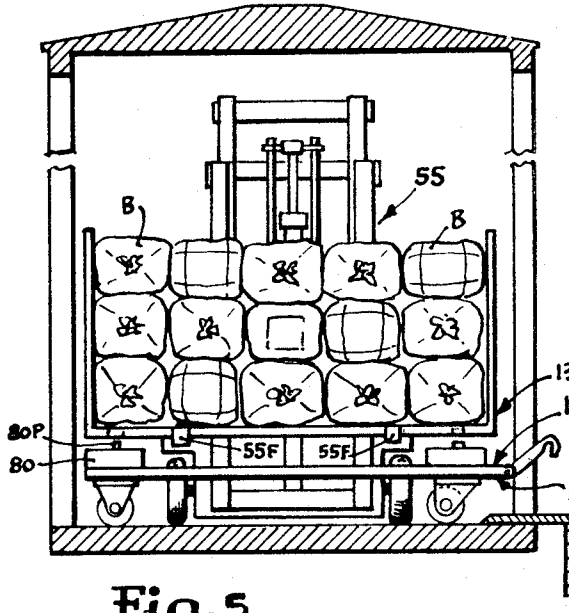


Fig. 5

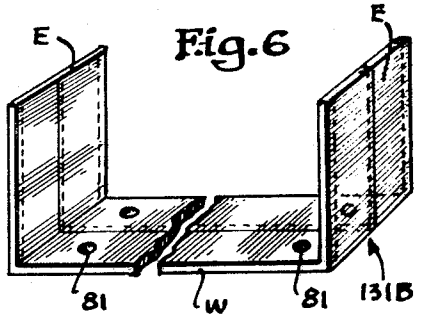
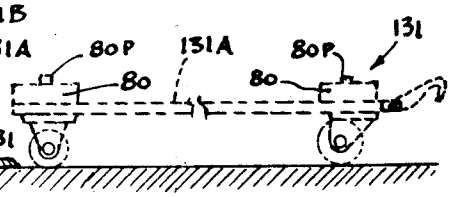


Fig. 6



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SYSTEM FOR HANDLING BAGGED MAIL

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Fig. 7

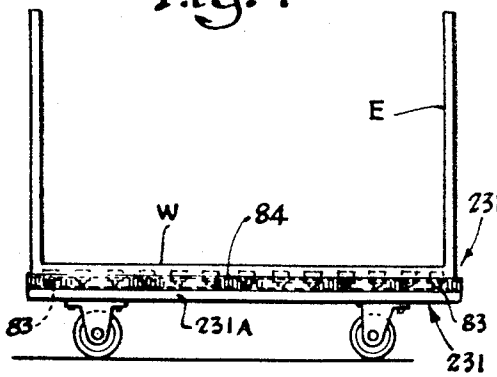


Fig. 8

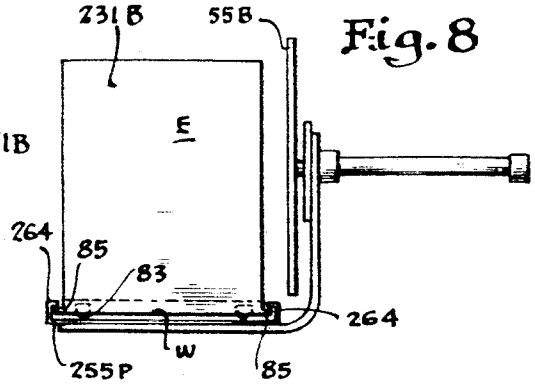


Fig. 9

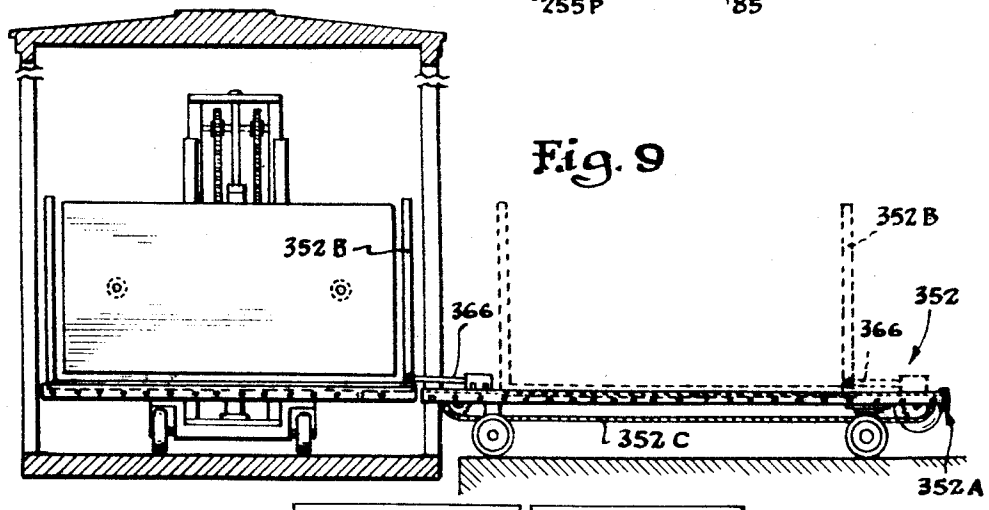
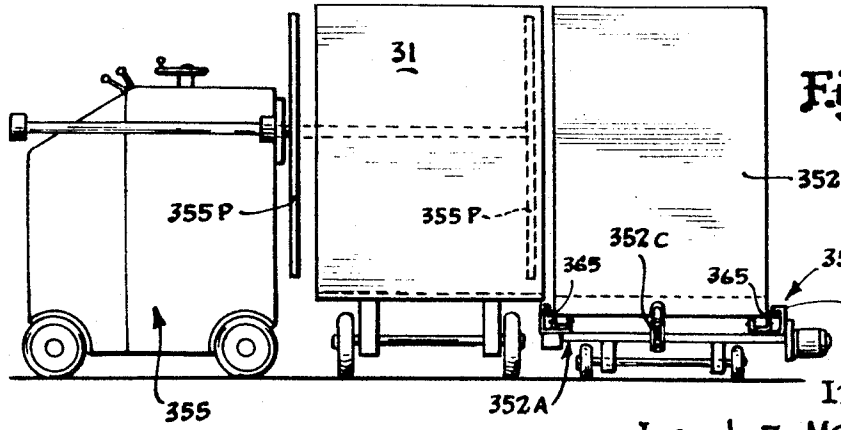


Fig. 10



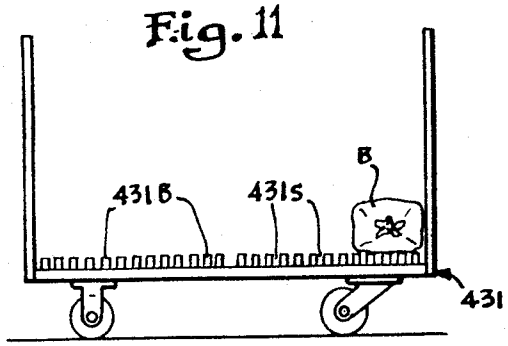
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SYSTEM FOR HANDLING BAGGED MAIL

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Fig. 11



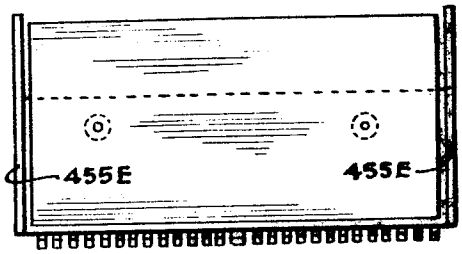


Fig. 13

Fig. 12

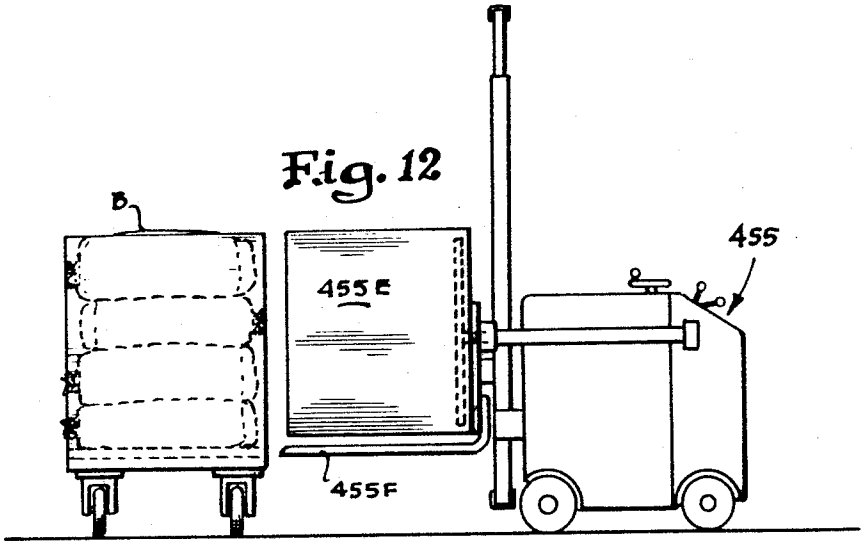
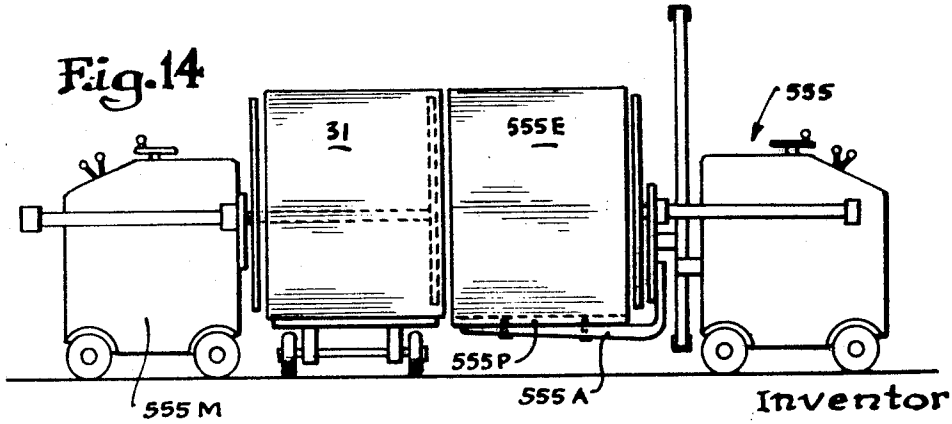


Fig. 14



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United States Patent Office 3,266,645 Patented August 16, 1966

3,266,645

SYSTEM FOR HANDLING BAGGED MAIL

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Filed Oct. 4, 1965, Ser. No. 492,831
5 Claims. (Cl. 214—38)

This application is a continuation-in-part of my copending application Serial No. 355,141, filed February 26, 1964, now Patent No. 3,209,926 which was a division of my application Serial No. 139,526 that matured into Patent No. 3,164,271 on January 5, 1965.

This invention relates to the handling of loaded and tagged bags of mail in terminals and the like, and particularly it relates to a system of sorting the bagged mail as to destination, and subsequently loading the bags into the carrier or transport bodies. The present application is directed to the carrier or transport body loading aspects of said system.

The Post Office Department pays carriers of bulk mail in bags on a cubic foot basis, and for purposes of economy the postal authorities require that bulk mail loaded in railway cars, motor trucks or trailers be loaded in a particular manner so as to fully utilize the capacity or volume of the transport body up to the maximum height to which the bags may be lifted by the workers in stacking. This loading may differ somewhat according to the type of carrier or transport body that is being used, but in general the bags are laid down in tiers that run transversely of the length of the transport body with the length of the bags extending longitudinally with respect to the transport body. Variations in bag loading of course cause variations in width of the loaded bags, but regardless of these variations, the bags are snugly related to each other in each tier, and successive tiers are placed one upon the other until the stack reaches the internal height of the transport body. This general plan, in the case of side loading bodies, such as railway cars, is modified in the area between the two doors so that the tiers and stacks run lengthwise of the body with the length of the bags extending transversely of the transport body.

The requirement that the transport bodies be loaded completely according to the general plan above outlined has constituted one element in complicating and increasing the cost of sorting, handling and loading bagged mail, and in the entire sorting, handling and loading process, the tiring manual effort required has long been considered to be objectionable. Thus in the handling system heretofore provided, the operations have been broadly considered as falling into a series of incoming operations and a series of outgoing operations, all of which have involved tiring and time-consuming manual operations, many of which were repeated many times in the course of the entire operation. Generally considered, the incoming operations have constituted the accumulation of bags on sorting floors, and sorting of these bags and loading the same on hand trucks in loads for subsequent reloading onto particular outgoing carriers, and then moving the loaded hand trucks to a temporary storage area. The outgoing operations comprise the moving of the loaded hand trucks to the dock area and into positions that may be required for transporting the bags into the transport body, and then transferring and stacking the bags in the transport body.

More specifically with relation to the incoming operations, the bags are dumped onto the sorting floor in random piles, and these sorting floors are relatively large with trucks of one kind or another positioned around the sorting floor. In some instances there may be as many as ninety trucks about the sorting floor to provide for the destinations that may be included in the bags that

are supplied to the sorting floor, and of course in such an instance, many of the trucks may be positioned from 100 to 150 feet from the point where a bag is located on the sorting floor. The worker, in sorting and loading the bags onto the proper hand trucks must stoop down and grasp the bag cords and read the destination tag that is attached to the cord. The bag must then be carried or dragged to the proper hand truck, and the worker must then stoop down and grasp the bag so as to lift the bag into position on the hand truck. This loading operation must be carried on carefully in order to assure that the stacked bags will remain in position on the truck when it is subsequently moved. The worker must then walk back to the sorting floor and repeat this operation. As the stacks of bags on the truck becomes higher, greater effort is of course involved, and this is particularly tiresome where the bags are loaded up to or beyond the allowable maximum of eighty pounds.

In the outgoing operations, the unloading of the bags from the hand trucks and the carrying or dragging of these bags into position in the carrier body for stacking according to the loading plan above described, involves further manual work that is extremely tiresome, and throughout all of these handling operations in both the incoming and outgoing portions of the work, there is a repetition of the orienting movements as the bag is oriented into position on the hand trucks and subsequently as it is oriented in placing it in position in the tiers of the transport body.

In view of the foregoing it is the primary object of the present invention to provide an improved system for handling, sorting and loading bagged mail, and to do this in such a way that walking, stooping and lifting are minimized and in such a way that time losses are reduced. Another and related object of this invention is to provide a system of the foregoing character wherein the loaded mail bags are oriented early in the cycle of operations, and in which this initial orientation is maintained throughout all of the subsequent handling operations so as to thereby reduce the physical effort and the time that has heretofore been required in respect to the orientation of the bags.

Another important object of this invention is to substantially eliminate manual lifting operations in the sorting, handling and loading of bulk mail bags, and it is a further object to eliminate such manual lifting operations through the adoption of standardized sequence of handling and loading operations which enables the lifting of the bags to be accomplished through the use of power means.

Other and further objects of the present invention will be apparent from the following description and claims, and are illustrated in the accompanying drawings, which, by way of illustration, show preferred examples of the present invention and the principles thereof, and what is now considered to be the best mode in which to apply these principles. Other embodiments of the invention embodying the same or equivalent principles may be made as desired by those skilled in the art without departing from the invention.

In the drawings:

FIGURE 1 is a plan view schematically illustrating the mail bag handling and sorting system of the invention, and illustrates the over-all system disclosed in my said Patent No. 3,164,271;

FIGURE 2 is a transverse section through a carrier or transport body in the form of a railway car and illustrating the way of which mail bags are moved into and then stacked in the proper relationship within the car;

FIGURE 3 is a plan sectional view of the structure shown in FIGURE 2;

FIGURE 4 is a view illustrating the way in which bags are loaded into an end loading truck body and showing

an arrangement for loading several tiers of bags at one time;

FIGURE 5 is a transverse sectional view showing the hand truck structure of FIGURE 4 as utilized for loading several tiers of bags in a car at one time;

FIGURE 6 is a perspective detail showing the truck body utilized in the loading operation shown in FIGURES 4 and 5;

FIGURE 7 is a side elevational view of a different form of hand truck;

FIGURE 8 is a view showing the lifting and pusher mechanism adapted for use in connection with the hand truck in FIGURE 7;

FIGURE 9 is a cross-sectional view of a railway car showing the use of an assembler type of hand truck for loading the car in balanced stacks;

FIGURE 10 is an end elevational view showing the system for loading the assembler of FIGURE 9;

FIGURE 11 is a side elevational view of another form of hand truck;

FIGURE 12 illustrates the way in which a load of oriented bags is removed from the hand truck of FIGURE 11;

FIGURE 13 is a front elevational view of the lifting and pushing structure of the lift truck of FIGURE 12; and

FIGURE 14 is an elevational view illustrating the way in which a conventional hand truck may be unloaded onto the lift platform of the lift truck.

THE SYSTEM IN GENERAL

For purposes of disclosure the system of the present invention has been schematically illustrated in FIGURE 1 to show the various operating steps and apparatus whereby loaded and labeled mail bags B may be sorted and loaded with increased efficiency. In FIGURE 1 the broad characteristics of the system are illustrated, and specific details of apparatus relating to the transfer of the bag from hand trucks to a transport vehicle (such as a railroad car) are shown in other views and will be described hereinafter. In general the system comprises an incoming section **30** in which the random assortment of loaded bags is sorted as to destination and loaded in predetermined oriented relation on conventional sideless hand trucks **31** allocated to the respective destinations, and a storage and loading section **32** in which the loaded hand trucks **31** are accumulated and temporarily stored and are thereafter loaded into the transport body of a truck or railway car.

Thus, with respect to the incoming section **30** of the system, an initial gathering area **33** is provided on which a random assortment of loaded and labeled mail bags B may be deposited from trucks, conveyors and the like, and the bags B are moved across the area **33**, due for example to floor slope, or by conveyors, to one edge **33E** of the area **33** that borders one side of a depressed walkway **34**. Along the other side of the depressed walkway **34**, a transfer conveyor **35** is extended at a level somewhat lower than the level of the edge **33E**, and a worker stationed in the depressed walkway **34** may thus grasp a bag B from the adjacent portion of the area **33** and may transfer the bag across the walkway **34** and onto the conveyor **35** in a predetermined oriented relation with respect to the conveyor. Such transfer and orientation are accomplished without lifting the bag B, and by provision of a sloping, movable transfer bridge **36** extended across the walkway **34**, the exertion involved is confined to the dragging effort required to start the transfer and turn or orient the bag B as it is deposited on the conveyor **35**.

The oriented bags B are advanced or carried by the conveyor **35** so as to be moved one by one into a transfer station **37** where a trip member **38** that is engaged by the leading bag stops the conveyor **35** with the leading bag B in substantially a predetermined relation to a pusher **39**. This pusher **39** is thereafter operated as will be described to push the bag off of the conveyor **35** and onto an adjacent distributing conveyor **40**. The distributing conveyor **40** is of the step-by-step kind, and as shown, moves in a direction opposite to the direction of the conveyor **35**. When the conveyor **40** stops with a bag B positioned opposite the pusher **39**, and with the trip member **38** actuated, the pusher **39** operates through forward and return strokes to transfer the bag B to the conveyor **40**. With the trip member **38** in released condition the return of the pusher **39** to its retracted position, again starts the conveyor **35**. In the transfer of the bag B to the conveyor **40** the originally established orientation of the bag B is maintained, and the destination tag L of the bag B may be readily and easily examined by an operator working at a routing station **41** adjacent the transfer station **37** and along a portion of the conveyor **40**.

The distributing conveyor **40** extends or travels past a succession of collecting stations **42A** to **42Z**, allocated respectively to different destinations that may be included among the bags B that are to be sorted and loaded, and in order that groups of bags B gathered at the respective stations **42A** to **42Z** may be easily discharged onto sideless hand trucks **31**, the conveyor **40**, and the transfer station **37** and the several collecting stations **42** are disposed in an elevated relation with respect to the floor upon which the trucks **31** rest, thus to permit gravity discharge of a gathered group of similarly oriented bags B onto a hand truck disposed beneath or within a collecting station **42**. As herein shown the transfer conveyor **35** includes an inclined portion **35A** which moves the bags B to the higher levels of the transfer station **37**.

When a particular bag B has moved into position opposite the proper collecting station **42**, a pusher mechanism **44** is operated automatically to push the bag B laterally off of the conveyor **40** and onto the collecting station, and as this is done, the originally established orientation of the bag B is maintained. The pusher mechanisms **44** at the several collecting stations **42** are rendered operative selectively by settable control means **45** located at the routing station **41** according to the destination label L carried by each bag B as it is moved through the transfer station and onto the distributing conveyor **40**.

As will be described in detail hereinafter, the bags B discharged successively at a particular collecting station **42** are collected therein a uniform side by side relation until they constitute a gorup large enough to form a complete tier from end to end on a truck **31**, and the group of bags is then discharged onto the related hand truck **31**. After several tiers or groups of bags have thus been loaded on a truck **31**, a new truck **31** is put in place beneath the particular station **42**, and the loaded truck **31** is moved to a temporary storage area that forms part of the storage and loading section **32** of the system.

As the fully loaded hand trucks **31** are removed from the respective collecting stations **42A** to **42Z**, these trucks are moved onto a relatively large storage floor **50** that constitutes a part of the temporary storage and loading section **32** of the present system. These fully loaded hand trucks **31** are of course arranged in groups on the storage floor **50** according to destination or are arranged in groups that may include several destinations which are to be loaded into a common transport body such as a railway car body **51** shown in FIGURE 1.

When a sufficient number of fully loaded hand trucks **31** have been assembled to take care of the loading of a particular transport body **51**, the transport body is brought into position along one edge of the area **50** which constitutes a loading platform, and the mail bags B from the several trucks **31** are put in position within the transport body **51** so as to form a compact and uniformly arranged load within the body **51**. This form of loading is standard and involves the arrangements of the bags B in tiers as illustrated within the body **51** in FIGURE 1, and similar tiers are arranged one upon another so as to fill the transport body from floor to ceiling.

Under the present invention this loading operation is accomplished in such a way that the manual effort involved is minimized, and is further accomplished in such a way that the manual operations are interrelated so that the minimum of help is required. Thus a bag assembler unit **52** is provided that constitutes a wheeled vehicle having a relatively long platform **52A**, this platform **52A** being of a length that is at least as great as the width of the transport body that is to be loaded. This dimension in almost every instance exceeds the length of the hand trucks **31**, and for this reason the bags on the hand trucks **31** are transferred manually from the hand trucks **31** onto the bag assembler platform **52A**, as will be described in further detail hereinafter. Once the platform **52A** has been loaded with a group of bags B sufficient to form a tier across the entire width of the transport body **51**, these bags are pushed off of the platform **52A** endwise thereof and onto the platform **55P** of a self propelled lift truck **55** that is at this time located inside of the transport body **51**. This movement of the bags off of the platform **52A** and onto the platform **55P** is accomplished by a pusher plate **52B** as will hereinafter be described. The lift truck **55** is of the general kind shown in Bomer Patent No. 2,256,454, patented September 16, 1941.

The loading of the platform **52A** of the bag assembler **52** is accomplished by moving a pair of end trucks **31** into position on opposite sides of the platform **52A** as shown in FIGURE 1 so as to leave a walkway **56** on each side of the bag assembler **52**. A worker may thus stand in each of these walkways and may shift bags B from the adjacent hand truck **31** across the walkway **56** and into position on the platform **52A**. This shifting operation involves supporting the bag B as it is moved across the walkway **56**, but does not involve lifting of the bag because in every instance the hand trucks **31** support the bags at or above the level of the platform **52A**. Moreover, no orienting movements are involved. After a tier of bags has been assembled on the platform **52A**, the pusher plate **52B** is operated to push the tier B of bags from the platform **52A** onto the platform **55P**, and if necessary the wheeled assembler **52** may be moved endwise toward the platform **55P** as required.

The self propelled lift truck **55** has the usual provision for raising and lowering the platform **55P**, and for loading, this platform **55P** is lowered slightly below the platform **52A**. When the platform **55P** has been loaded, it is raised or lowered to the approximate level at which the tier of bags is to be deposited within the transport body **51**, and the truck **55** is advanced so that the platform **55P** is located substantially over the position that is to be occupied by the tier of bags.

For the purpose of discharging the tier of bags from the platform **55P**, the lift truck **55** has a pusher plate **55B** mounted so as to move up and down with the platform **55P** and for movement in a forward direction across the platform **55P**. Thus after the platform **55P** is in position over the location that is to be occupied by the tier of bags, the pusher plate **55B** is actuated in an advancing or forward direction and the lift truck itself is moved in a rearward direction at a speed substantially corresponding to the speed of the movement of the pusher plate **55B**. Through this action, the platform **55P** is withdrawn from beneath the tier of the bags, and the tier of bags is deposited in the location that is desired.

LOADING OF SIDE-OPENING TRANSPORT BODIES

When a sufficient number of hand trucks **31** have been loaded (as described in my said Patent No. 3,164,271) with respect to a particular destination, and have been accumulated on the storage floor **50**, the bags B from the trucks **31** may be loaded into a transport body such as the railway car body **51** shown in FIGURES 1, 2 and 3. Such loading operation is accomplished through the use of the assembler unit **52** which is in the nature of a long flat truck having wheels **52W** and which is adapted to be brought into position opposite the adjacent side door **51D** of the railway car body **51**. The bag assembler **52** is thus put in the position shown in FIGURES 1 and 3, and two loaded hand trucks **31** are moved into position on opposite sides of the platform **52A** of the assembler **52**, there being a space or walkway **56** between the respective hand trucks **31** and the sides of the platform **52A**. It will be recalled that the hand trucks **31** are loaded with several tiers or layers of bags, and the platform **52A** is at a relatively low elevation so that it is at or below the level of any bags that may be carried on the hand trucks **31**. Workmen may thus stand in the walkways **56** on opposite sides of the assembler platform **52A** and may transfer bags B one at a time from the hand trucks onto the platform **52A** while maintaining the original orientation of the bags B and without performing any actual lifting work. The bags B are merely supported by the workman during a horizontal movement across the walkways, or are controlled as they move angularly downwardly across the walkway onto position on the platform **52A**. The bags B are arranged in a single layer or tier on the platform **52A** in a sufficient number to thereafter constitute a complete tier that will extend entirely across the width of the transport body **51**.

When the platform **52A** has been fully loaded, the lift truck **55** is brought into a position as shown in FIGURE 3 where the platform **55P** of the lift truck is disposed in endwise alignment with the platform **52A**, and the arrangement is such that the platform **52A** is just slightly above the level of the platform **55P** as shown in FIGURE 2. The pusher plate **52B** is then operated, and this is accomplished by operation of a reversible motor **55M** on the assembler **52**, and this motor drives an endless chain **52C** on each side of the frame of the assembler **52**. The upper run of the chain **52C** is connected to the pusher **52B** so that by operation of the chains **52C** the pusher **52B** may be advanced along the platform **52A** to push tier of bags B onto the platform **55P**. The pusher **52B** is then withdrawn to the position shown in FIGURES 2 and 3 so that the workmen may immediately start reloading the platform **52A** while the worker inside the car body **51** is putting the previous load of bags B into the proper position within the car body. This coordination of the working time of the workers inside and outside of the car **51** is important in that it avoids objectionable idle time and reduces the cost of the loading operation.

When the platform **55P** of the lift truck **55** has been loaded, as described, the lift truck is driven toward the end of the car, and the platform **55P** is elevated to the extent necessary. When the lift truck **55** has moved to a longitudinal point in the car where the platform **55P** is located over the position that is to be occupied by the tier of bags B, the platform **55P** is lowered as far as possible toward the surface on which the particular tier of bags is to be supported, thus to eliminate the possibility that these bags may tumble and assume improper positions or orientations during the unloading operation.

When the platform **55P** has thus been lowered as far as possible, the pusher plate **55B** is operated so as to move forwardly across the platform **55P**, and at the same time, the lift truck **55** is moved at the same speed as the pusher plate **55B** in a reverse direction. These movements are timed so that the bags B on the platform **55P** remain directly over the final locations that they are to have in the car. Thus the tier of bags B is dropped gently and in a uniform arrangement into position at the proper location within the car, and this is accomplished without tumbling or undesired disturbance of the orientation of the bags B.

The unloaded lift truck **55** is then returned to the position and relationship shown in FIGURE 3, and by this time the assembler **52A** will have been reloaded so that it may be immediately operated to push another tier of bags from the platform **52A** onto the platform **55P**.

LOADING OF END-OPENING TRANSPORT BODIES

In the foregoing description, the system has been described as employed in loading side-opening transport bodies such as railway cars, but it will be evident that the same procedure may be employed in loading a rear-opening or end-opening transport body such as a motor truck. In such an instance the open rear end of the truck is backed into position adjacent the edge of a loading platform, and the lift truck **55** is disposed in alignment with the open end of the truck body so that it may run directly into the truck body after the platform of the lift truck has been loaded. In such an instance, the positioner **52** is located on the loading platform or dock beside the path of the lift truck **55**. The positioner **52** may be then loaded with a tier of bags from hand trucks **31** in the manner hereinbefore described, and the positioner **52** may then be unloaded in an endwise direction to move the tier of bags into position onto the lift platform of the lift truck. The lift truck may then be run into the open end of the truck body and may be unloaded so as to stack the tier of bags in the manner hereinbefore described.

HANDLING OF LARGER OR MULTIPLE TIER GROUPS IN LOADING

In the system hereinbefore described, the bags B have been loaded into the transport body one tier at a time, but where the user is willing to invest additional money in replacing the usual hand trucks **31**, the entire balanced stack of bags B arranged in several tiers on a hand truck may be transferred as a unit and stacked as a unit within the transport body.

In FIGURES 4, 5 and 6, one such embodiment of the present system is illustrated. Thus in order to provide for handling and arranging the mail within the transport body in relatively large groups or balancing stacks, a special sideless hand truck **131** is provided having a wheeled base portion **131A** with a separable sideless body **131B**. The sideless body **131B** shown in FIGURE 6, comprises a bottom wall W and end walls E rigidly associated therewith. The sideless body **131B** rests on cross blocks **80** near opposite ends of the wheeled base **131A**, and locating pins **80P** on the upper sides of the blocks **80** are arranged to enter locating openings **81** formed in the bottom wall W of the sideless body. The hand truck **131** is moved endwise off of the loading dock and through the door of the car and into position opposite the lift truck **55**. In this instance the lift truck **55** is made without a platform and has a modified form of fork **55F** which may be inserted in the space between the two blocks **80**, thus to enable the lift truck to elevate the entire body **131B**. The base **131A** is then withdrawn to the position shown in dotted lines in FIGURE 5, and the lift truck **55** is advanced toward the stack of bags at the end of the car. The vertical position of the loaded body **131B** is then arranged so that it is just above the location that is to be occupied by the newly arrived stack of bags, and after the body is in position over the location where the bags are to be deposited, the pusher of the truck is operated to push the bags off of the body **131B**, and the lift truck **55** is backed away at a corresponding rate so that the bags drop gently into position, as for example into the dotted line bag positions shown in FIGURE 4 of the drawings.

In the showing of FIGURES 4, 5 and 6, the transport body is the railroad car body **51**, which is normally a side-opening type transport body. In utilizing the form of the invention disclosed in connection with FIGURES 4, 5, and 6, a number of the special hand trucks **131** may be lined up alongside of the railroad car body **51**, when the latter is parked at a convenient loading dock, and the hand trucks, assuming that they have been loaded with the mail bags in accordance with the teachings of

this invention to provide a balanced stack of such mail bags, may be consecutively unloaded in the manner described above in connection with FIGURES 4, 5, and 6 by consecutively handling the respective hand trucks in the manner indicated. After the individual loads are deposited in the manner described, the special fork lift truck **55** is moved back to the initial load receiving position (which would be comparable to the position shown in FIGURE 1) with the base portion **131A** of the hand truck assembly **131** being processed being in the meantime returned back into position to receive its body **131B**, whereupon the lift truck would be operated to replace the body **131B** on its associated base portion **131A** by maneuvering the body to dispose openings **81** over pins **80P** and then lowering the body to rest on the cross blocks **80**.

The reassembled truck is then withdrawn from the car body **51** and moved out of the way, and the next loaded hand truck is moved to the operating position necessary to insert it within the car body **51** in front of the fork lift truck **55** for processing in the manner already indicated.

When one end of the railroad body **51** is filled up, the lift truck is turned around and operates in the same manner to fill the other end of the vehicle body **51**.

A similar procedure may be employed for loading of end-opening transport bodies, such as high vehicle trailer bodies. For this purpose, the highway vehicle trailer bodies are backed up to an appropriate loading dock and hand truck assemblies **131** loaded in the manner described are lined up adjacent the vehicle. A lift truck **55** arranged in accordance with the teachings of FIGURES 4–6 is disposed in alignment with the open end of the truck or trailer body with its fork end projecting toward the vehicle doorway and the body is opened so that the fork lift truck may run directly into the truck body after picking up one of the hand truck bodies **131B**. To start this operation, when the fork lift truck has been aligned in the manner indicated, the first hand truck assembly is moved between the vehicle end and the fork lift truck and the fork lift truck is operated in the manner already described to separate the loaded body **131B** of this particular truck and the base portion **131A** of this particular truck is then moved to one side of the fork lift truck. The fork lift truck with its loaded hand truck body then moves into the transport vehicle body and deposits its load at the extreme inner end of the body in the manner already described in connection with the showing of FIGURES 4–6.

The fork lift truck then backs outwardly of the transport vehicle body back onto the loading dock after which the hand truck wheeled base portion for the hand truck body the fork lift body is carrying is repositioned in front of the fork lift truck and the fork lift truck replaces the truck body on its base portion. The then emptied and reunited hand truck assembly is moved to one side and the next hand truck assembly moved in fornt of the fork lift truck and between the fork lift truck and the end of the transport vehicle for processing in the same manner, which is repeated until the highway vehicle transport body is loaded.

It should be noted that in connection with both of the methods described above, the fork lift truck merely moves rectilinearly or back and forth and longitudinally of the transport body being loaded between the point where the fork lift truck receives a loaded hand truck body portion, the point where the load is deposited in the transport vehicle, and the point where the unloaded hand truck body portion is reassembled on its base portion. This simplified maneuvering of the fork lift truck plus the preloading and lining up of the hand truck assemblies provides a fast and efficient manner of loading the balanced stacks of mail bags into the transport vehicle.

It is also to be noted that the hand trucks in being maneuvered in accordance with the methods described im-

mediately above move laterally of the transport vehicle in being positioned for cooperation with the fork lift truck and in being withdrawn from the path of movement of same.

In FIGURES 4, 5 and 6, the separable hand truck body is separated from the wheeled base by a vertical movement. However, other arrangements may be employed such for example as the arrangements shown in FIGURES 7 and 8. In FIGURE 7, a hand truck **231** has a wheeled base **231A** and a separable sideless body **231B**. In this instance, the sideless body has a plurality of anti-frictional members **83** on its lower face and may be moved endwise off of the wheeled base **231A**. In this instance the base **231A** has a pair of channels **84** along its opposite sides, and the upper flanges thereof are arranged to overlie laterally projecting pins **85** on the bottom wall W of the sideless body **231B**. For use with trucks **231**, the lift truck **55** has the same form of pusher **55P**, but has a platform **255P** with flanges **264** of the same form and size as the channels **84** of the truck **231**. Hence the body **231B** of the hand truck **231** may be pushed endwise off of the wheeled body **231A** and into position on the platform **255P** as shown in FIGURE 8. The lift truck **55** may then be driven into its unloading position and the bags may be unloaded from the body **231B** in the manner hereinbefore described.

The present system as described with respect to FIGURES 5 to 8, may be utilized in those instances where the width of the vehicle body being loaded does not materially exceed the length of the hand trucks, but in those instances where the width of the transport body is too great, the system may employ a modification of the bag positioner **52** to handle balanced stacks of bags B. Thus, as shown in FIGURES 9 and 10 of the drawings, a positioner **352** is provided in the form of a special hand truck similar to hand truck **231** and having a wheeled base **352A** and a removable or separable sideless body **352B** mounted thereon. The body **352B** has bottom and end walls and is guided for endwise movement on the base **352A** by means including laterally projecting lugs or pins **365** that run under flanges **364** on the wheeled base **352A**. Positioner or hand truck **352** includes, however, a motor-operated endless chain **352C** has a drive link **366** connected thereto and adapted for detachable connection with one end wall of the body **352B**. Thus the positioner **352**, after loading of the body **352B**, may be brought into the position shown in FIGURE 9, and by operation of the chain **352C**, the body **352B** may be pushed endwise from the dotted line position in FIGURE 9 to the full line position thereshown. In such a movement the body **352B** may be moved into position on a platform **255P** of the kind shown in FIGURE 8 so that the unloading operation may be carried on as described in respect to FIGURE 8. After the bags have been unloaded from the truck body **352B** in the manner described with respect to the truck body **231B**, the lift truck is brought back into position shown in FIGURE 9, and the link **366** is connected thereto so that by operation of the chain **352C**, the body **352B** may be pulled back into the position shown in dotted outline in FIGURE 9. The body **352B** may then be reloaded and the operation repeated. Such loading of the sideless body **352B** may be accomplished in the manner shown in FIGURE 10 where a conventional hand truck **31** is brought into position beside the positioner **352** and a pusher truck **355** having a pusher plate **355P** operated to push the balanced stack of bags B off of the hand truck **31** and into position on the positioner body **352B**. In this respect, it may be noted that if the positioner body **352B** is of substantially greater length than the body of the hand truck **31**, there will be some redistribution of the bags on the body **332B** by reason of an endwise sliding or rolling of the bags of the balanced stack within the confines of the positioner body **252B**.

In FIGURES 11 to 13, the loading portions of the present system are illustrated as accomplishing loading of balanced stacks of bags without separation of the body of the hand truck from its base. Thus, in FIGURE 11, a hand truck **431** is illustrated which in most of its structure is identical with the usual hand truck. In this instance, however, a plurality of bars **431B** are provided that extend transversely of the platform of the hand truck **431** in a laterally spaced relation. This leaves transverse spaces **431S** between the adjacent bars **431B** and these spaces are sufficient in height and width to receive fork members **455F** with which the lift truck **455** is provided in this instance. Hence the lift truck **455** is manipulated to insert the forks **455F** into the several spaces **431S**, and the platform provided by the forks **455F** is then elevated to lift the balanced stack out of the truck **431**. The balanced stack is at this time supported or confined at its ends by a pair of end walls **455E** that are associated with the lift forks **455F**, and it will be noted by a comparison of FIGURES 11 and 13, that the end walls **455E** are spaced apart in such an amount that they may move into position opposite or outside of the ends of the hand truck **431** as the forks **455F** are being inserted beneath the load. In this respect it may be pointed out that the end walls **455E** are supported from their rear edges so that after the forks **455F** are in place beneath the load, the entire load may be lifted upwardly out of the hand truck **431**, and thus the hand truck may be withdrawn in an endwise direction.

In FIGURE 14 of the drawings still another arrangement is disclosed whereby balanced stacks of mail from a conventional hand truck may be handled as a group or as balanced stacks without the necessity for using a separable hand truck body. Thus in FIGURE 14 the lift truck **555** is illustrated wherein a platform **555P** is carried on supporting arms **555A**, and this platform has end walls **555E**. A hand truck **31** is moved into position opposite the forward side of the platform **555P**, and a pusher truck **555M** is positioned on the opposite side of the hand truck so that it may by operation of its positioner mechanism transfer the entire load or stack of bags from the hand truck **31** onto the platform **555P** where the load will be located between the end walls **555E**. The lift truck **555** may then be manipulated to put the balanced stack of bags in position on the transport body in the manner hereinbefore described.

CONCLUSION

From the foregoing description it will be apparent that the present invention provides an improved system for handling, sorting and loading bagged mail, whereby the labor costs and time required are materially reduced and the danger of the workers incurring back injuries or the like is particularly eliminated. It will be evident that the present invention provides such a system where walking, stooping and lifting are minimized, and the character of the work involved is made more desirable.

It will also be apparent that the present invention provides a mail handling system wherein the bags are oriented early in the cycle of operations, and wherein this originally established orientation is preserved throughout all of the subsequent handling operations so that the physical effort and time that has heretofore been required in repeated reorientation of the bags is eliminated.

It will also be apparent that the present invention provides a system wherein any handling operations with respect to the bags require merely turning or support of the bags and do not involve actual lifting of the bags, and it will also be apparent that under the present invention, the system of handling mail bags is of such a character that maximum use may be made of power lifting and transporting machines.

Thus while I have illustrated and described preferred examples and embodiments of my invention it is to be understood that changes and variations may be made by those skilled in the art without departing from the spirt and scope of the appending claims.

I claim:

1. In a system for handling loaded mail bags and loading same in tier fashion into a transport vehicle of predetermined load carrying width transversely thereof, apparatus for handling the bags in tier fashion, said apparatus comprising:

a plurality of sideless hand trucks on which bags for a common destination are placed in tier fashion transversely of the truck,

a powered lift truck,

a vertically movable load support device for said lift truck defining a load supporting structure proportioned to support a load of one or more tiers of mail bags positioned in substantially parallel side-by-side relation with said bags extending parallel to the forward and rearward directions of movement of said truck and the load having a length approximating the width of the transport vehicle,

means for raising and lowering said load support device,

means for applying the load to said load support device,

pusher means on said lift truck for pushing said tier load as a unit off said device in a direction forwardly of said truck,

said load support device comprising a panel like shelf portion on which the load rests and having a length approximating said width,

and means for holding said load support shelf portion against movement with respect to said lift truck on operation of said pusher means,

said pusher means being positioned to engage the entire tier load length on operation of said pusher means,

whereby the tier load may be discharged from said truck onto the transport vehicle as a prearranged unit without causing tumbling of the bags thereof out of said unit,

said load support shelf portion comprising an open sided hand truck body having an end wall rigidly secured to each end thereof and defining between said end walls a platform proportioned to support said load,

each of said hand trucks separately mounting one of said bodies,

and wherein said lift truck includes vertically movable fork means for supporting said load support bodies,

said fork means comprising said raising and lowering means,

said fork means including stop means positioned to engage said platform on operation of said pusher means to hold said platform on said lift truck against the action of said pusher means,

said hand trucks each comprising one of said bodies and a wheeled base,

said bases each defining forward and rearward ends,

said bases at their forward and rearward ends carrying body support members on which the respective ends of the respective bodies rest when mounted on said bodies,

said bases being open between their respective support members with such openings being proportioned to receive said fork means,

and vertically disposed locating pin means acting between said bodies and the respective base support members to key the respective bodies to said bases when said bodies are rested on the support members of the respective bases,

whereby said bodies are mounted on the respective hand truck bases for vertical movement with respect thereto, with said fork means being received in the respective base opening to lift said bodies from said bases.

2. The apparatus set forth in claim 1 wherein:

said pin means are fixed to the respective support members.

3. A bulk mail handling method for loading loaded elongated mail bags intended for a common destination into the load receiving area of a transport vehicle and utilizing hand trucks each comprising a separable sideless hand truck load support pallet portion resting on a wheeled base, said method comprising:

arranging the bags into load units of one or more tiers on the respective hand trucks with the tiers having a length approximating the width of the transport vehicle load receiving area and the bags extending transversely of the hand trucks,

lining the hand trucks in end to end relation adjacent the loading doorway of the vehicle,

positioning the first hand truck to dispose its load unit in alignment with the vehicle load receiving area with the bags extending longitudinally thereof,

lifting the hand truck pallet portion from the first hand truck base on a fork lift truck,

moving the said hand truck base to one side of the fork lift truck,

moving the fork lift truck to move said pallet portion and its load to a position in the vehicle that is in superimposed relation immediately above the location that the load is to be disposed in on the transport area with the bags of the load unit extending transversely of the vehicle,

depositing the load in said location by withdrawing said pallet portion from under the load unit by moving the pallet portion longitudinally of the unit load bags to drop the said load unit bags in said location,

returning the emptied pallet portion to its hand truck base,

moving the reassembled hand truck to one side of the fork lift truck,

and consecutively unloading the remaining hand trucks in like manner until the vehicle is loaded.

4. The method set forth in claim 3 in which the transport vehicle is of the side opening type and wherein:

the fork lift truck in receiving and handling said pallet portion operates within the vehicle and longitudinally thereof,

and the individual hand trucks in performing said positioning and moving steps are moved into and out of the vehicle through the side opening of the vehicle.

5. The method set forth in claim 3 in which the transport vehicle is of the type having a loading entrance wherein:

the fork lift truck in receiving and handling said pallet portion moves longitudinally of the vehicle and into and out of said vehicle through said loading entrance.

and the individual hand trucks in performing said positioning and moving steps are moved laterally of the vehicle adjacent to but outside of said end opening.

No references cited.

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