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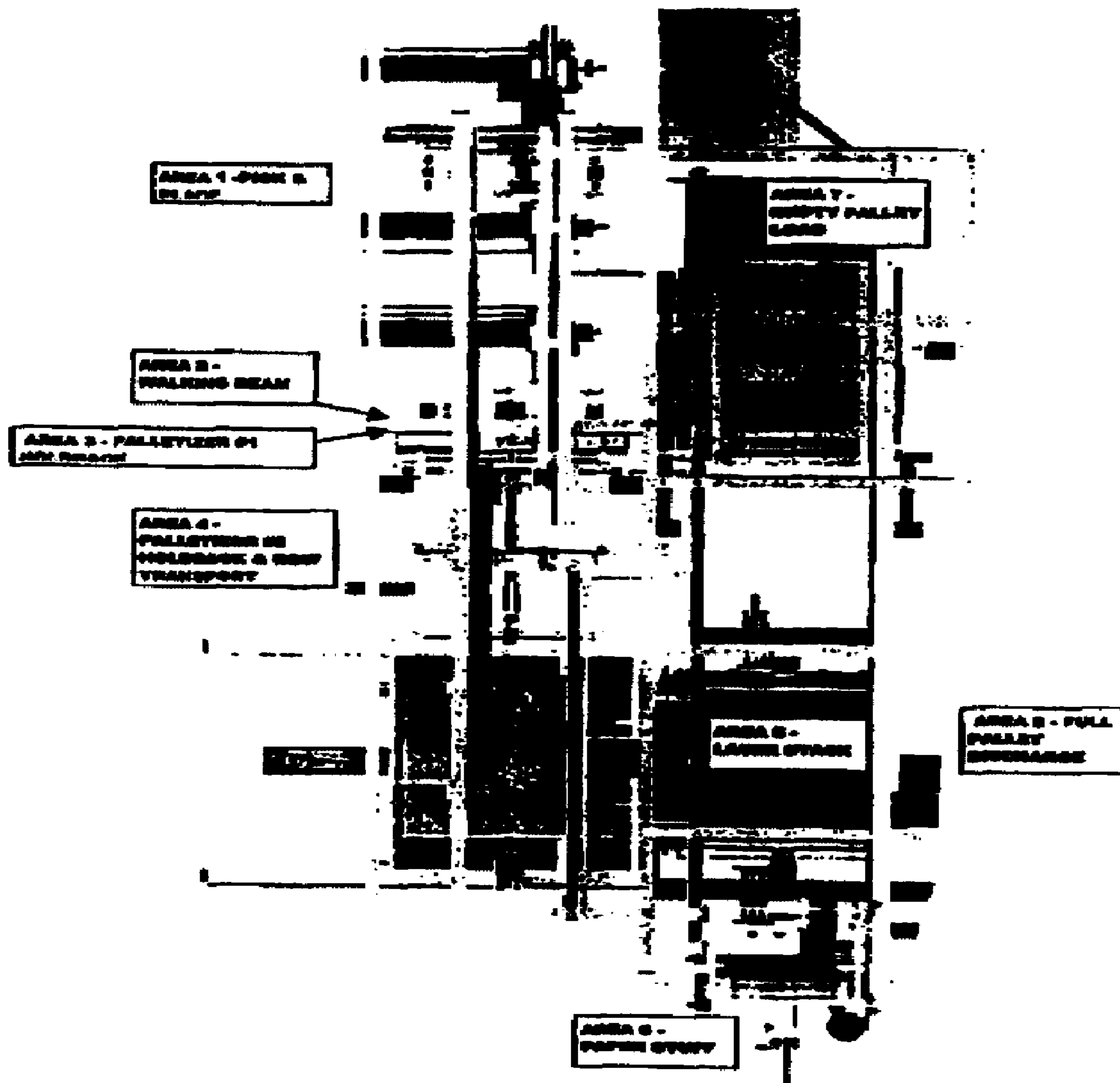
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(30) 1997/09/30 (60/060,518) US

(54) **PROCEDE ET APPAREIL SERVANT A PALETTISER DES SACS  
ALLONGES D'EXTREMITES DE CONTENEURS**

(54) **METHOD AND APPARATUS FOR PALLETIZING ELONGATED  
BAGS OF CONTAINER ENDS**





(57) L'invention concerne un mécanisme (PP, WB, HB-1, HB-2) de palettisation fournissant une palette et une longueur de papier d'emballage en vue de recevoir des rangées successives de sacs jusqu'à ce qu'un chargement complet de palette soit préparé. L'appareil de palettisation peut être assemblé à un appareil de mise en sacs, et peut être actionné de manière synchrone avec celui-ci sous la commande d'un organe de commande programmable commun. L'appareil de palettiseur reçoit chaque pile de couvercles de boîtes-boisson dans une orientation prédéterminée, et maintient cette orientation pour toutes les piles d'une charge de palette. Les piles sont placées de manière séquentielle dans une rangée comportant un nombre prédéterminé de piles, puis chaque rangée est chargée au sommet d'une couche d'emballage, la première rangée reposant sur une palette vide appropriée, puis l'emballage est passé par-dessus la dernière rangée placée. Cette opération se poursuit avec un mouvement de va-et-vient du dispositif fournissant l'emballage jusqu'à ce que le nombre voulu de rangées soit automatiquement accumulé sur une palette.

(57) A palletizing mechanism (PP, WB, HB-1, HB-2) supplies a pallet and a length of wrapping paper for receiving successive rows of bags until a full pallet load is prepared. The palletizing apparatus can be mated to the bagger apparatus, and operated synchronously therewith under the management of a common programmable controller. The palletizer apparatus receives each stick of can ends in a predetermined orientation, and maintains the orientation vis-a-vis all sticks in a pallet load. The sticks are placed sequentially into a row of predetermined number of sticks, then that row is loaded onto the top of a layer of wrapping, the first row being supported on a suitable empty pallet, then the wrap is passed over the last placed row. This operation proceeds with the wrap supply following a to-and-fromotion until the desired number of rows is automatically built up on a pallet.

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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/US98/20409</p> <p>(22) International Filing Date: 30 September 1998 (30.09.98)</p> <p>(30) Priority Data: 60/060,518 30 September 1997 (30.09.97) US</p> <p>(71) Applicant (for all designated States except US): DAYTON SYSTEMS GROUP, INC. [US/US]; 3003 South Tech Boulevard, Miamisburg, OH 45342 (US).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): COOK, Steven, T. [US/US]; 4067 Glenberry Circle, Bellbrook, OH 45305 (US). CLARK, Brian, W. [US/US]; 130 Douglas Drive, Lewisburg, OH 45338 (US). KRACUS, Steffen, W. [US/US]; 1319 Pursell Avenue, Dayton, OH 45420 (US). MOORE, Dennis, F., Jr. [US/US]; 251 Grand Vista Drive, Beaver Creek, OH 45440 (US). SCHNEBERGER, William, E. [US/US]; 6231 Overture Drive, West Carrollton, OH 45449 (US).</p> <p>(74) Agent: NAUMAN, Joseph, G.; 696 Renolda Woods Court, P.O. Box 292470, Dayton, OH 45429 (US).</p>		<p>(81) Designated States: BR, CA, CN, JP, KR, MX, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p><b>Published</b> <i>With international search report.</i></p>
<p>(54) Title: METHOD AND APPARATUS FOR PALLETIZING ELONGATED BAGS OF CONTAINER ENDS</p>		
<p>(57) Abstract</p>		
<p>A palletizing mechanism (PP, WB, HB-1, HB-2) supplies a pallet and a length of wrapping paper for receiving successive rows of bags until a full pallet load is prepared. The palletizing apparatus can be mated to the bagger apparatus, and operated synchronously therewith under the management of a common programmable controller. The palletizer apparatus receives each stick of can ends in a predetermined orientation, and maintains the orientation vis-a-vis all sticks in a pallet load. The sticks are placed sequentially into a row of predetermined number of sticks, then that row is loaded onto the top of a layer of wrapping, the first row being supported on a suitable empty pallet, then the wrap is passed over the last placed row. This operation proceeds with the wrap supply following a to-and-fro motion until the desired number of rows is automatically built up on a pallet.</p>		

**METHOD & APPARATUS FOR PALLETIZING  
ELONGATED BAGS OF CONTAINER ENDS**

**Related Applications**

This application is related to U.S. Provisional Patent  
5 Application S.N. 60/060,518 filed 30 September 1997 entitled  
Bagger & Palletizer for Can Ends, and to copending International  
Patent Application No. PCT/US98/ (Docket DSG 006 P2) entitled  
Bagger filed on the same date as this application.

**Technical Field**

10 This invention relates to methods and apparatus for  
packaging can ends, e.g. disc-like end units which have a  
preparatory curl on their edge and which may also have attached  
easy-open tabs. In practice such apparatus is often called a  
bagger, since the preferred manner of packaging the ends places a  
15 stack (usually called a "stick") of the ends in a tubular bag  
which is then folded closed at its initially open end. The  
invention disclosed relates to methods and apparatus for  
assembling and placing the sticks on pallets.

**Background Art**

20 In the early 1970s can ends were placed manually into bags,  
and the bags were loaded manually into pallet for use at  
filling/closing machinery. In the mid-1970s semi-automatic  
bagging equipment was introduced in an effort to keep up with the  
increased output of newer conversion presses, and that  
25 development led to automatic bagging machines, which were first  
introduced in the mid-1980s. Some of the impetus for this  
development was the monotony of repeated manual operations, which  
also appeared to be the cause of repeated strain to the hands of  
those doing the bagging.

30 Those automatic machines formed a "stick" of ends and then  
packaged them 1) by wrapping them from a coil or reel of paper or  
plastic, or 2) placing the sticks into preformed bags. It was  
found that kraft paper was the preferred wrapping material since  
it can be recycled, and since it will "breathe" to void fumes

which may linger with the stick of ends from synthetic sealing compounds applied to the ends in an earlier operation, or to void moisture which may linger from water based compounds.

In the early patent prior art, the disclosures in US patents  
5 3,337,064, 3,417,853, 3,545,631 and 3,618,530 are representative  
of systems which use a pneumatic or similar input conveying  
system for the individual can ends, and troughs or the like for  
gathering the ends in a face to face on-edge stack. Mechanical  
feeding mechanisms engage the curl edges of the generally  
10 vertically positioned ends and move them into the input or  
receiving end of a stack forming in a trough, then the ends are  
supplied to a filling and closing (end curling) machine.  
Wrapping a stack is not disclosed, and the filled trough is  
intended to function as a reservoir for smooth steady supply of  
15 ends to the closing machine.

In US patents 3,722,741, 4,000,709, 4,537,550, 4,676,708 and  
5,335,810 more sophisticated buffer systems for stacks of ends  
are disclosed, wherein the stacks are separated according to a  
count of stacked ends, and those stacks are loaded into  
20 successive vertically arranged carriers on an endless, carousel-  
type conveyor which supplies the stacks to a closing machine.

US patents 3,878,945, and its various divisions Nos.  
3,962,845, 3,971,189, 4,051,965, and US patent 5,119,617, all  
disclose features of an automatic bagging system in which ends  
25 are supplied to a gathering and counting device which separates  
ends into stacks (or "sticks"), wrapping devices for loading the  
stacks into individual bags, and mechanism for loading the  
wrapped stacks onto pallets.

US patent 4,364 relates to a conveying improvement for  
30 gathering ends, providing temporary spacing thereof to facilitate  
curing of previously applied end seam compound. US patent  
4,655,350 discloses an improvement for detecting and removing  
ends which have been reversed face-to-back (e.g. public to  
product sides) in the formation of a stack. US patent 4,742,669

discloses and improved end counting device in the end counting and stack forming systems. US patent 5,005,340 discloses a system for inspecting an assembled stack of ends. US patent 5,372,245 discloses an improved drive for an in-feeding array of assembled ends. US patent 5,524,947 discloses an improved mechanism for picking and placing stacks (also called "sticks") of ends in the bagging and palletizing process.

US patents 4,537,010 and 5,372,473 disclose more advanced devices for handling bagged stacks of ends and placing them into pallets.

Thus, prior art automatic bagging machines allow lanes of ends from the output of a conversion press to be counted, separated in stacks or sticks, the stacks placed into individual bags, and the bagged stacks are then loaded into a common palletizer, from which a supply is provided to one or more filling and closing devices.

#### Disclosure of the Invention

A palletizing mechanism supplies a pallet (support) and a length of wrapping paper (usually Kraft paper or the like) for receiving successive rows of bags until a full pallet load is prepared. The palletizing apparatus can be mated to the aforementioned Bagger Apparatus, and operated synchronously therewith under the management of a common programmable controller; an Allen-Bradley Model No. H-4030 is employed in an actual embodiment. The palletizer apparatus receives each stick (closed bag of can ends of predetermined count) in a predetermined orientation, and maintains the orientation vis-a-vis all sticks in a pallet load. The sticks are placed sequentially into a row of predetermined number of sticks, then that row is loaded onto the top of a layer of wrapping, the first row being supported on a suitable empty pallet, then the wrap is passed over the last placed row. This operation proceeds with the wrap supply following a to-and-fro motion until the desired number of rows is automatically built up on a pallet.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

#### Brief Description of the Drawings

5 Figure 1 is a schematic plan view of the major components of the system;

Figure 2 is an enlarged schematic plan view of the palletizer and its components;

10 Figure 3 is a perspective view of the Pick and Place mechanism in the palletizer;

Figure 4 is a perspective view of the walking beam mechanism;

Figure 5 is a perspective view of the first palletizer hold back device;

15 Figure 6 is a pictorial view of the stick crowder device;

Figure 7 is a pictorial view of the second palletizer hold back and row transport mechanism;

Figure 8 is a perspective view of the row offset control cylinder;

20 Figure 9 is a perspective view of the main table in the palletizer;

Figure 10 is a perspective view of the empty pallet storage lift;

Figure 11 a perspective view of the empty pallet shuttle;

25 Figure 12 is a pictorial view of the full pallet lift;

Figure 13 is a perspective view of the row cutoff and row tamp devices;

Figure 14 is a perspective view of the row supports;

30 Figure 15 is a perspective view of the snake wrap carriage, including the paper stuffer and cardboard lift vacuum cup;

Figure 16 is a perspective view showing the snake wrap paper cutter;

Figure 17 is a pictorial view of the full pallet lift and pallet discharge roller table;

Figure 18 is a pictorial view of the partial pallet restart alignment arm;

Figure 19 is a pictorial view of the manual stick insert tray;

5 Figure 20 is a side view of the thread up schematic for the snake wrap;

Figure 21 is a perspective view of the snake wrap carriage, viewed from ground level; and

10 Figures 22A & 22B are together the Process Flow Chart for the palletizer operation.

#### **Description of the Preferred Embodiment**

#### **Best Mode for Carrying Out the Invention**

The present invention is directed to an improved palletizer apparatus which is part of a bagger/palletizer system.

15 To understand the following description, it is desirable to include first definitions of certain terms, as follows:

A "Stick" is a bag filled with a predetermined number of can ends or lids;

20 A "Skid" refers to the wooden structure on which a pallet of sticks is built; Filled pallets are formed in the palletizer apparatus;

"Bagger" refers to the portion of the system that forms the sticks by counting ends from the lead (foremost) end in a stream of can ends which are supplied to the bagger  
25 apparatus along in-feed rails, the ends being placed on edge and moving face-to-face along such rails; The bagger counts a predetermined number of ends, separates them from the following stream, and places them into a bag, then folds and seals the bag; Sticks are formed in the bagger apparatus, as  
30 disclosed in the related International Application PCT/US98/ (Docket DSG 006 P2);.

"Palletizer" refers to the portion of the system that builds layers of filled, sealed bags and places them onto a skid.

#### **The Palletizer**

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The Pick and Place, seen in Fig. 3, removes the filled, sealed bags from the stick discharge grippers of the bagger folding mechanism, and places them on the walking beam mechanism WB (Fig. 4). The walking beam mechanism in turn places each of the sticks in the appropriate position in the staging area. The first (or temporary) hold back device PH-1 (Fig. 5), is comprised of three fingers PH-11 which can inhibit the first stick from rolling, and retain the row until the Primary Hold back is reached.

10 As each stick is placed, the Stick Crowder, also seen in Fig. 6, forces the factory sealed or closed end (against which the ends are pushed in the stick formation) of the bag against a stainless steel plate to ensure that each row of the pallet is properly packed.

15 The Primary Hold back retains the row during building while sticks 8-16 are placed. In conjunction with the Pull Off, the Primary Hold back transfers the completed layer to the Main Table.

20 Fig. shows the Pull Off, which clamps the row against the Primary Hold back, and transfers the completed layer of the pallet from the staging area to the Main Table.

The Main Table is a movable platform that extends over the pallet and places a completed layer of sticks.

25 The Skid Storage Lift is the loading point for the empty skids. The X and Y Skid Positioners locate the top skid against the Skid Back Stop.

Figure 11 shows the Skid Shuttle, which contains the Skid Grippers that clamp and align the top skid and transport it to the Pallet Lift area.

30 The Pallet Lift is the hydraulic lift on which the skid is filled with completed layers. The Pallet Lift has a motorized roller table to transport the finished pallet to the Pallet Discharge Roller Table for removal by the operator.

The Row Cut Off, shown in Fig. 13, inhibits the row of sticks from retracting with the Main Table.

The Front and Rear Vertical Tampers, also shown in Figure 2.22, compact the pallet as each new layer is placed.

5 The Upper Side Guides impose the row offset and retain the layer of sticks as it is placed on the pallet. The Lower Side Guides restrain the palliated layer, and support and compact the new layer being placed.

10 1. The Snake Wrap Carriage, seen in Figure 20, covers each completed layer with paper after the layer is transferred to the Pallet Lift.

2. The Paper Stuffer (Area 6, Fig. 2) tucks the first layer of paper underneath the cardboard on the skid.

15 3. The Snake Wrap Paper Cutter cuts the wrap at the completion of the pallet.

The Pallet Discharge Roller Table, shown in Figure 17 is a motorized roller table that moves the completed pallet away from the pallet building area for removal by the operator. This section describes the procedures required to prepare the system  
20 for operation. It is divided into two sections; Palletizer and Bagger.

Fig. 20 is a schematic of the Snake Wrap Carriage that shows the proper thread up of the Snake Wrap Roll from the Snake Wrap Catwalk vantage point. Fig. 21 is a pictorial view from the same  
25 vantage point.

To load the Snake Wrap roll from the catwalk during system set-up, referring to Fig. 20:

1. Open the Snake Wrap Catwalk door guard.  
2. Remove the Split Collar from the Paper Roll  
30 Cylinder.

3. Align the Paper Roll such that the paper feeds counterclockwise from the top of the roll.

4. Slide the properly aligned Paper Roll onto the Paper Roll Cylinder.

8-

5. Replace the Collar.

6. Thread the paper into the pinch rolls ensuring that the paper feeds underneath the tensioning rod prior to the pinch rolls.

5 7. Feed the paper between the stainless steel paper guide and the roller guide.

8. Feed the paper between the spring loaded Paper Clamp and the Roller Guide.

10 9. Thread the paper through the Slot below the Roller Guide.

[Close all door guards.]

The manually feed the paper by depressing and holding the Snake Wrap Jog push button, being sure to feed a sufficient amount of paper to ensure the Snake Wrap is dispensing properly.

15 The snake wrap paper is cut with a double-edge, carpet knife blade.

The skid storage lift (Fig. 10) can hold up to 10 empty skids. To load the skids onto the skid storage lift, open the door guard and place the stack of skids onto the left. Then push  
20 the stack against the stops at the rearmost and right most positions, and close the door guard.

Prior to homing the Palletizer, it is necessary to ensure that the Skid Storage Lift and Pallet Lift are in the lowest position. It is also necessary to remove all sticks from the  
25 Pick & Place, the temporary staging area, and the Main Table, and to remove any partial pallets or empty skids from the pallet lift.

#### Operating Sequence

The pick and place mechanism PP (Fig. 3) removes a stick from  
30 the stick discharge of the Bagger apparatus, and places it on the walking beam WB (Fig. 4). Then the walking beam WB places the first stick against the temporary hold back HB-1 (Fig. 5). Those steps are repeated until a complete layer (sixteen sticks) is built. During the building process, the temporary hold back HB-1

and previously placed sticks are pushed progressively farther from walking beam WB as each of the sticks 1--7 are placed. After the 7th stick is placed, the temporary hold back HB-1 rotates below the level of the sticks, returns to its home  
5 position, and the primary hold back HB-2 begins retaining the layer. The primary hold back HB-1 and previously placed sticks continue to be pushed away from the walking beam WB as sticks 8--16 are placed (see Fig. 7).

The row transport RT lowers into position and clamps the  
10 completed layer against the primary hold back HB-2. The row transport RT and hold back HB-2 transport the completed layer from the layer building area to the main table MT. The offset cylinder OC (Fig. 8) extends and stops the row transport RT at the appropriate location for the row offset. The main table  
15 retainers MTR (Fig. 9) clamp the positioned layer. Then, the row transport RT and hold back HB-2 return to their home position.

Next, the main table MT extends out over the pallet (Fig. 2) and the row cut off RCO lowers. The main table MT then retracts while the row cut off RCO hold the layer of sticks in place.  
20 Effectively they are wiped off the main table onto the top of the load on the pallet. The row supports RS (Fig. 14) restrain the layer after it is positioned, and the row tamp RT (Fig. 13) compacts the layers on the pallet as each layer is placed.

The snake wrap carriage SWC drapes a layer of wrap on top of  
25 the completed layer, and waits on the opposite side of the pallet for the next layer to be placed. The row tamp again compacts the layers of the pallet. The foregoing steps are repeated until the pallet is complete, normally when 27 rows are in place.

After completing the last layer of paper wrap, the snake  
30 wrap paper cutter WPC cuts the wrap from the roll. The full pallet lift FPL then lowers to its discharge position. The motorized roller table on the full pallet lift turns on and transports the full pallet to the pallet discharge roller table DRT. It in turn transports the pallet away from the pallet

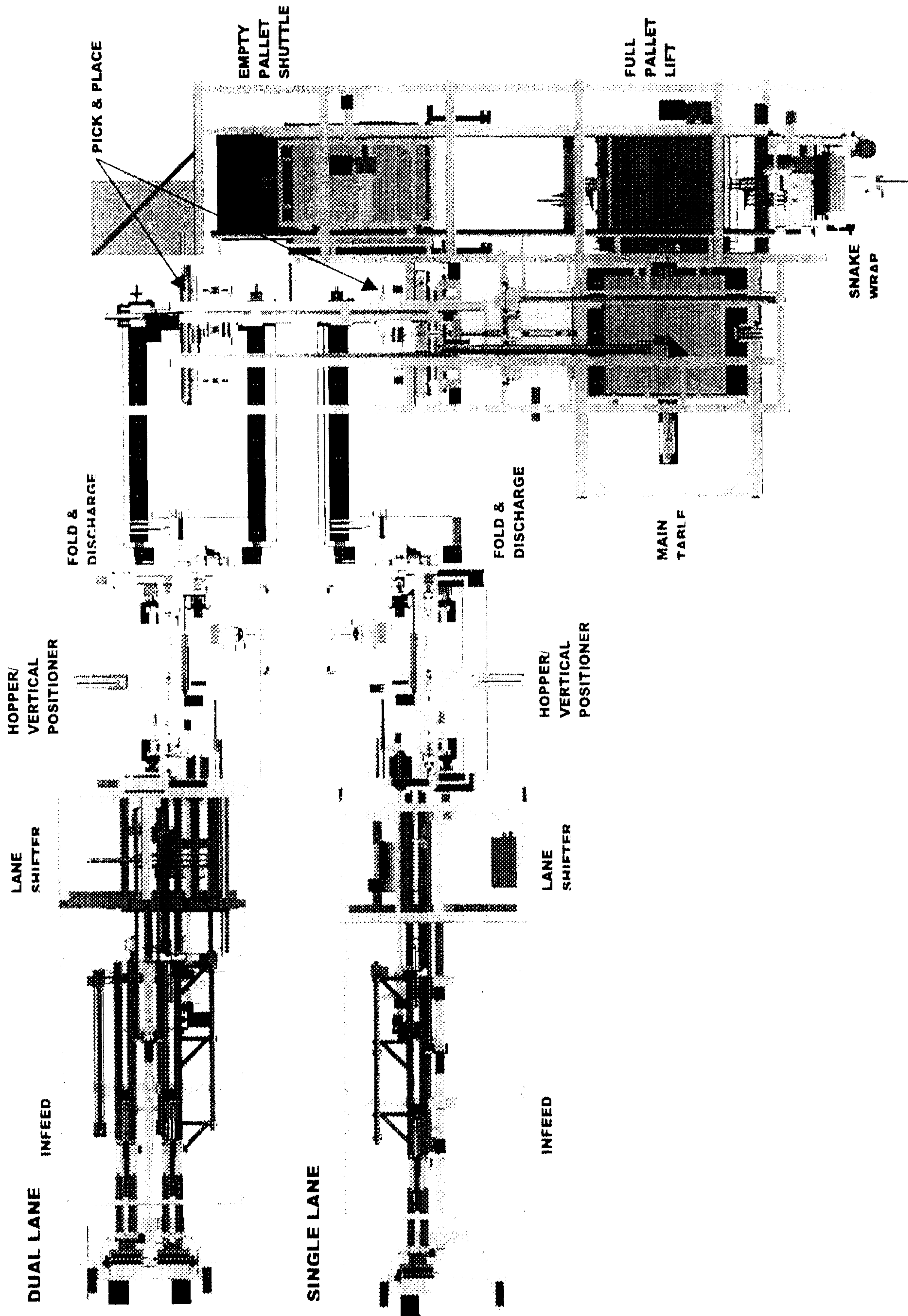
building area to allow the operator to remove the completed pallet. The empty pallet shuttle EPS transports an empty pallet from the empty pallet storage lift to the pallet Lift PL to begin building the next pallet.

5           While the methods and apparatus for carrying these methods into effect, constitute preferred embodiments of this invention, it is to be understood that the invention is not limited to these precise methods and forms of apparatus, and that changes may be made in either without departing from the scope of the invention,  
10   which is defined in the appended claims.

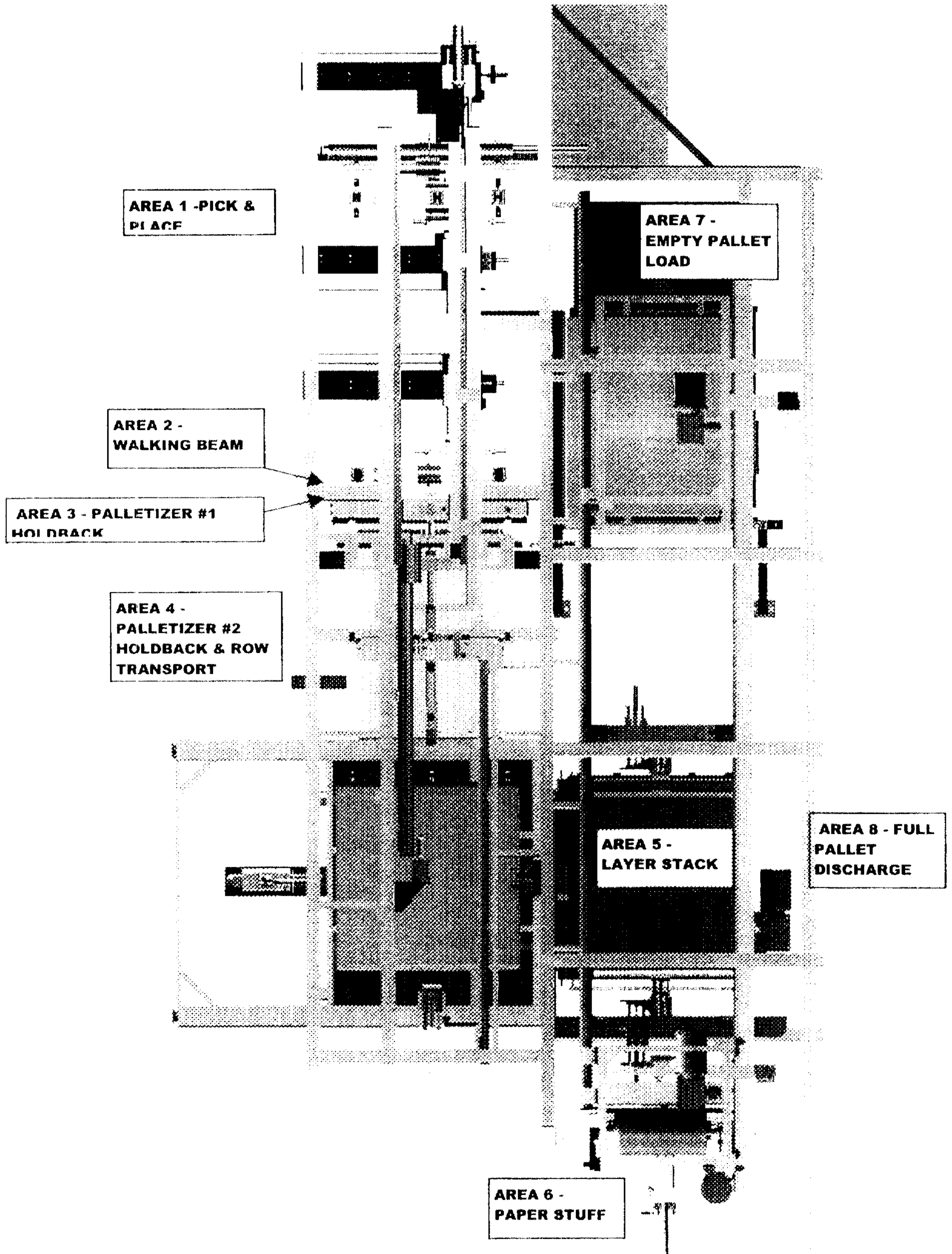
What is claimed is:

1. A palletizing apparatus for loading a pallet with successive rows of can end sticks, comprising  
means for receiving a succession of sticks each in a  
5 predetermined orientation,  
mean for placing the sticks sequentially into a row of  
predetermined number of sticks,  
a wrapping supply roll, and a moving support for said roll,  
means for loading the rows onto the top of a layer of wrapping,  
10 the first row being supported on the empty pallet,  
means for passing the wrapping over the last placed row,  
said moving support following a to-and-fro motion until the  
desired number of rows is automatically built up on a pallet.
  
- 15 2. A method of loading a pallet with successive rows of can end  
sticks, comprising
  - a) receiving a succession of sticks each in a predetermined  
orientation,
  - b) placing the sticks sequentially into a row of predetermined  
20 number of sticks,
  - c) moving a wrapping supply roll back and forth over the pallet,
  - d) loading the rows onto the top of a layer of wrapping, the  
first row being supported on the empty pallet, and
  - e) passing the wrapping over the last placed row,  
25 said moving support following a to-and-fro motion until the  
desired number of rows is automatically built up on a pallet.

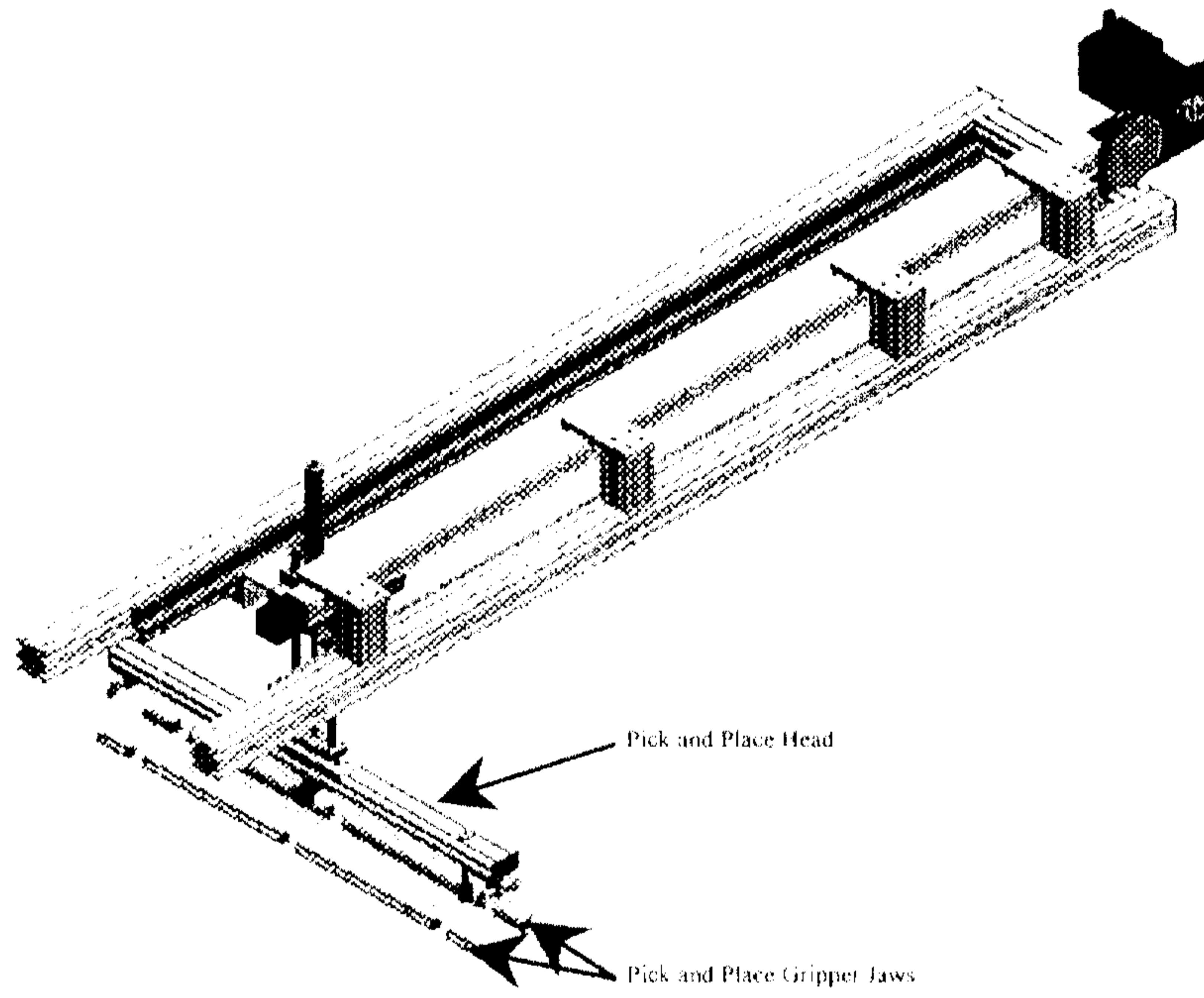
Figure 1



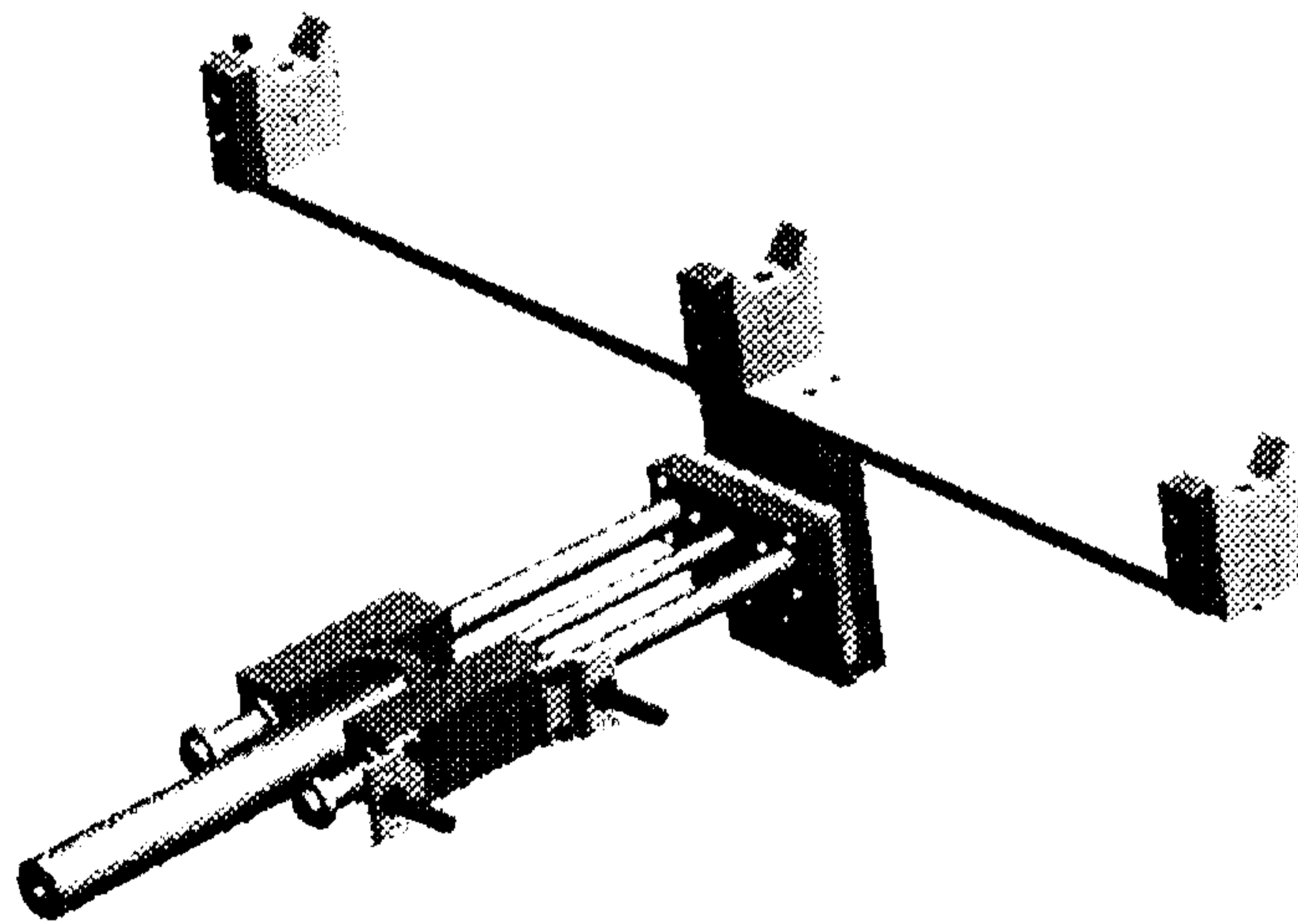
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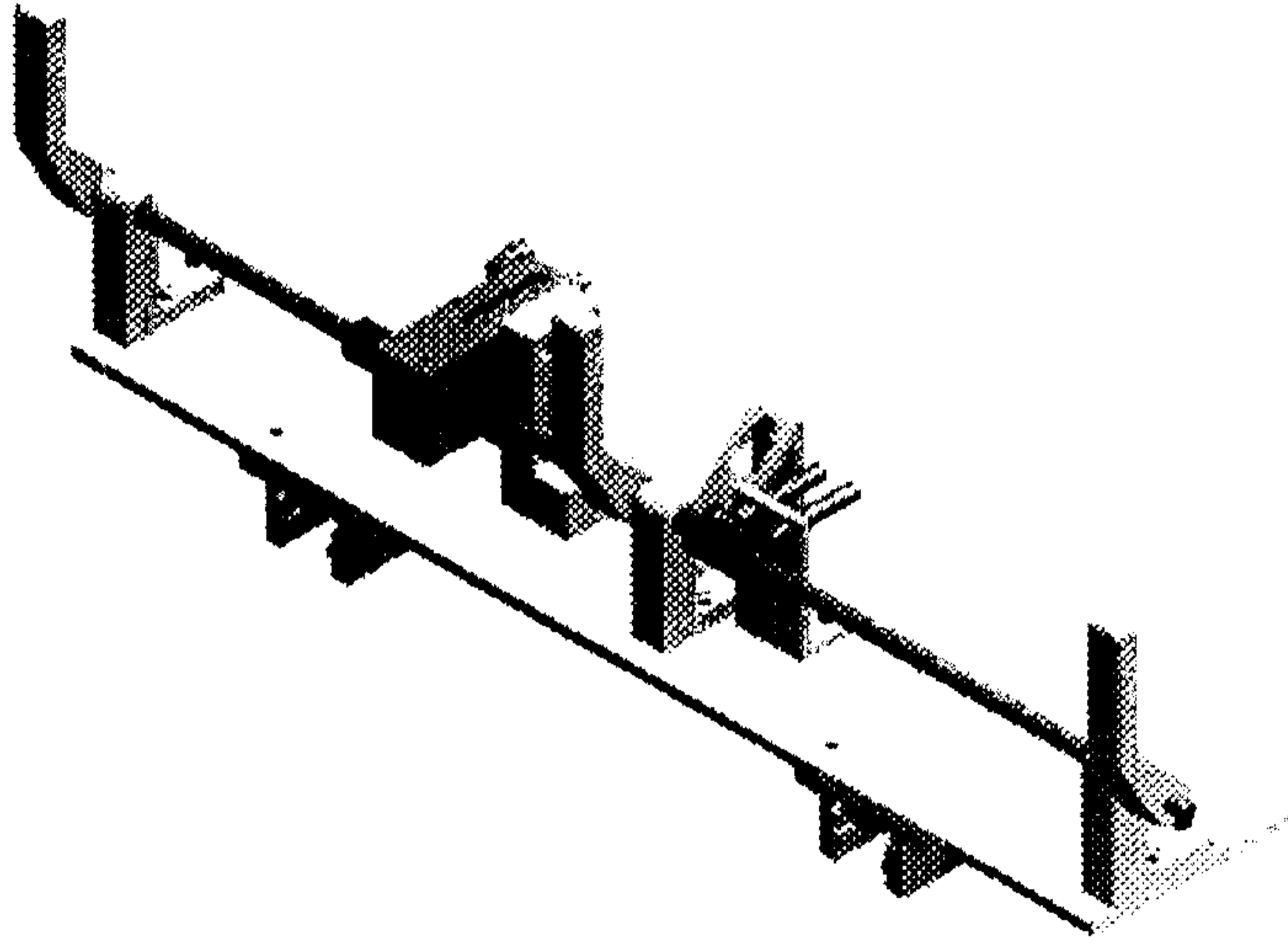
**Figure 3**



**Figure 4**



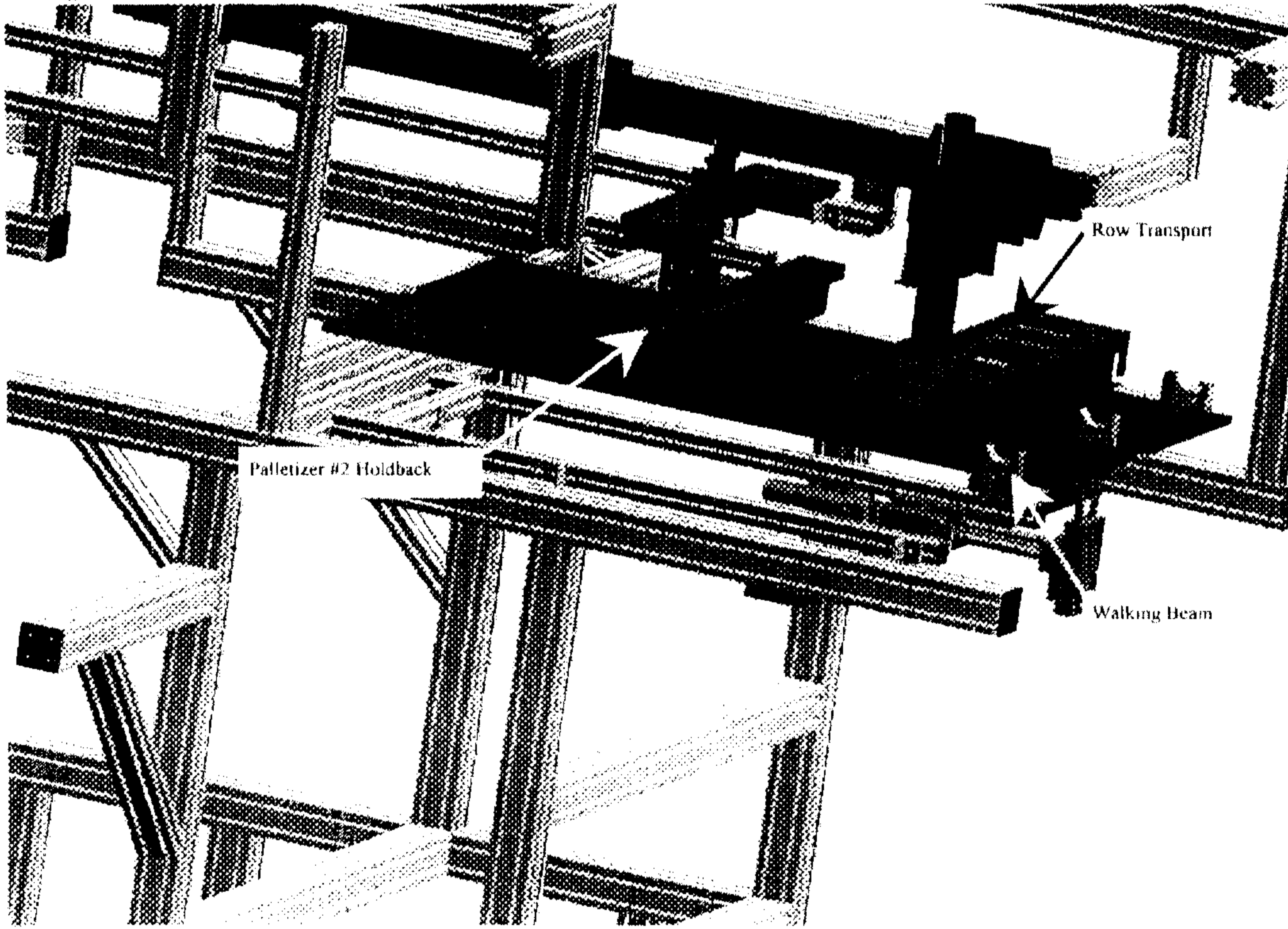
**Figure 5**



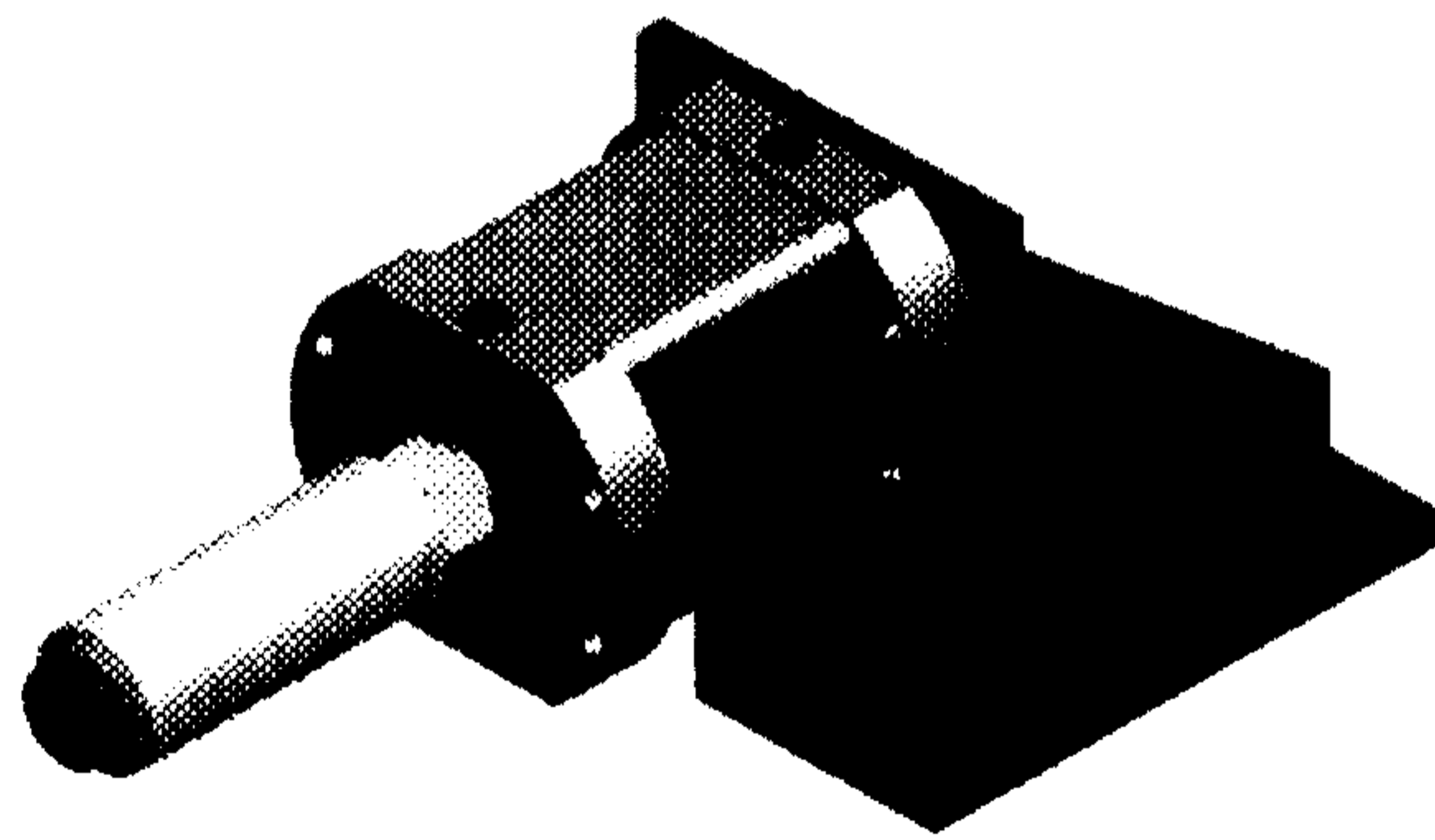
**Figure 6**



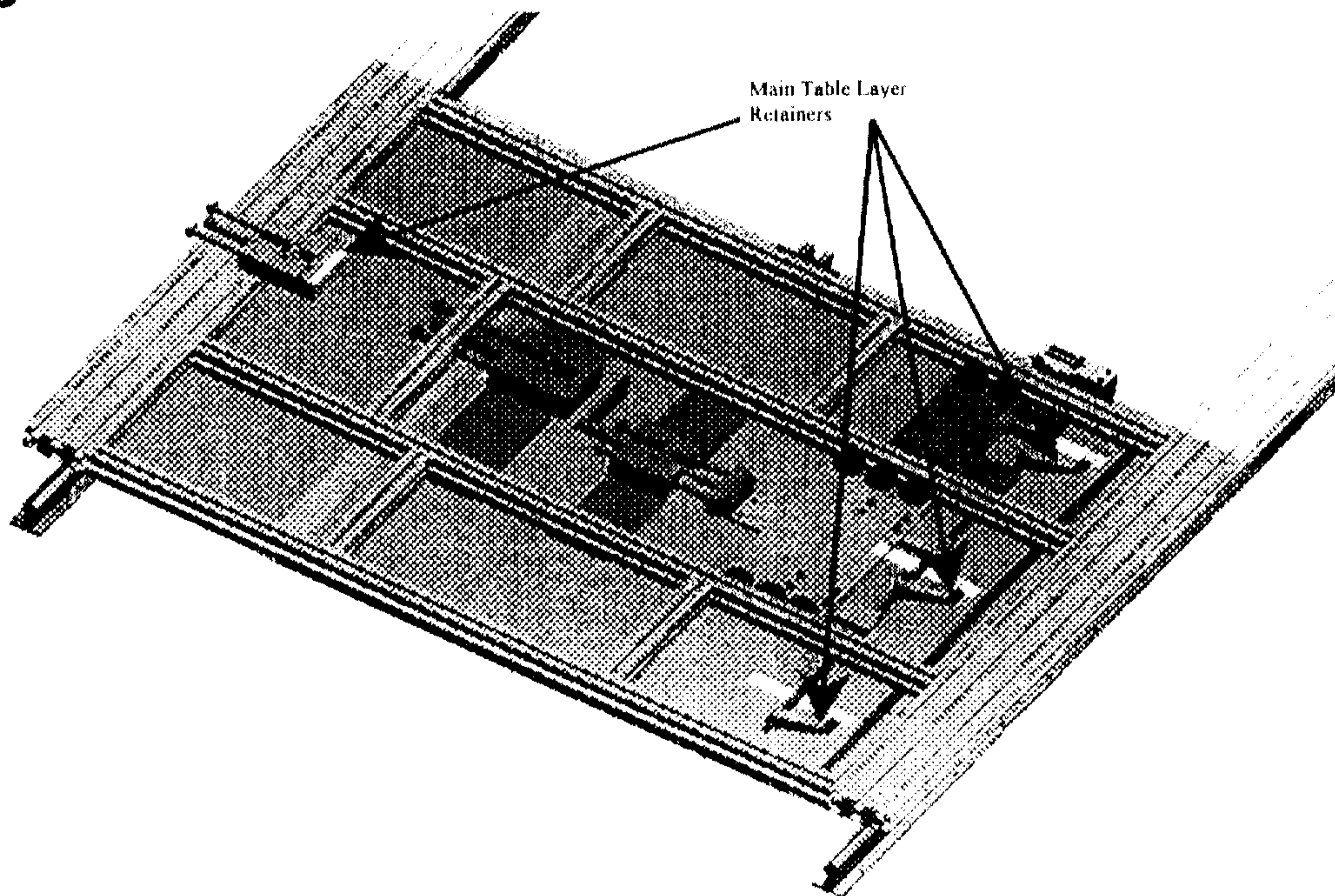
**Figure 7**



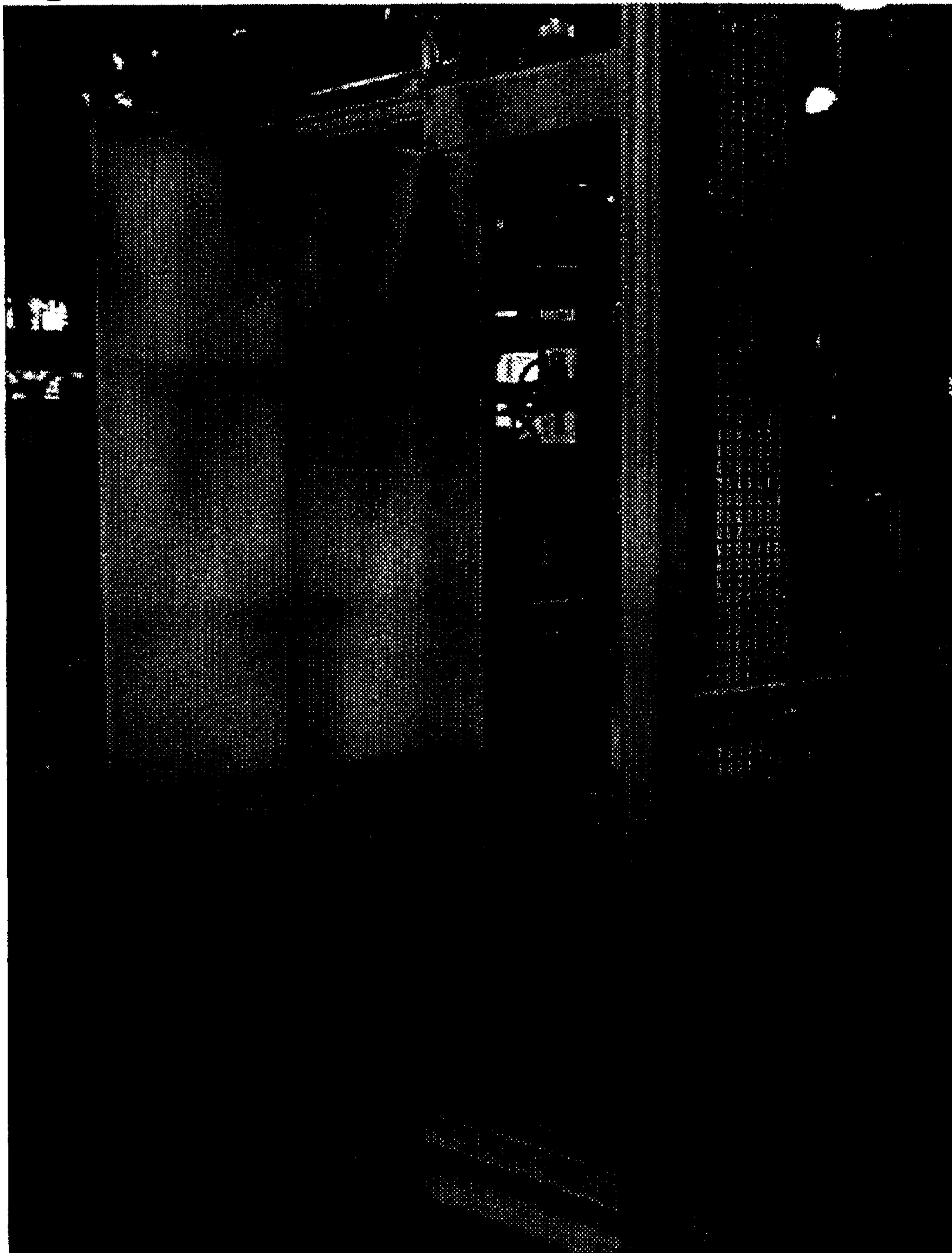
**Figure 8**



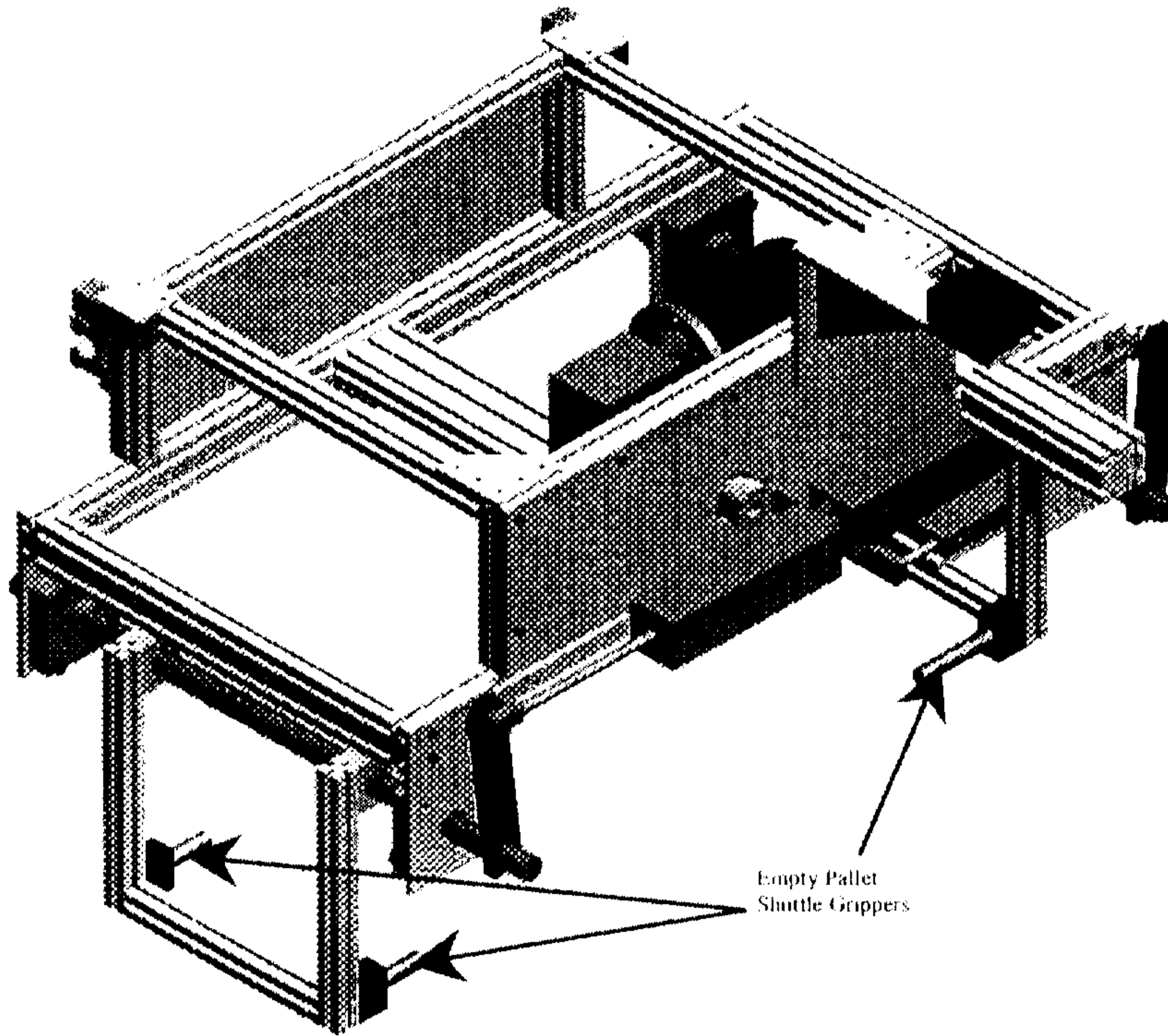
**Figure 9**



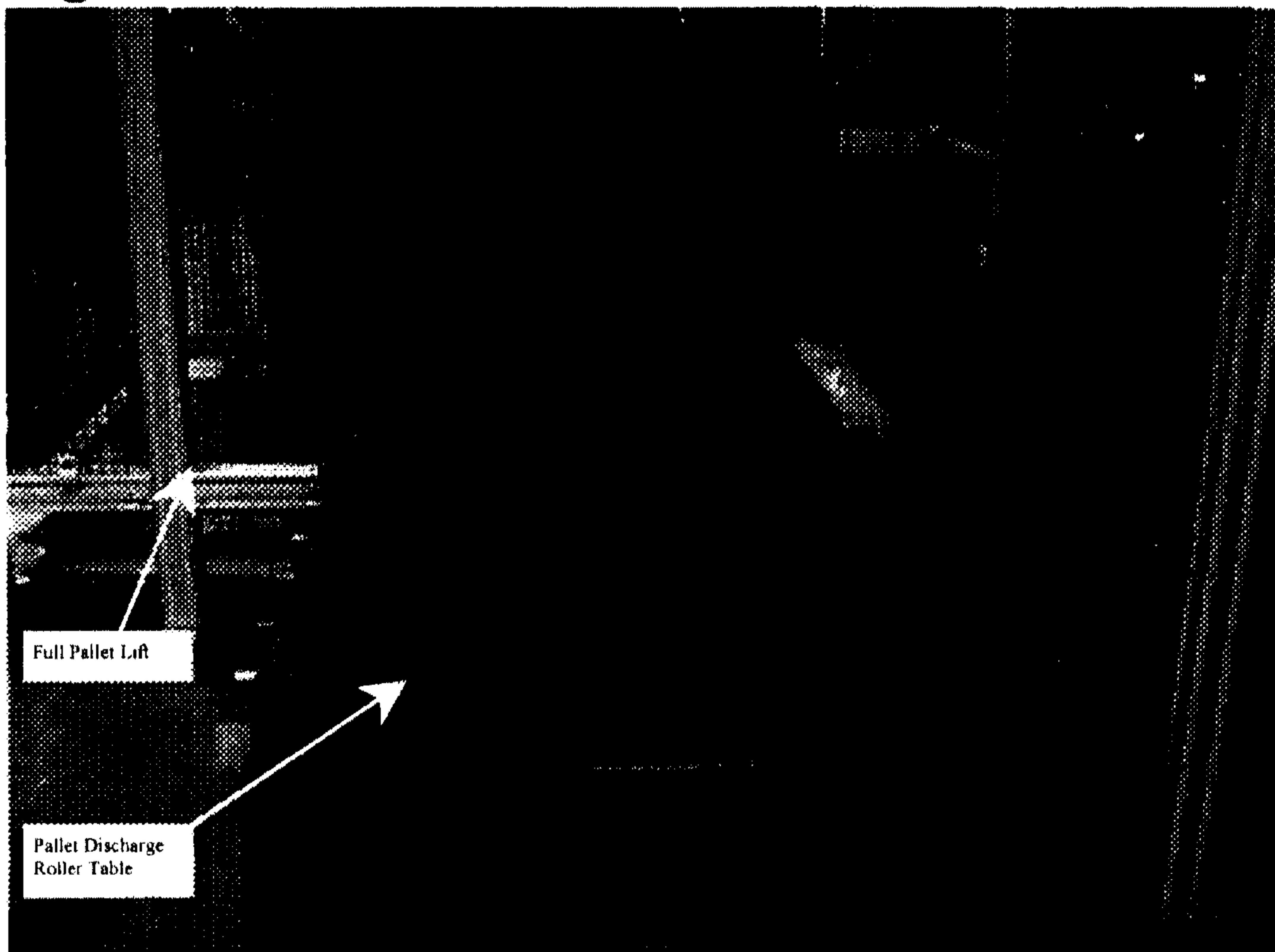
**Figure 10**



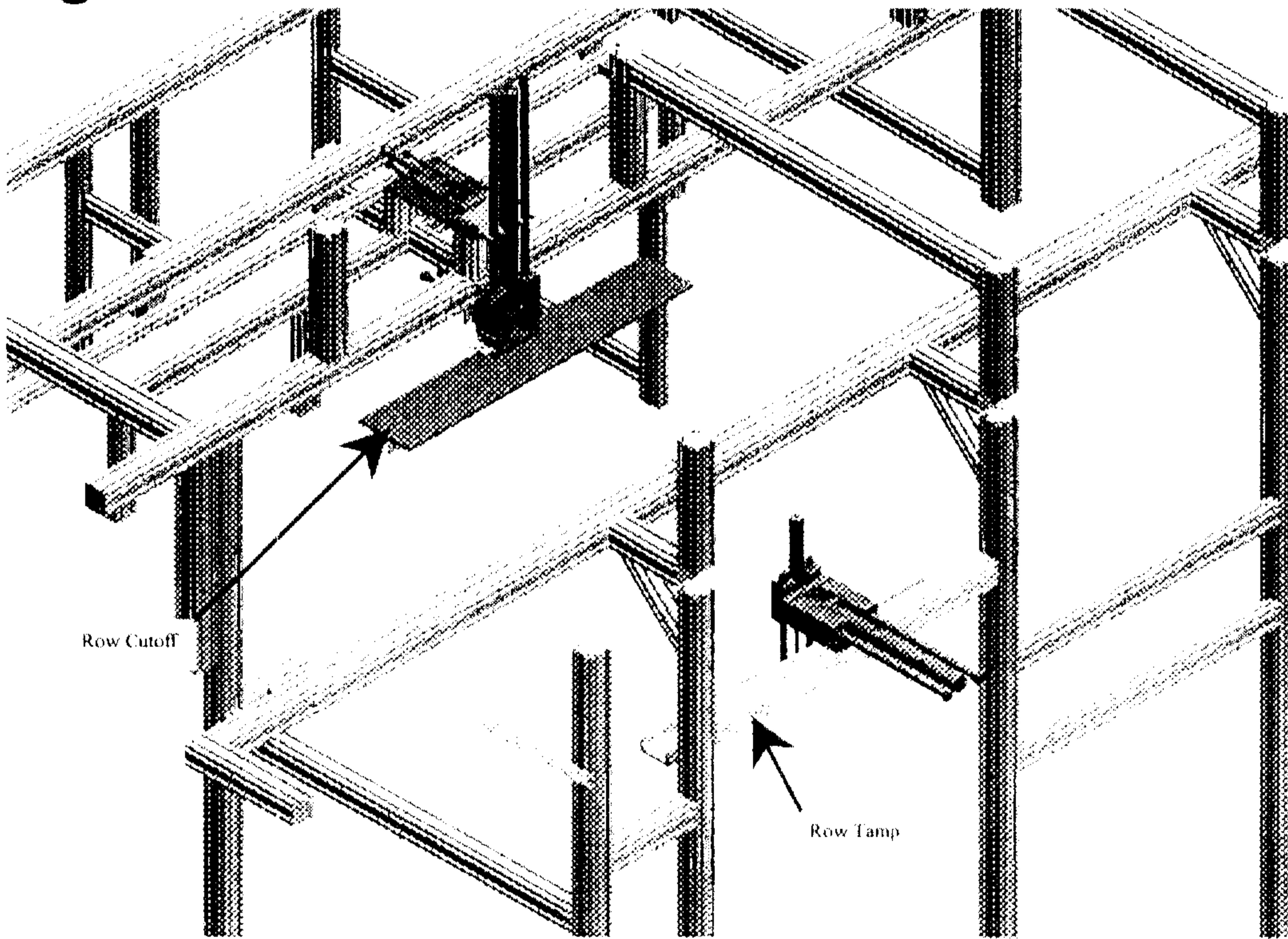
**Figure 11**



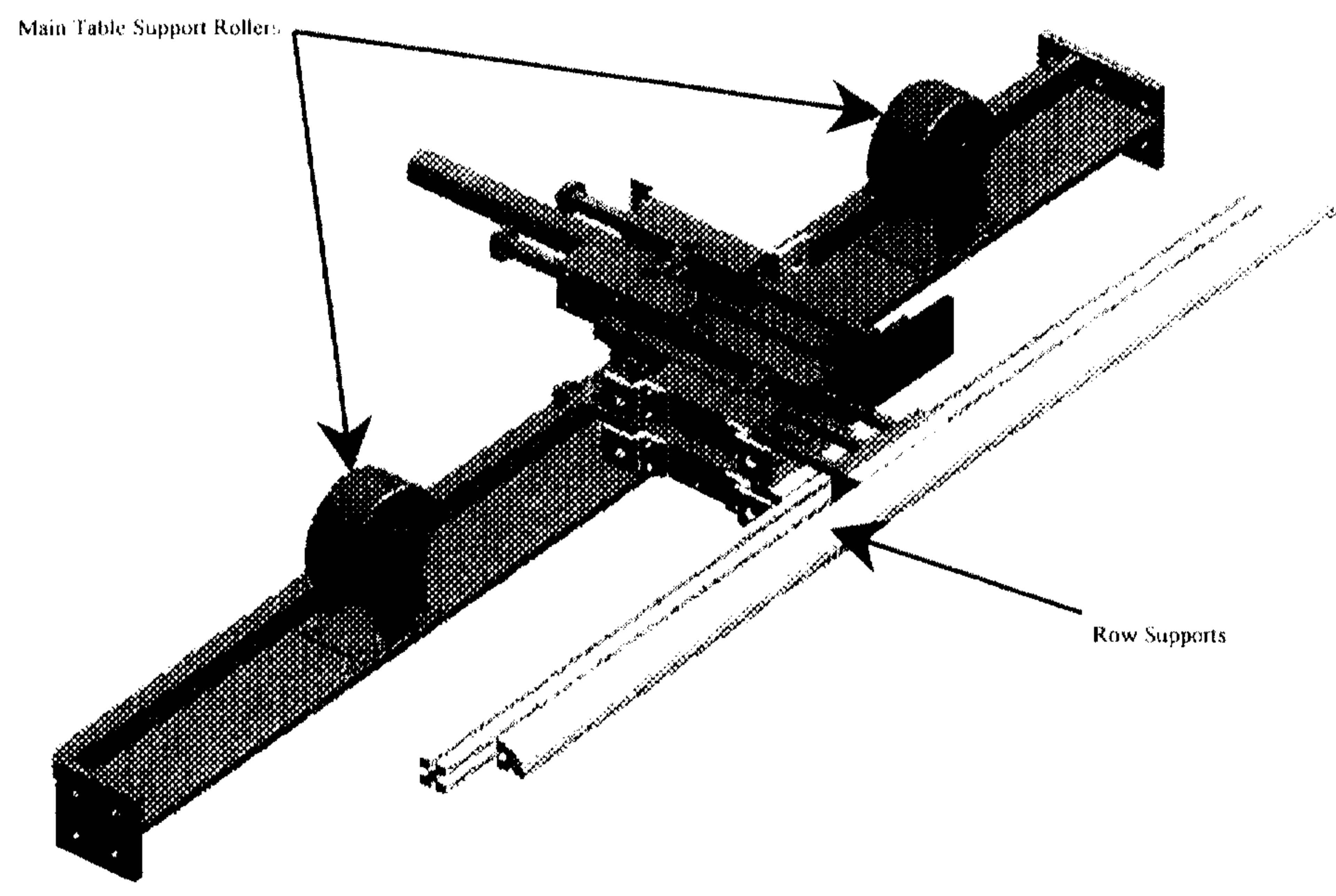
**Figure 12**



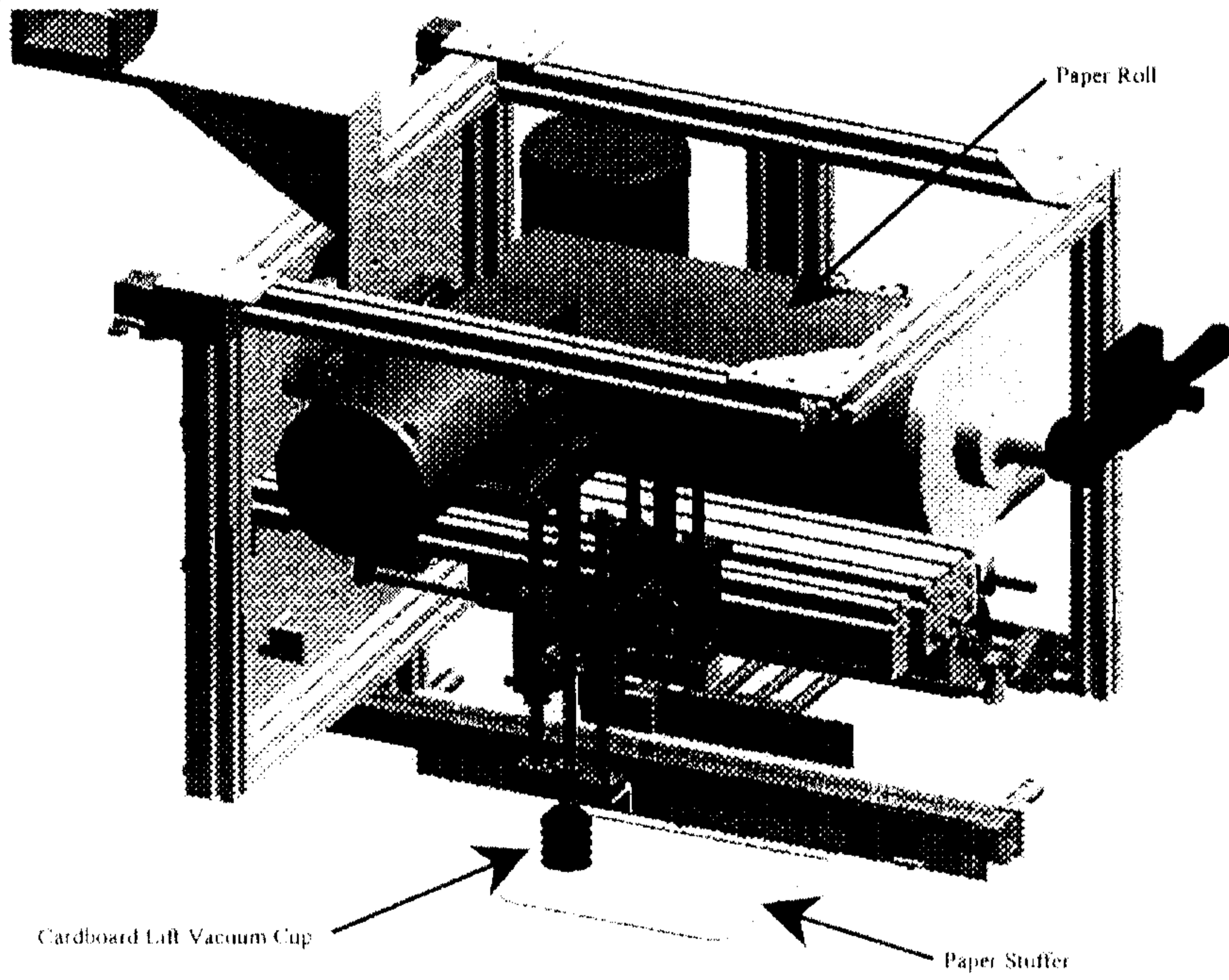
**Figure 13**



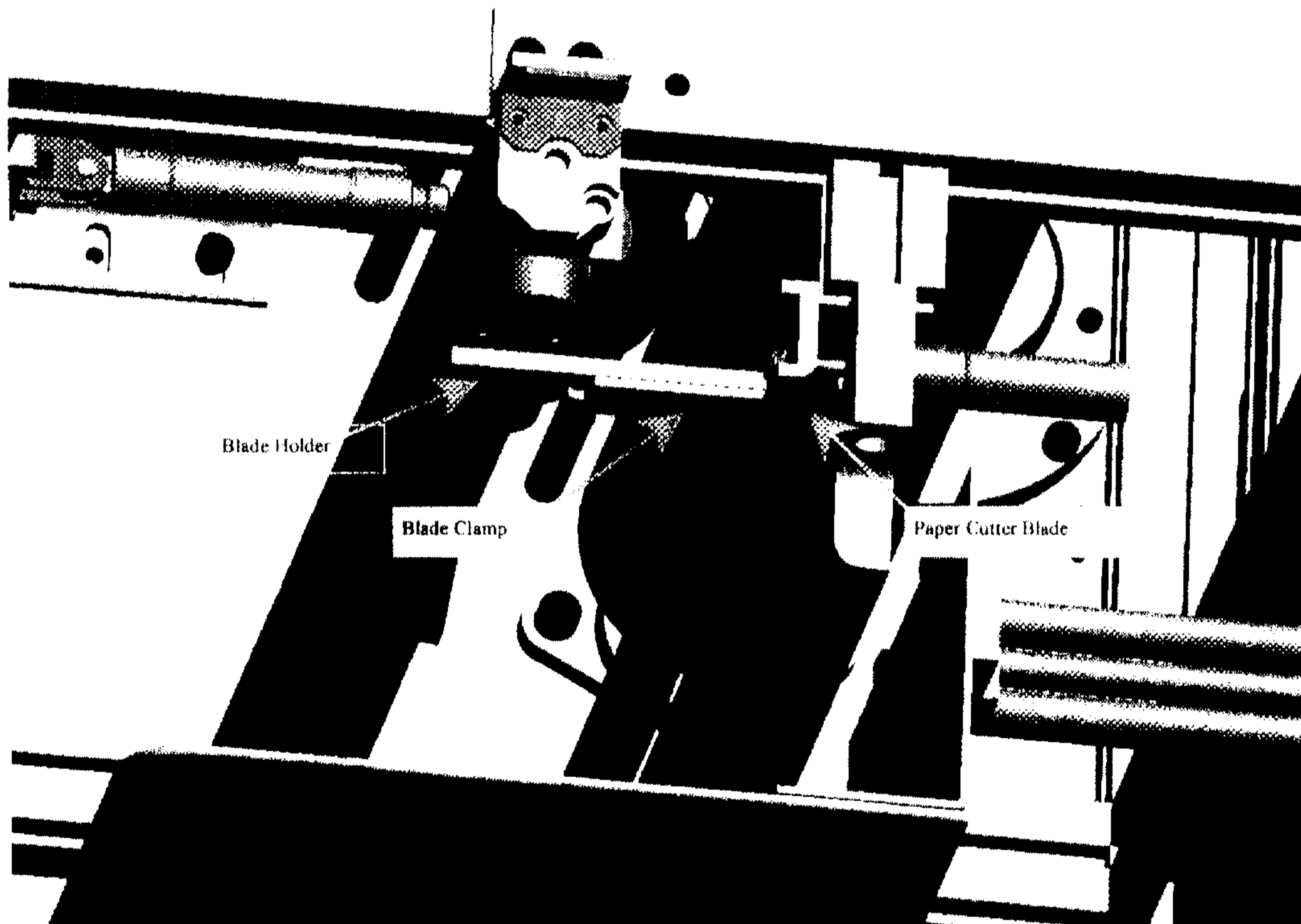
**Figure 14**



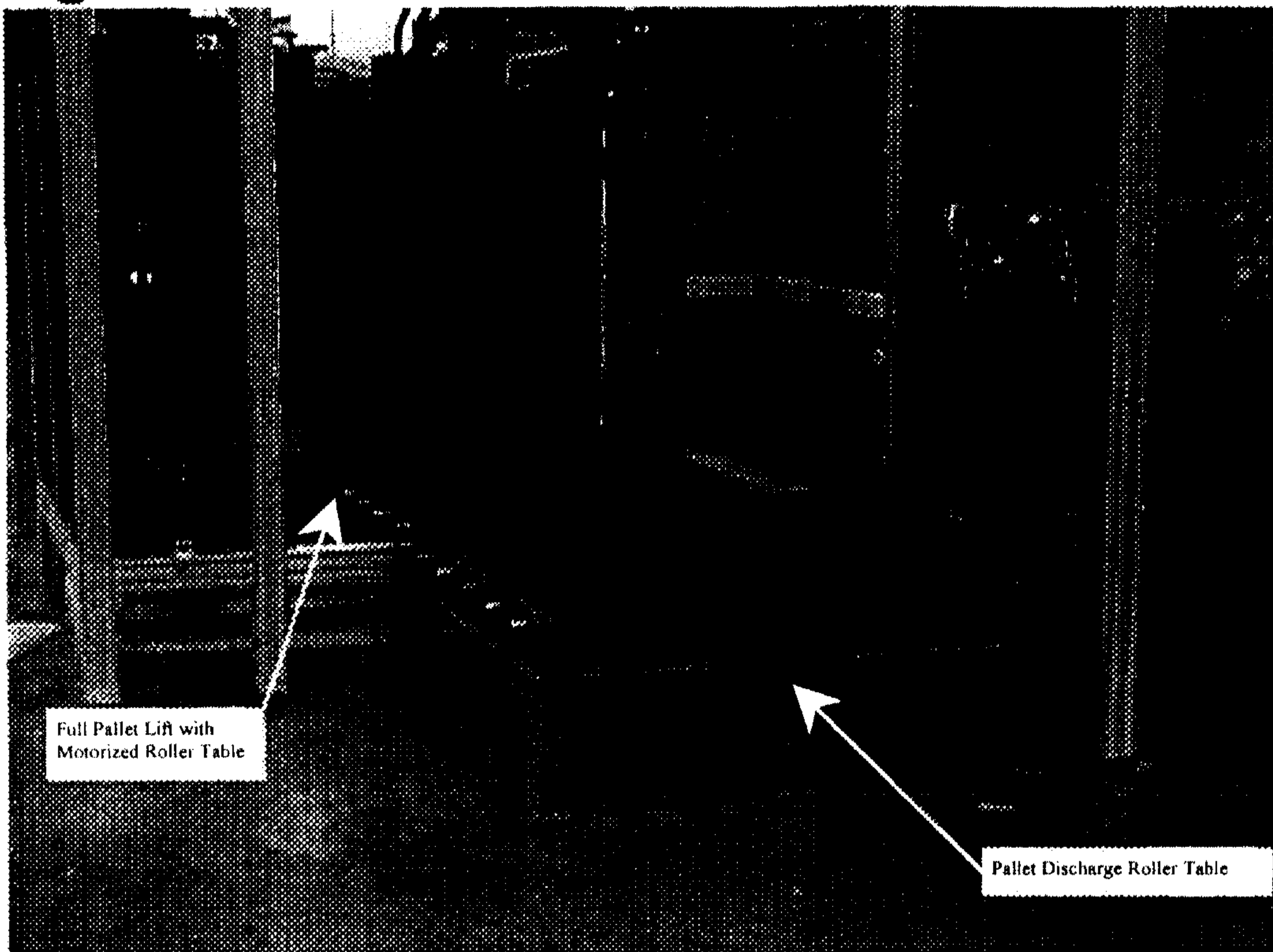
**Figure 15**



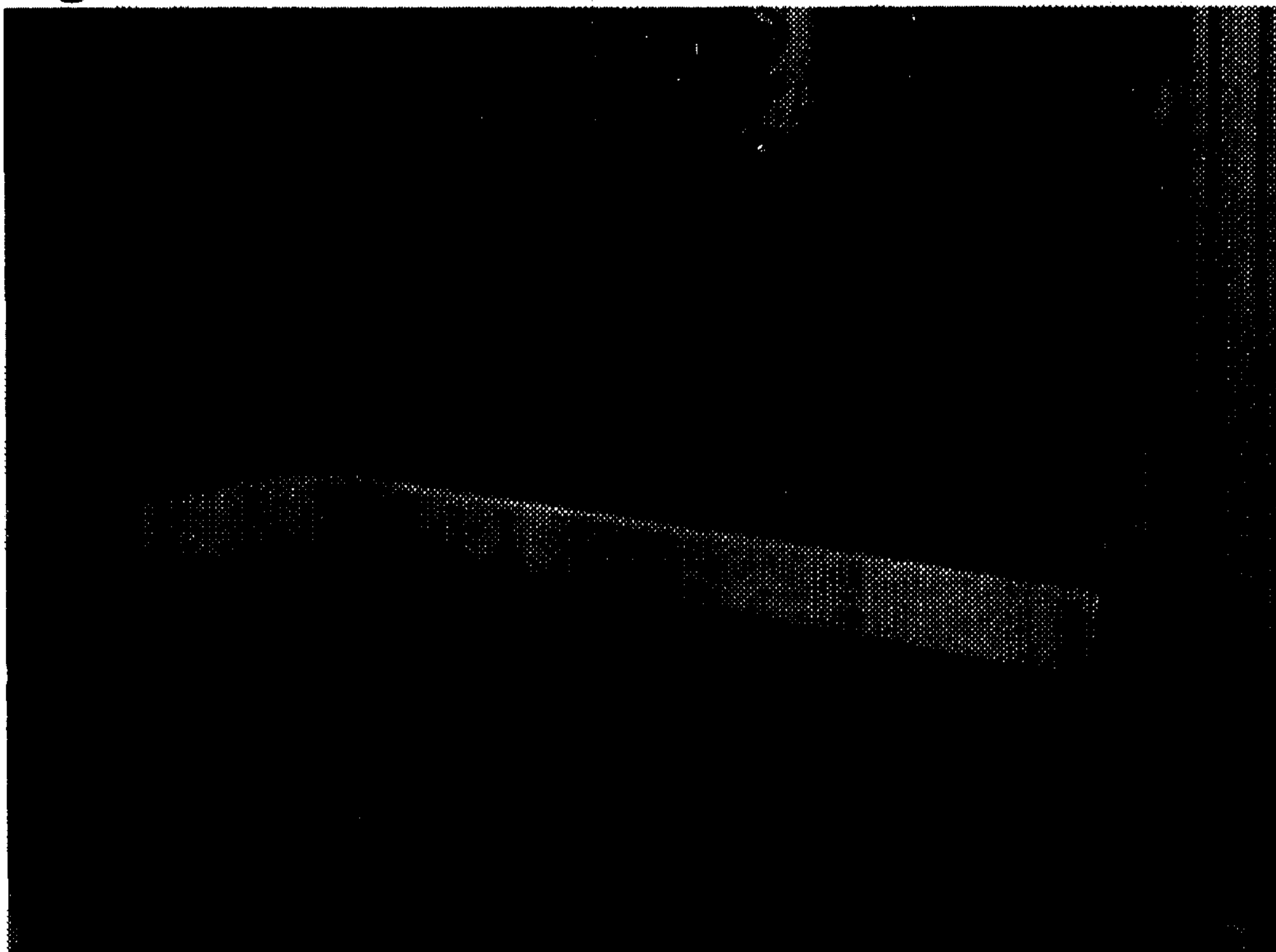
**Figure 16**



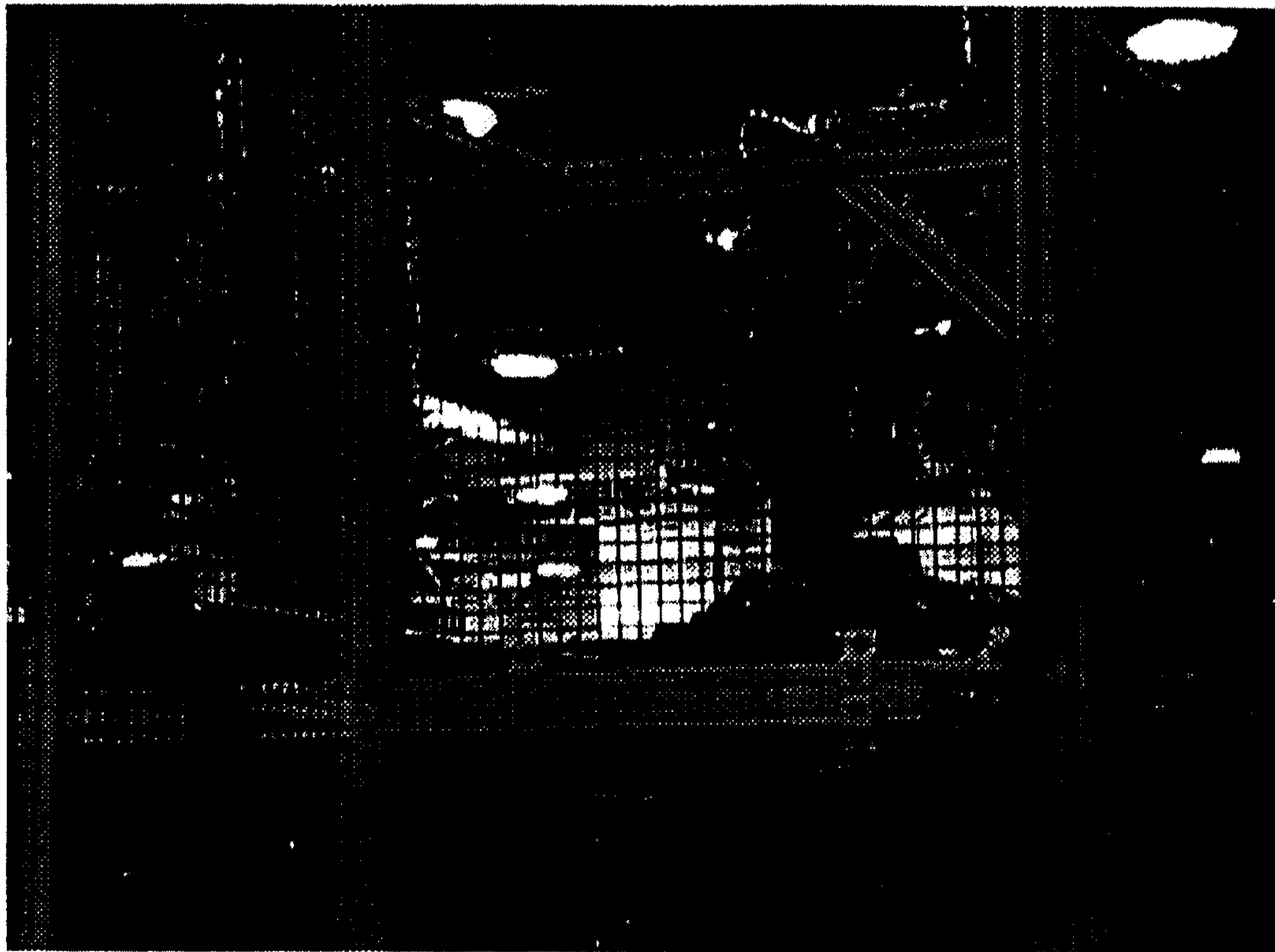
**Figure 17**



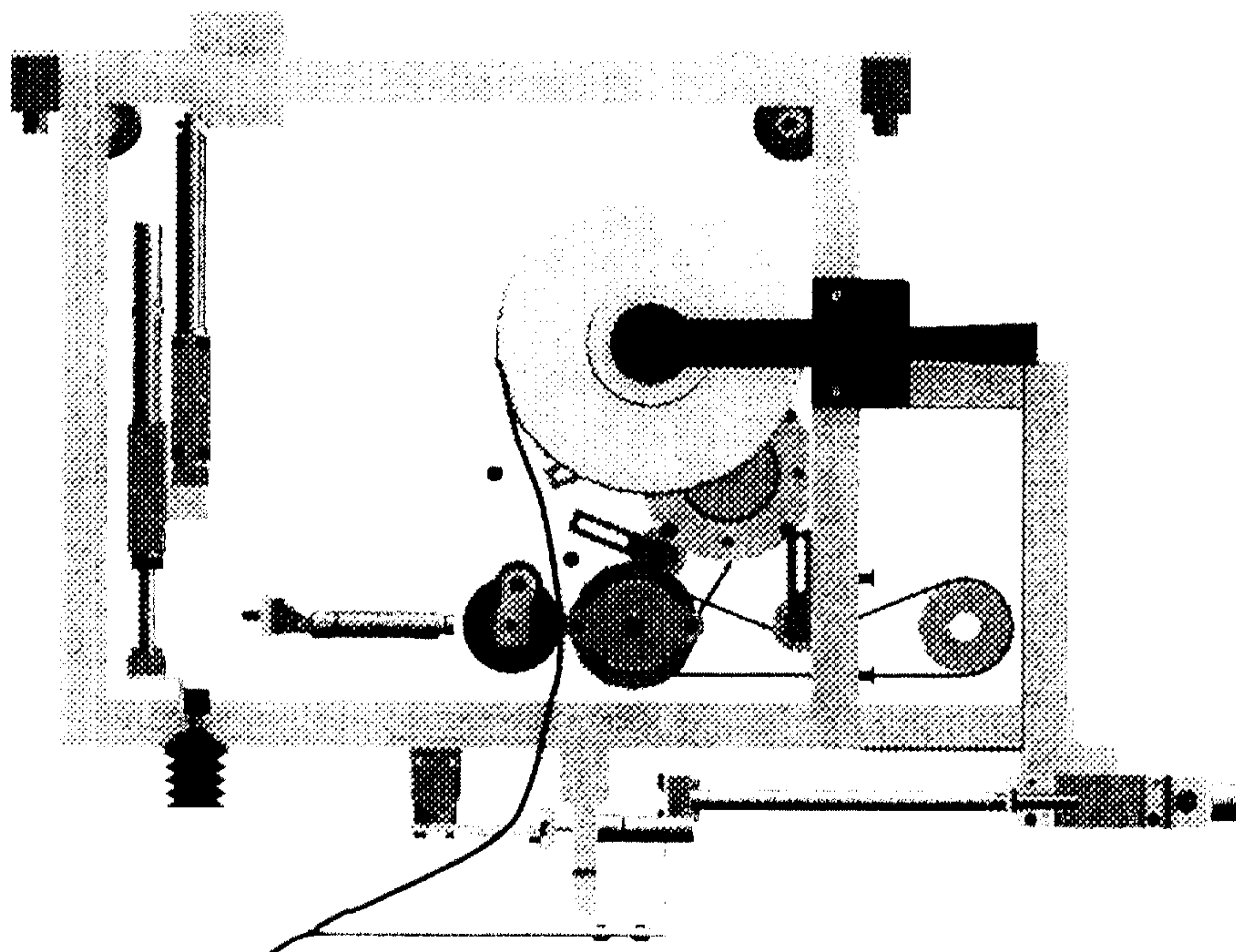
**Figure 18**



**Figure 19**



**Figure 20**



**Figure 21**

