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Snyder et al.

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[54] **AUTOMATIC STORAGE SYSTEM ORDER PICKER CAB CONSTRUCTION**

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[52] **U.S. Cl.** .....**214/16.4 A,** 187/28

[51] **Int. Cl.** **B65g 43/00**

[58] **Field of Search** .....180/65 R, 77 R; 214/16.4 A; 187/28

[56] **References Cited**

UNITED STATES PATENTS

3,584,897	6/1971	Frantz et al.	296/102
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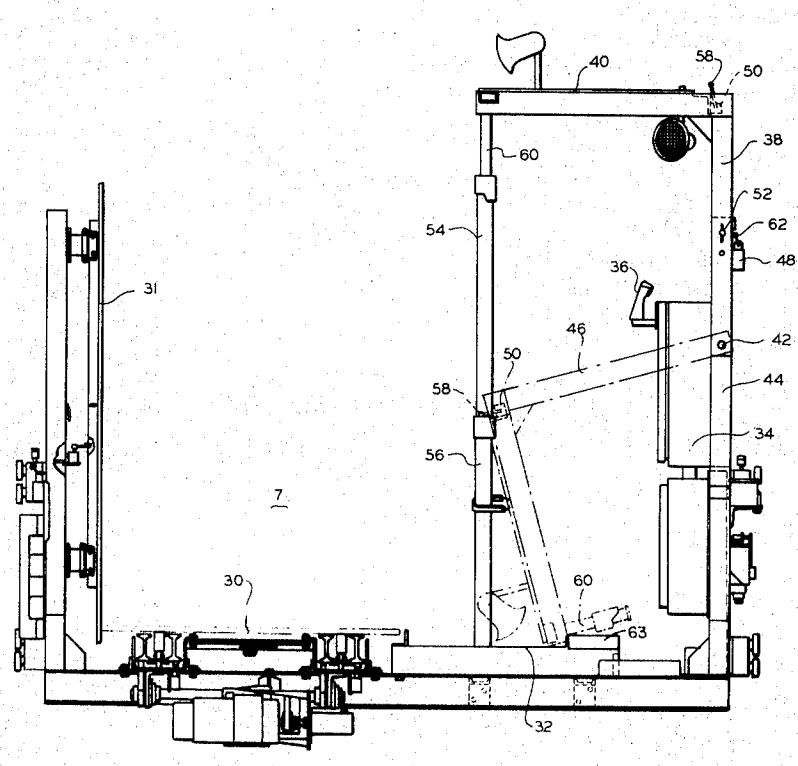
[57] **ABSTRACT**

This is a storage system having a stacker which may be operated in remote full automatic control or in manually permitted automatic control from the cab on the stacker. The stacker has a pivotal overhead shield to protect the person operating the stacker manually. In the raised position a limit switch is closed which permits stacker moves only when the order picker is on board and holding closed two foot switches and two hand switches. Shuttle operation is restricted to specific off load points for removal of picked loads. The overhead shield when folded down permits full automatic operation with maximum vertical travel of the stacker and when in the upright position provides means under control of the operator to permit automatic operation of the stacker and protects the operator on the stacker from overhead falling objects.

6 Claims, 2 Drawing Figures



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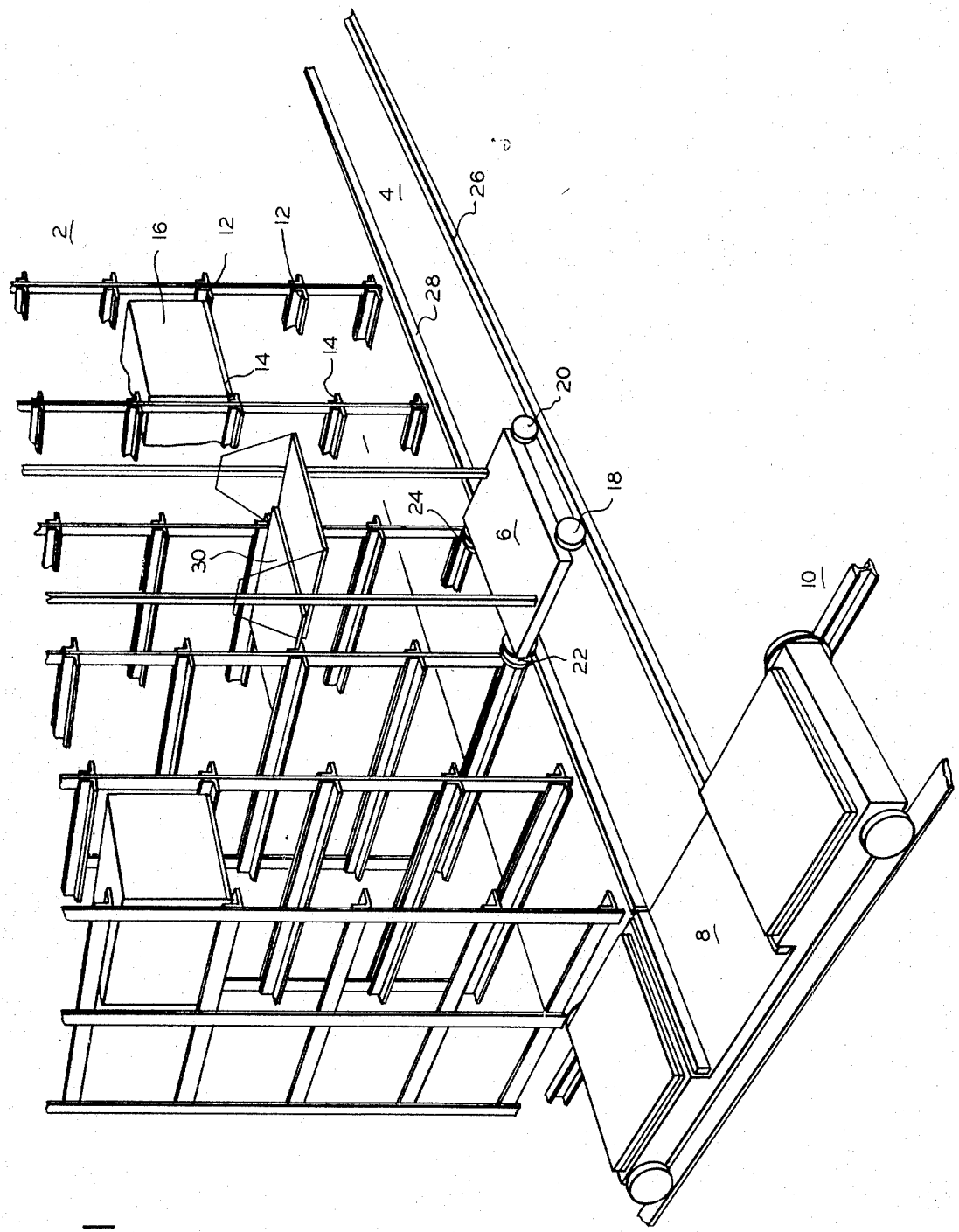

FIG. 1

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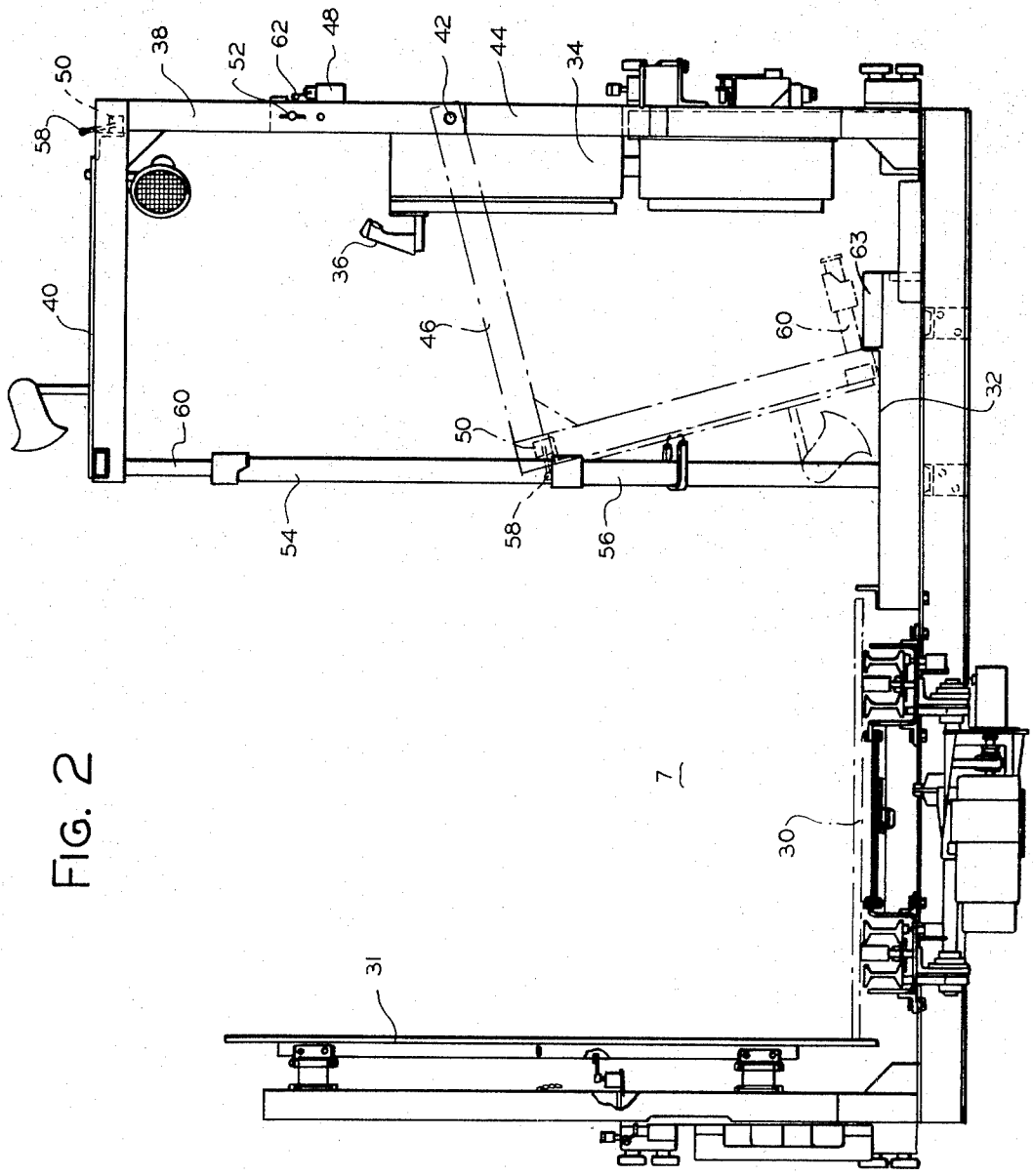

FIG. 2

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AUTOMATIC STORAGE SYSTEM ORDER PICKER CAB CONSTRUCTION

BACKGROUND AND SUMMARY OF INVENTION

This invention relates to automatic storage equipment and more particularly to stackers of this equipment which permit remote automatic operation for the deposit and retrieval of containers and manual control of its operation from a platform on the stacker for order picking. This invention relates more particularly to automatic storage systems of the type shown in U.S. Pat. No. 3,503,530 — Burch et al., issued Mar. 31, 1970.

The operator platform on this stacker has an overhead shield which in the upright position permits manual control of the operation of the stacker by the operator while giving the operator overhead protection from any falling object. The stacker cannot be manually controlled by the operator unless the overhead shield is in the full upright position. In the folded down position the shield operates a switch which permits automatic operation of the stacker but restricts an operator from riding on the platform. The stacker cannot be operated unless the overhead shield is in the full upright or the full lowered position, thus preventing inadvertent dual control of the stacker.

Previous practice has been to design a stacker primarily for automatic control but with provision for manual control but without positive safeguards both physical and electrical to prevent inadvertent automatic operation of the stacker while it is being manually operated for order picking and to permit the manual operation of the stacker by a person on the operator platform only when an overhead shield is in place. Certain of the previous stackers have physical protection for the operator while order picking using a permanent overhead shield. The use of a fold down shield, as in the present invention, permits maximum use of the height of the storage area during automatic operation.

It is an object of the present invention to provide a stacker for a material storage system which may be operated automatically from a remote station with an alternate over control operated from a platform on the stacker for order picking with mechanical and electrical interlocked safety features to protect both the operator and the equipment.

It is another object of the present invention to provide a fold down overhead operator protective shield on the stacker which gives maximum protection of the operator during manual control and permits maximum elevation of the stacker under automatic control.

It is a further object of the present invention to provide an operator platform for the stacker of an automatic storage system which permits manual control of the stacker for order picking with maximum safety.

Other objects of the present invention will more fully appear from the following description made in connection with the accompanying drawing and will be pointed out more particularly in the claims.

GENERAL DESCRIPTION

Referring to the figures in the drawing;

FIG. 1 is a schematic drawing showing the general arrangement of the material storage system of the type utilizing the present invention;

FIG. 2 is a view showing the operator platform with its fold down overhead shield and its relationship to the material platform.

Referring more particulatly to FIG. 1, 2 illustrates the bin arrangement for storing material mounted on pallets utilized in one embodiment of the present invention.

4 is the aisle between the bin structure 2 and a neighboring bin structure, while 6 illustrates a stacker which travels in the aisle 4. The stacker 6 is carried between aisles by a transfer cart 8 which travels on rails 10 extending transverse to the aisle. The bins shown generally as 2 have a series of shelves or bin structures 12 and 14 suitably spaced to support the material 16 being stored therein.

The stacker 6 is supported on wheels 18, 20, 22 and 24 which operate on rails 26 and 28 in the aisle 4. The stacker vehicle 6 has a vertically movable cab structure shown generally as 7 having a laterally movable material support platform 30 and an operator cab adjacent this material platform 30. The material storage system thus far described with the exception of the cab structure shown generally as 7 is of the type shown and described in U. S. Pat. No. 3,503,530 — Burch et al., referred to above.

Referring now to FIG. 2, the vertical moving structure 7 carried by the stacker 6 is shown in greater detail. 30 is the load carrying platform used to deposit and retrieve the material 16 (shown in FIG. 1) from the bins of the storage system. 31 is the stop against which the material is located to assure the material being in the proper position for deposit in the selected storage bin. 32 is the operator platform used for manual control of the stacker for individual order picking from the bins of stored material. The cabinet 34 contains the electrical equipment which is actuated by the manual controls 63 and 36. The operator is protected by a pivotable shield 38 having an overhead shield portion 40 which folds down and rests on the operator platform 32 when the storage apparatus is operated in automatic control. When the overhead shield is folded down, the storage system is operated in automatic control as described in U.S. Pat. No. 3,503,530 — Burch et al.

OPERATOR CAB DESCRIPTION

The present invention is particulatly related to the operator cab construction shown in FIG. 2. In the cab construction which is particularly related to the present invention, the load carrying platform 30 is of the type shown and described in the above-mentioned patent. The operator platform 32 with the fold down overhead structure permits the stacker to be operated in automatic control with maximum vertical travel of the stacker. When the overhead guard is in the folded down position, as shown in dotted lines at 46, it lies on the operator platform and discourages anyone from riding on the platform by restricting the space. When the overhead guard is in the up position, as shown in solid lines, the operator may stand the switches 63 on the platform 32 and permit operation of the stacker by closing the switches on the controls 36, as will be described later, so that the stacker may be operated automatically. Referring particularly to FIG. 2, the guard having an overhead shield section 40 and a back shield section 38 is pivoted at 42 to the frame 44 to permit its

being moved to the position shown in dotted lines **46**. The telescopic shield support column has a portion **54** which telescopes into the column **56**. A locking pin mechanism **52** together with the shield support column **44** holds the overhead shield **38** and **40** in the manual control position shown in solid lines. When it is in this position, the switch **48** is actuated to prevent automatic operation of the stacker unless the manual control switches **63** and **36** are closed. When the shield is in the folded down position for automatic operation, as shown in **46**, the switch **50** is actuated which energizes the automatic controls, bypassing switches **63** and **36**. It may, therefore be seen that the stacker may be controlled manually only when the overhead shield is in the full upright position and the switch **48** is actuated to energize the manual controls **63** and **36**. The stacker may be operated in automatic control bypassing controls **63** and **36** when the shield is in the fully folded down position **46** and the switch **50** is actuated to energize the automatic controls directly.

OPERATOR CAB OPERATION

The material storage system shown in FIGS. **1** and **2** may be operated in automatic control as shown and described in the abovementioned patent when the cab is in the folded down position, as shown in FIG. **2**. When the cab is in the folded down position, as shown in FIG. **2**, the switch **50** is closed and this bypasses switches **62** and **36** to energize the automatic controls directly by the actuating arm **58** of the switch engaging the telescopic support column **56**. When the automatic controls are actuated, the transfer car **8** carries the stacker **6** on the rails **10** to the proper aisle **4**, after which the stacker **6** travels off of the stacker **8** on the rails **26** and **28** to deposit or retrieve material **16** from the bins **12–13** by actuation of the lateral platform **30**, as is described in the above-mentioned Burch U.S. Pat. No. 3,503,530. When material **16** is placed on the load carrying platform **30** for later deposit on the bin rails **12–14**, it is located against the pivotal locating member **31** to assure its proper location for depositing on the rails **12** and **13**, which comprise the storage bin.

It is frequently desirable to remove one or more packages from a pallet stored in a particular bin for a specific customer order and then replace the pallet in the bin. When it is desired to pick orders manually from the pallets stored in the bins and then replace the remaining material in the bins, an operator platform with proper manual controls are necessary to permit this order picking. In the present invention, the operator platform with proper safeguards are provided as described above and operated as follows.

For automatic operation from a remote control, the operator protective shield is positioned in the folded down position **46** so as to actuate the automatic control switch **50** by mechanical movement of the actuating arm **58** by the column **56**.

For manual order picking control from the operator platform, shown in FIG. **2**, this overhead shield is raised into the upright position. When the switch arm **58** disengages the column member **56**, the switch **50** is opened, thus de-energizing the automatic controls for the entire system. This switch de-energizes the entire electrical automatic control system. When the overhead shield is in the full upright position, the locking pin **52** is inserted to lock the members **38** and **40** to the frame **44**. The telescopic member **54** is then raised into engagement with the support member **60** carried by the overhead shield member **40** and locked into position. This protective shield is then in position to protect the operator from any object which may inadvertently fall from above. When the shield is in this upright position, the switch **48** is closed by the mechanical actuation of the operating arm **62** of the switch by the member **38**. When the switch **48** is closed, the electrical circuits to the manual controls **63** and **36** are energized. The operator may then permit automatic control of the vertical movement of the assembly **7** on the stacker **6** and the horizontal movement of the stacker **6** in the aisle **4**. In addition to these movements, the operator may also through the controls **36** and **63** permit control of the deposit and retrieval material platform **30** to deposit and retrieve the material container **16** from the bin rails **12** and **13**. The operator manual controls **36** are located opposite the material platform **30** so that the operator's arms must be in a safe position with regard to the load carried on the platform **30** when the platform is being moved and the control switches **63** are so located that the operator must be standing in the proper position on the platform **32**. This is to prevent the manual operation of the material load platform **30** with the operator's hands on the material or his feet in an improper position, thus promoting safety.

The operator, by controls **63** and **36** permits the stacker to go to the proper bin to retrieve the load from the bin, the operator then takes the packages from the load desired for a particular order and then redeposits the load in the bin. This operation is repeated at various selected bins until the order for a particular customer or group of customers is completed. After the order is completed, the operator closes switches **63** and **36** and the automatic control lowers the assembly **7** and operates the stacker **6** up the aisle **4** until it reaches the end of the aisle at the stacker transfer car **8**, at which point the stock picker (operator) removes the material for the orders he has filled and then either returns to the bins to pick further orders or gets out of the cab, folds the overhead shield to the position shown in dotted lines, at which position the manual controls are bypassed and the automatic controls are again effective and the stacker is put back in automatic operation.

It may thus be seen that by the present invention the stacker may be at the operator's option used under operator control for order picking with maximum safety to operator and equipment, or under remote automatic control with the shield folded down to give maximum height utilization of the stacker.

Having thus described the preferred embodiment of the present invention, it will, of course, be understood that various changes may be made in the stacker, its controls, details, arrangements or proportion of parts without departing from the scope of the invention, which consists of the matter shown and described herein and set forth in the appended claims.

We claim:

1. A storage system for material units comprising:
   a storage structure with multiple bins arranged in rows and columns and defining an aisle adjacent said bins,
   each of said bins being adapted to receive a material unit,

a load station at the end of said aisle in alignment with the row of bins,

a stacker vehicle adapted to move forward and backward in said aisle between the load station and a selected bin, and between selected bins,

said stacker vehicle including a material platform adapted to support a material unit and to move laterally of said aisle to transfer a material unit to and from a selected bin,

said stacker vehicle including driving means for moving it along said aisle and for actuating of said platform,

said stacker selectively operated in full automatic control or under manually permitted automatic control,

an operator mounted platform on said stacker capable of supporting an operator,

a shield pivotally attached to said operator platform,

said shield so constructed that when pivoted to its upright position a portion thereof is located over the head of an operator when said operator is standing on said operator platform,

said shield so constructed that when pivoted to its lower position it restricts an operator from occupying said operator platform,

a first switching means capable of energizing said stacker for automatic operation,

a second switching means capable of energizing said stacker for manually permitted automatic control by an operator from said operator platform,

means for automatically actuating said first switching means when said shield is in its lowered position to permit automatic operation of said stacker,

means for automatically actuating said second switching means when said shield is pivoted to its upper position to permit automatic operation of said stacker by manual control from an operator from said operator platform,

whereby the stacker is under the control of an operator from said platform when said shield is in the upright position, and an operator is restricted from said platform and the stacker is under automatic control when said shield is in its lowered position.

2. A storage system as claimed in claim **1** including:

a telescopic support mounted on said operator platform capable of supporting said shield in its upright position.

3. A storage system for material units as claimed in claim **1** including:

first manual means for permitting automatic operation of said stacker is located on the side of the operator platform opposite the location of the material platform.

4. A storage system for material units as claimed in claim **2** in which;

the means for actuating said first switch is located on said telescopic support member and effective to operate said switch when said telescopic support member is in the lower position and said shield is pivoted to its lower position.

5. A storage system for material units as claimed in claim **2** including;

a locking pin insertable only when the pivotable overhead shield is in its full upright position to rigidly lock said overhead shield to the stacker.

6. A storage system for material units as claimed in claim **3** including:

a second manual means located in the floor of the operator platform for permitting automatic operation of the stacker.

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