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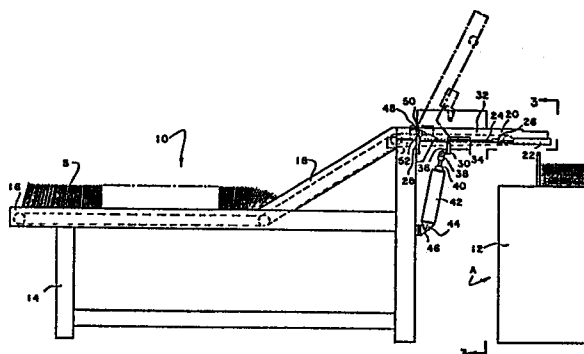
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⑥④ **Hopper loader.**

⑥⑦ Apparatus for delivering a stream of signatures (5) to a hopper (12) which comprises a generally horizontal first conveyor section (16) for receiving signatures (5) thereon. An upwardly inclined second conveyor section (18) engages the signatures (5) toward the hopper (12). A third conveyor section (20) receives a stream of signatures (5) from the second conveyor section (13) and delivers the stream of signatures (5) into the hopper (12). Means is provided for pivoting the third conveyor section (20) about a horizontal axis with respect to the inclined second conveyor section (18) and the hopper (12).



HOPPER LOADER

Background of the Invention

The present invention relates to an apparatus for delivering a stream of signatures to a hopper of a collator from which the signatures are fed and collated.

Such an apparatus is widely known as a hopper loader, and generally comprises a first generally horizontal conveyor section on which the signatures are received in a stacked on-edge side-abutting relationship. A second conveyor section inclined upwardly and away from the first conveyor section receives the signatures from the first conveyor section and conveys them in a shingled stream to a third generally horizontal conveyor section which conveys the stream of signatures into a hopper. A plurality of hopper loaders are used for feeding signatures into a plurality of hoppers of a collator and are positioned in a side-by-side relationship. U.S.

Patent 3,945,533 shows a typical example of such an apparatus.

The hopper loaders shown in U.S. Patent 3,945,533 are mounted on wheels so that they can be moved around a plant floor and away from the collator. The known hopper loaders also include a suitable jogger mechanism for jogging the signatures as they are fed into the hopper. The jogger mechanism includes a motor and a suitable mechanism for oscillating the joggers.

One problem which has been encountered using hopper loaders involves servicing or adjusting the collator hopper for handling different size signatures. To effect servicing of a respective hopper, the hopper loader apparatus must be removed from the hopper or the servicing must be accomplished in spite of the location of the hopper loader making such servicing cumbersome. Removing the hopper loader and repositioning it requires substantial time and effort.

Recently, it was proposed to mount the second and third conveyors on a movable carriage that effects movement of the second and third conveyors in a substantially horizontal plane. Such an apparatus is disclosed in U.S. Patent 4,366,955.

The object of the present invention is to provide a hopper loader that assures easy access to the hopper and achieves this in a simple and effective manner.

Summary of the Invention

The object of the present invention is achieved by providing a hopper loader having three conveyor sections as discussed above and in which the third conveyor section is pivotable about a horizontal axis with respect to the second conveyor section and the hopper. The pivoting of the third conveyor section results in the hopper becoming totally accessible to the operator.

The third conveyor section includes a pivotal frame portion which is pivotally connected to the main frame of the hopper loader by hinge joint. A fluid cylinder is connected to the pivotal frame portion to effect pivotal movement thereof around the horizontal axis.

When the third conveyor section pivots, the joggers and part of the jogger drive also pivots. A cross bar is fixedly connected to the pivotal frame portion and the fluid cylinder is attached to the cross bar. The cylinder effects pivoting of the cross bar and thereby the whole third conveyor section. A ball and socket joint assembly provides for pivoting of one portion of the cable drive relative to another portion.

Brief Description of the Drawings

The foregoing and other features and objects of the present invention will become more apparent upon a reading of the following description taken in conjunction with the accompanying drawings wherein:

Fig. 1 is a side elevational view of a hopper loader embodying the present invention with parts omitted;

Fig. 2 is a schematic plan view of a plurality of hopper loaders of the present invention associated with a collator;

Fig. 3 is a schematic view of the hopper loader of Fig. 1 looking at the hopper loader of Fig. 1 as indicated by line 3-3 of Fig. 1; and

Fig. 4 is a fragmentary top view of the hopper loader of the present invention looking at the hopper loader of Fig. 3 as indicated by the arrows 4-4, and showing a nose section thereof.

Description of the Preferred Embodiment

The hopper loader of the present invention is generally shown in Fig. 1 and is designated by numeral 10. The hopper loader 10 receives a stack of signatures and provides for feeding signatures into a hopper 12 of a collator machine. The hopper loader provides for maintaining a predetermined stack of signatures in the hopper. The hopper loader generally includes three conveyor sections. The signatures are loaded onto a horizontal first conveyor section in on-edge condition and are advanced by the first conveyor section to a second upwardly inclined conveyor section. The second conveyor section is generally driven at a faster speed than the

first conveyor section. The second conveyor section converts the stack of on-edge signatures into a shingled stream of signatures. A third conveyor section engages the shingled signatures and transports them to the upper end of the hopper where they are deposited into the upper end of the hopper which generally extends vertically. As used herein, the term "extends vertically" identifies a hopper in which the walls extend vertically upward from a bottom support.

The hopper loader feeds signatures into the top end of the hopper when the stack of signatures in the hopper falls below a predetermined minimum level. As shown in Fig. 2, a plurality of hopper loaders 10 can be used for delivering signatures into a plurality of hoppers 12 of a collator. Each hopper loader 10 is associated with each hopper 12 of the collator. The hopper loaders are disposed in side-by-side relationship. As discussed above, such a disposition of loader makes servicing of hoppers rather cumbersome and requires substantial effort and time.

The use of the hopper loader of the present invention permits easy access to the hoppers and facilitates hopper servicing.

The hopper loader of the present invention comprises a stationary frame 14 for supporting conveyor sections 16, 18, 20. The signatures S are loaded onto the horizontal

first conveyor section 16 in a generally on-edge condition. The first conveyor section 16 advances the signatures toward the upwardly inclined second conveyor section 18. The second conveyor section 18 engages the flat surface of the signatures and forms the signatures into an overlapped or shingled stream. The overlapped signatures are then engaged by the third conveyor section 20 which transports the signatures to the upper end of the hopper 10. Each of the conveyor sections 16, 18, and 20 includes a plurality of belts (not shown) which are trained around pulleys (not shown) located at the opposite ends of the respective conveyor section. A suitable drive mechanism (also not shown) drives the respective conveyor sections.

The foregoing description broadly describes the function of a hopper loader. Such a hopper loader is well known and is disclosed, for example, in U.S. Patents 3,904,191 and 3,945,633.

A known suitable jogger mechanism 22 associated with the third conveyor section 20 jogs the signatures as they move into the hopper 14. The jogger mechanism includes an actuator means. The jogger mechanism used in the present invention can be such as disclosed in U.S. Patent 4,164,348.

A cable drive 24 effects driving of the shaft of the actuator means. The cable drive 24 is supported by front

and rear supports 26 and 28, respectively, and a cross bar 30. The cross bar 30 of the cable drive is fixedly attached to a pivotal frame 32 of the third conveyor section 20 by a pair of linkage plate 34.

The third conveyor section 20 is adapted to pivot about a horizontal axis. The pivoting mechanism includes a hinge joint 36 attached to the cross bar 30. A fork 38 attached to the rod 40 of a fluid cylinder 42 engages the hinge joint 36. The fluid cylinder 42 has a hinge joint 44 at the rear end thereof. The hinge joint 44 is attached to a bracket 46 fixedly connected to the main frame 14 of the hopper loader. The cylinder 42 is connected to an appropriate fluid source (not shown).

The third conveyor section 20 is connected with second conveyor section by two hinge joints 48. An auto-lubricating ring 50 provides for lubrication of the hinge joint 48. A ball and socket joint 52 provides for pivoting of one portion of the cable drive 24 relative to another portion thereof.

The operation of the hopper loader according to the invention is apparent from the foregoing description. When pivoting of the third conveyor section is required, the control of the cylinder 42 is actuated, and the cylinder 42 effects pivoting of the third conveyor section to a position shown in dash lines in Fig. 1. When repositioning of the third conveyor section is required,

the control of the cylinder 42 is actuated again in a direction to return the third conveyor section to its normal operating position.

While a particular embodiment of the invention has been shown and described, various modifications thereof will be apparent to those skilled in the art, and, therefore, it is not intended that the invention be limited to the disclosed embodiment or details thereof, and departure can be made therefrom within the spirit and scope of the invention as defined in the appended claims.

Having thus described our invention, we claim:

1. Apparatus for delivering a stream of signatures to a hopper, said apparatus comprising a generally horizontal first conveyor section for receiving signatures thereon, an upwardly inclined second conveyor section for engaging the signatures on said first conveyor section and for feeding the signatures toward said hopper, said inclined second conveyor section being inclined upwardly and away from said first conveyor section, a third conveyor section for receiving a stream of signatures from said second conveyor section and for delivering the stream of signatures into said hopper, and means for pivoting said third conveyor section about a horizontal axis with respect to said inclined second conveyor section and said hopper.

2. Apparatus as set forth in claim 1 wherein said apparatus includes a main frame, said third conveyor section is pivotally connected with said main frame, and said means for pivoting said third conveyor section comprises a fluid cylinder connected with said third conveyor section for pivoting the same relative to said frame.

3. Apparatus as set forth in claim 1 further including a jogger means for jogging signatures being

moved into said hopper and a jogger drive means for driving said jogger means.

4. Apparatus as set forth in claim 3 wherein said apparatus includes a main frame and said jogger drive means includes a cable drive, a first means for pivotally connecting at least a portion of said cable drive to said main frame, and second means fixedly connected with said third conveyor section.

5. Apparatus as set forth in claim 4 wherein said second means includes a cross bar fixedly attached to said third conveyor section, said means for pivoting said third conveyor section includes a fluid cylinder, said fluid cylinder being connected with said cross bar at one end thereof for pivoting the same to thereby pivot said jogger drive means and said third conveyor section with respect to said frame.

6. Apparatus as set forth in claim 5 wherein the piston rod of said fluid cylinder is connected to said cross bar, and said fluid cylinder is connected to said frame at the other end thereof.

7. Apparatus as set forth in claim 3 wherein said drive means comprises a motor, a cable driven by said

motor, and a cross bar, said cross bar being fixedly connected with said third conveyor section and comprising a hinge joint, said fluid cylinder being connected with said hinge joint for pivoting said cross bar about a horizontal axis to thereby pivot said third conveyor section.

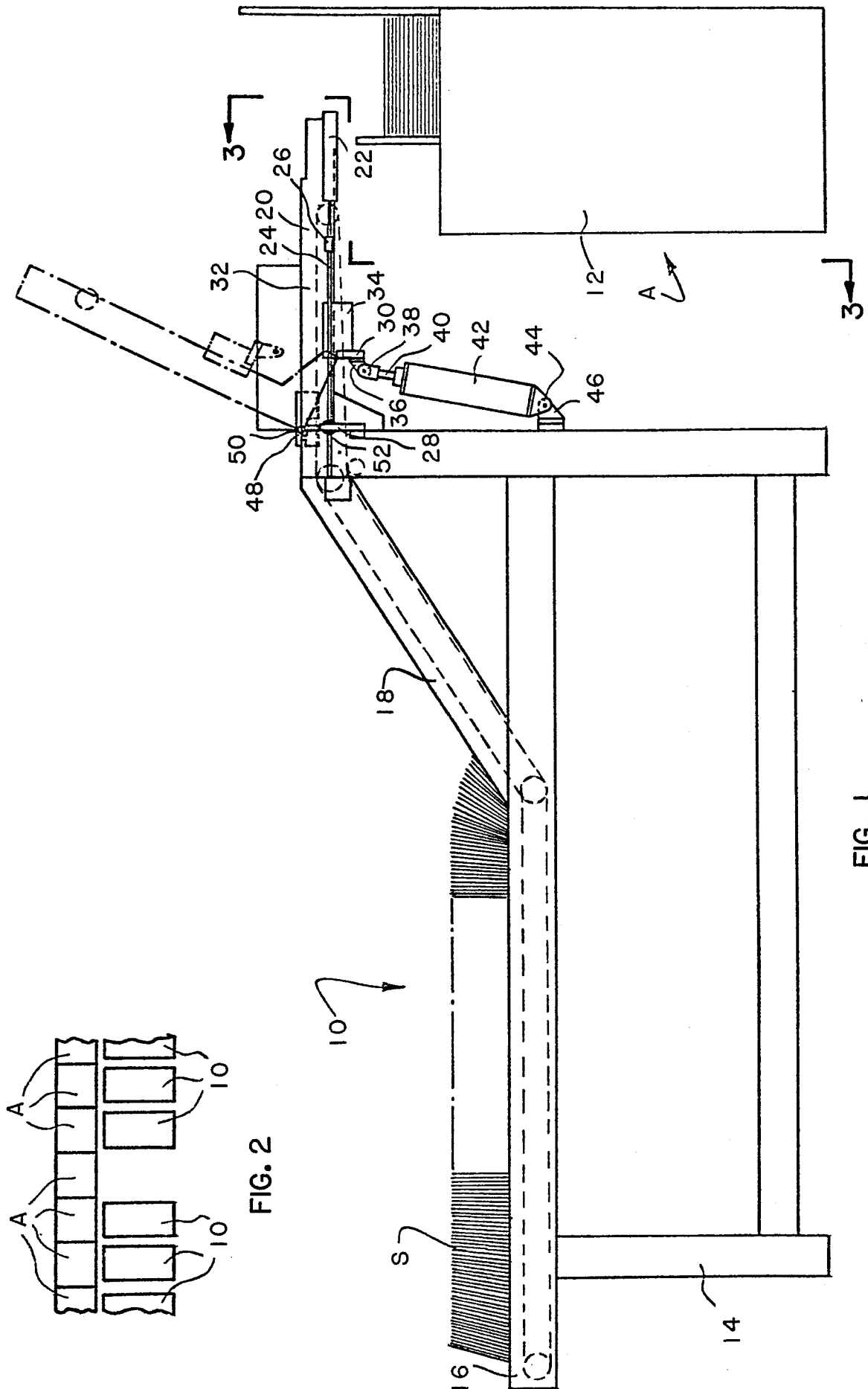


FIG. 1

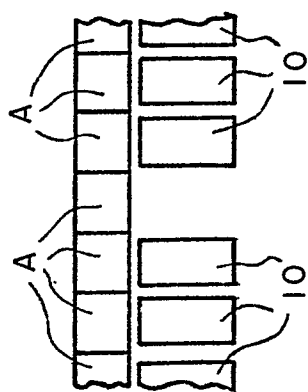


FIG. 2

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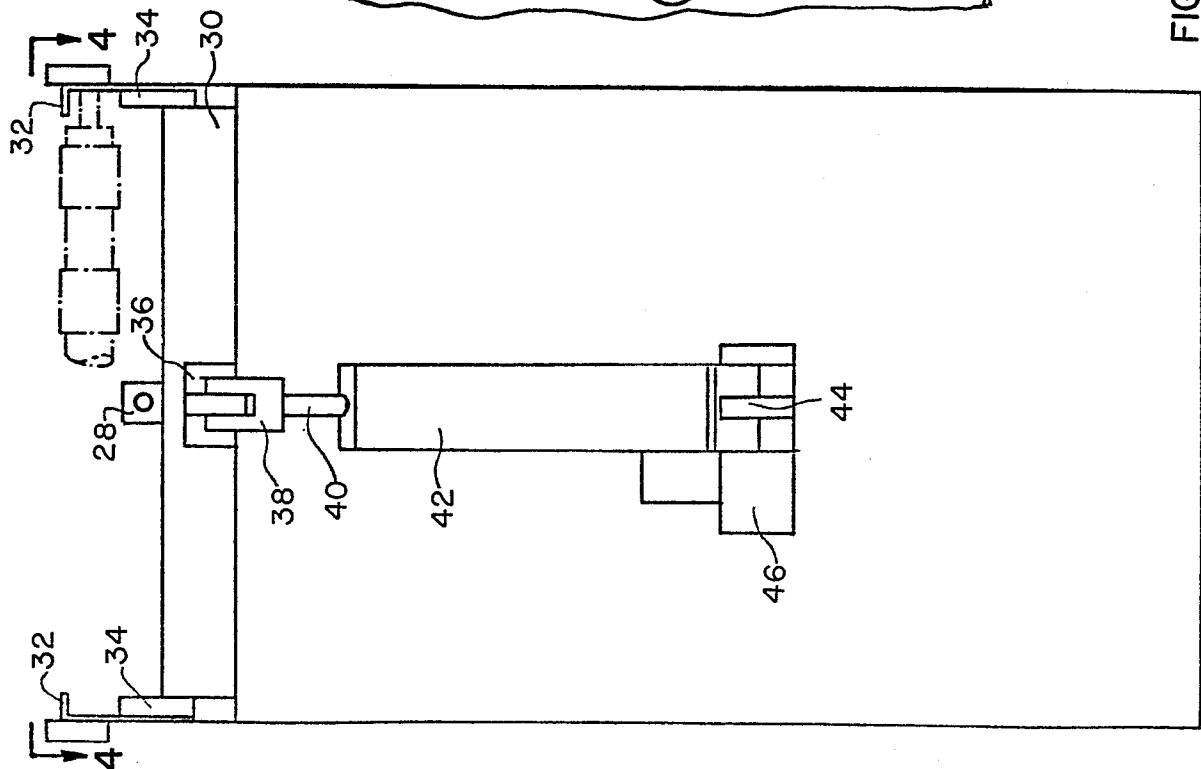


FIG. 3

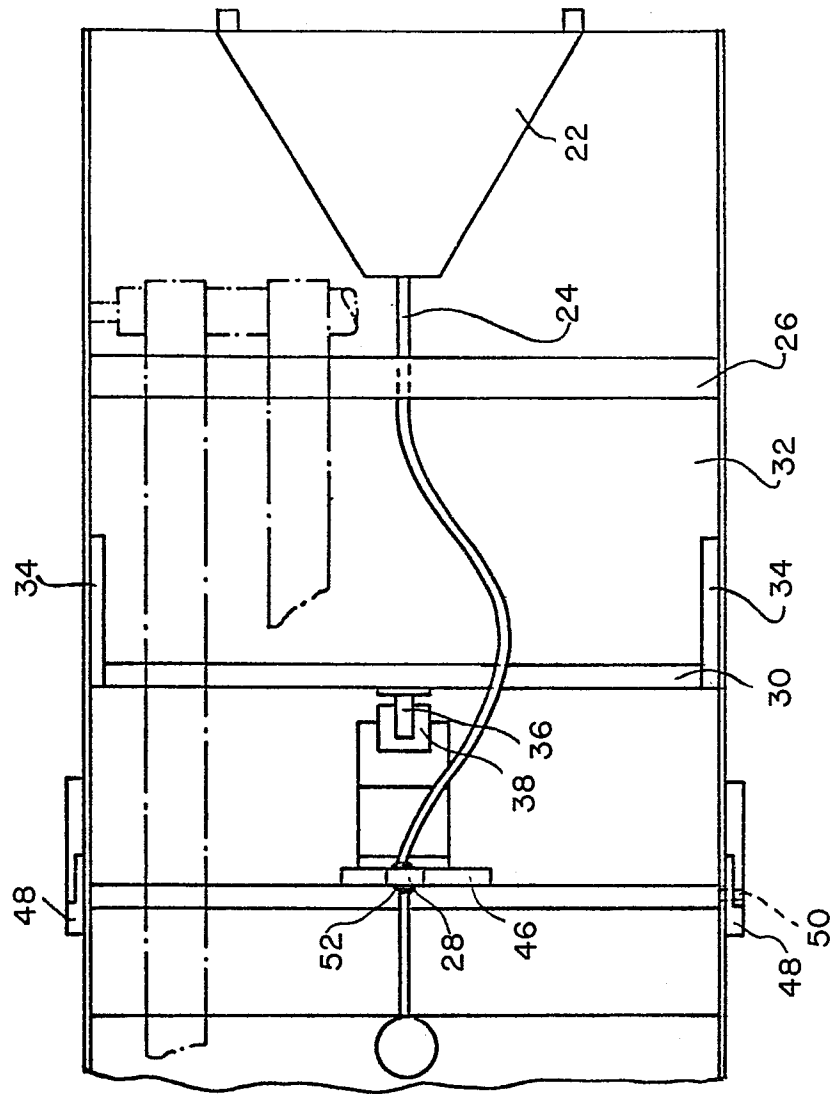


FIG. 4



European Patent
Office

EUROPEAN SEARCH REPORT

0152503
Application number

EP 84 10 1699

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Y,D	US-A-3 945 633 (KNOPP) * whole document *	1-3	B 65 H 1/30 B 65 H 31/38
Y	US-A-3 772 972 (DUTRO et al.) * whole document *	1-3	
A		5-7	
Y,D	US-A-4 164 348 (DORIA) * whole document *	1-3	
A		4,7	
A	CH-A- 136 402 (SCHNELLPRESSENFABRIK AG HEIDELBERG) * page 2, left-hand column, lines 35-40; figure 2 *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
			B 65 H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25-09-1984	Examiner RECHLER W.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			