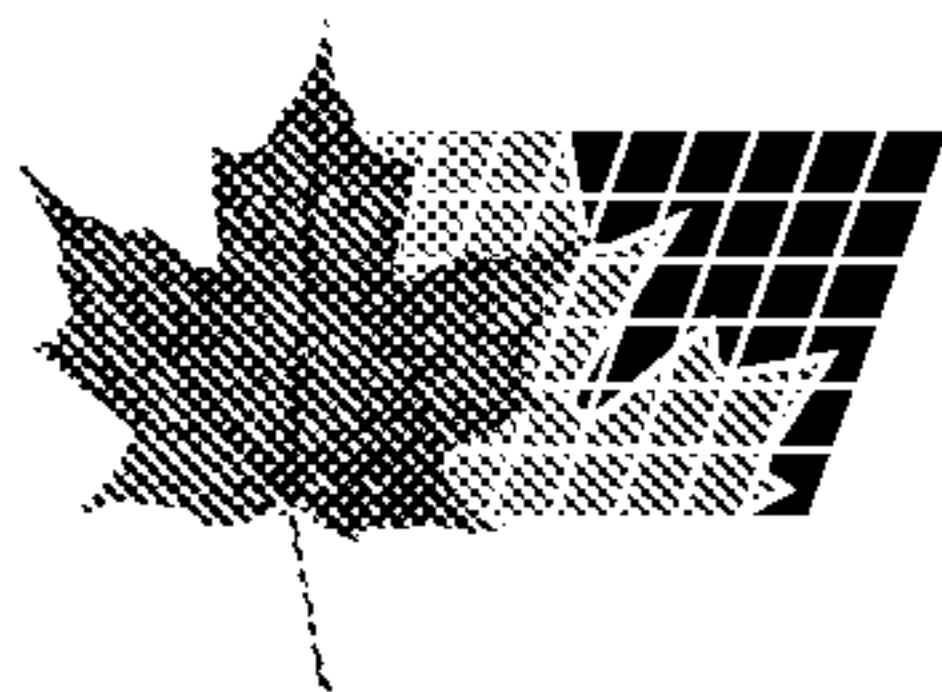




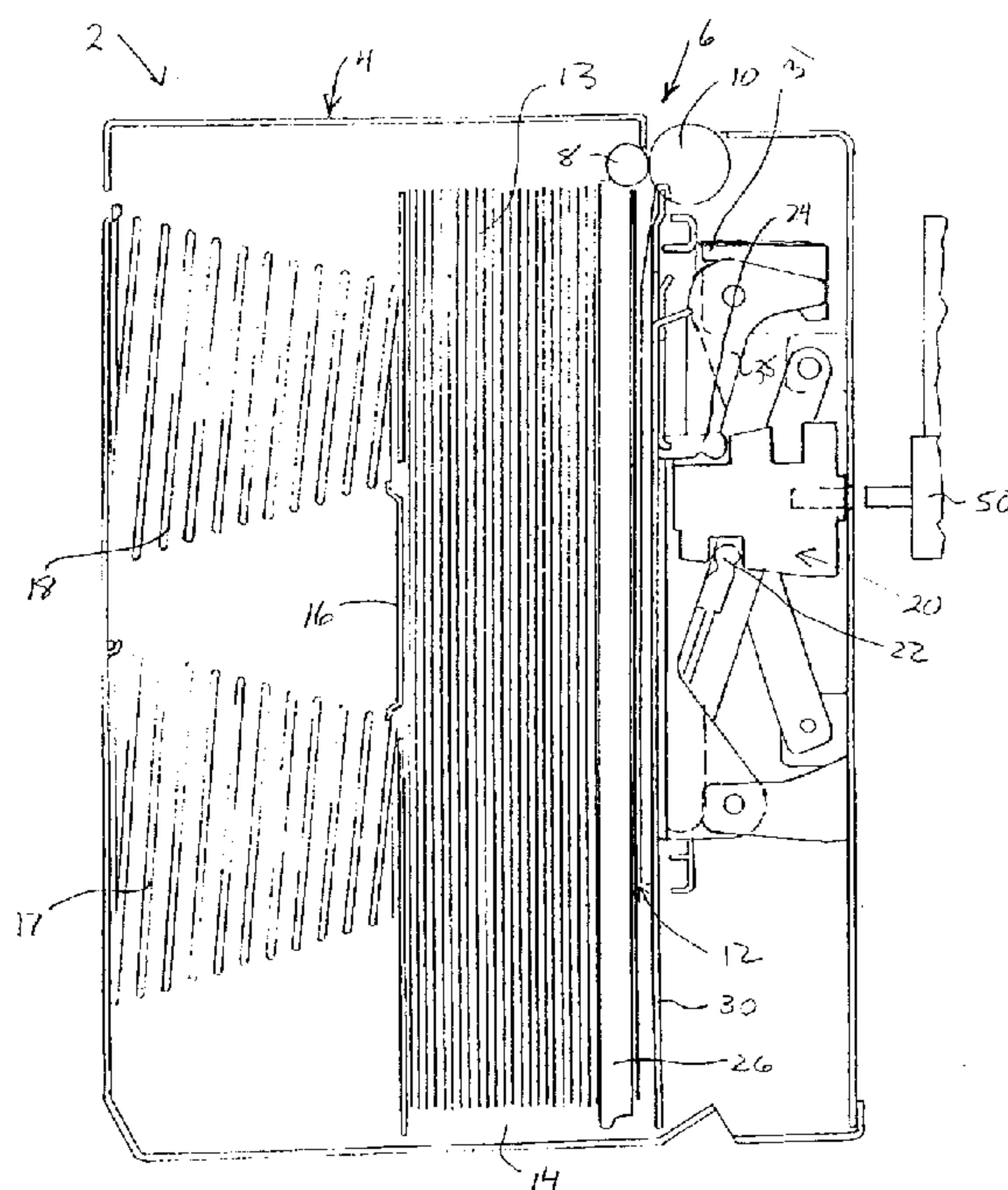
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(51) Int.Cl.⁶ B65H 29/46

(54) **CASSETTE DE RANGEMENT DE BILLETS DE BANQUE**

(54) **CASSETTE FOR STACKING BANKNOTE**



(57) A cassette for receiving and storing banknotes advantageously uses a movable guide in combination with a movable actuator which each move toward the other for stripping of a banknote received in the guide and adding the stripped banknote to a stack of banknotes.

ABSTRACT OF THE DISCLOSURE

A cassette for receiving and storing banknotes advantageously uses a movable guide in combination with a movable actuator which each move toward the other for stripping of a banknote received in the guide and adding the stripped banknote to a stack of banknotes.

TITLE: CASSETTE FOR STACKING BANKNOTEFIELD OF THE INVENTION

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BACKGROUND OF THE INVENTION

The present invention relates to cassettes for receiving and stacking of banknotes. In particular, the invention relates to cassettes with improved stacking capability.

Existing cassettes for banknote accepting devices such as currency validators or vending devices, include a mechanism for initially receiving a banknote in a guide with a movable actuator positioned between the guides for displacing the banknote laterally to add it to a stack of banknotes adjacent one side of the guides. Typically, this actuator moves the stack of banknotes a sufficient distance for the best banknote to clear the guides. The guides are stationary and aligned with a receiving slot of the cassette. A helical spring bias the banknote in one direction and the movement of the actuator also causes a compression of the spring.

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Cassettes of this type require considerable interior space for accommodating movement of the actuator through the stationary guides for stripping of the last received banknote. Furthermore, the actuator must have sufficient power for displacing the stack of banknotes and the spring when a banknote is added to the stack. In many cases, the maximum capacity of the cassette determines the frequency that the cassettes have to be removed and large capacity cassettes are normally desired. On the other hand, space is often at a premium and there is a trade-off between the size of the cassette and the space that is available. Larger capacity cassettes have also required

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higher power for the actuator as the size of the stack of banknotes which is displaced is also larger.

The present invention provides a structure which more efficiently makes use of the interior volume of the cassette.

SUMMARY OF THE INVENTION

10 A cassette for receiving banknotes according to the present invention comprises a housing having a slot for longitudinally receiving banknotes between two opposed guides, such that the guides engage opposite sides of a received banknote. A storage arrangement is located to one
15 side of the guides and an actuator is located at the opposite side of the guides. The actuator cooperates with the guides for engaging a banknote received in the guides and moves the received banknote into the storage arrangement. A drive arrangement is connected to the
20 actuator and the guides for causing the guides and the actuator to move a banknote into the storage arrangement by moving the actuator through the guides in one direction as the guides are moved in the opposite direction past the actuator.

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According a preferred embodiment of the invention, the drive arrangement includes a rotary cam which controls movement of both the guides and the actuator.

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According to yet a further aspect of the invention, the actuator is a platform member which in a banknote receipt position closes one side of the guides and acts as a flat support for a received banknote.

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According to yet a further aspect of the invention, the drive arrangement moves the guides in a direction away from the storage arrangement while moving the actuator towards the storage arrangement.

According to yet a further aspect of the invention, the storage arrangement includes a spring unit for providing a spring force urging receiving banknotes
5 maintained in a stack against the stop and allowing movement of such stack of received banknotes to accommodate a new banknote to said stack once the actuator moves through such guides.

10 According to yet a further aspect of the invention, the stop for the banknote is defined by the guides and is movable with the guides.

The banknote cassette, according to the present
15 invention, comprises a housing defining an enclosure having a slot opening wall thereof through which a banknote can be longitudinally inserted into the cassette. A banknote receiving arrangement is associated with the slot opening and comprises opposed guides in an initial position for
20 engaging the sides of received banknote and a support member in an initial position located between and to one side of said guides. A banknote storage arrangement is located to the side of the guides opposite the initial position of the support member and receives banknotes
25 removed from the guides. A drive arrangement is provided for moving the guides towards the initial position of the support member and for moving of the support member towards the initial position of said guides to remove a received
30 banknote from said guides and to locate the received banknote in the storage area and thereafter return the guides and the support member back to the initial positions.

According to yet a further aspect of the invention,
35 the cassette includes a rotating cam member which controls movement of both the support member and the guides during movement from and return to the initial position.

According to yet a further aspect of the invention, the guides members and the support member each have their own linkage with a cam follow arrangement attached to said cam member with said linkages maintaining said guides and
5 said support arrangement in a generally parallel relationship during movement of the support member through the guides.

10 BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are shown in the drawings, wherein:

Figure 1 is a sectional view through the cassette;
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Figure 2 is a simplified view showing the guides and the support arrangement in an initial position for receipt of a banknote;

20 Figure 3 shows initial movement of the support arrangement through the guides to start to remove a banknote from the guides;

Figure 4 shows the relative movement of the support
25 arrangement and the guides freeing the edges of a banknote from the guides;

Figure 5 shows the guides returning to the initial
30 position;

Figure 6 shows movement of the support arrangement to the initial position such that the support arrangement and the guides are now positioned for receipt of a
35 banknote;

Figure 7 is a side view showing a cam actuator cooperating with a scissor linkage used to control the guides;

Figure 8 is a view of the cam drive arrangement as cooperation with a linkage is used to control the support arrangement;

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Figure 9 is a view similar to Figure 8 with the support arrangement moved to an end position adding the banknote to a stack of banknotes; and

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Figure 10 is a simplified perspective view.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

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The cassette 2 shown in Figure 1 has a housing 4 with a slot opening 6 for allowing banknotes to enter the cassette. Associated with this slot opening 6 is an idler wheel 8 and a drive wheel 10 which cooperate to engage a banknote and drive it into a banknote slot 12 defined between opposed "U-shaped" guides 26 and 27. Drive wheel 10 and idler wheel 8 are located at the slot opening 6 and drive a received banknote into the guides 26 and 27 without belts.

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The cassette to one side of the guides 26 and 27 has a banknote storage area 14 with a stack of banknotes generally shown as 13. A plate 16 is attached to the springs 17 and 18 and generally bias the stack of banknotes 13 against one side of the guide members 26 and 27. A moveable support 30 is located between the opposed guides 26 and 27, and cooperates with the guides to strip a received banknote from the guide members and add it to the stack 13 banknotes.

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Movement of the guides 26 and 27 and the support arrangement 30 to cause a banknote to be stripped from the guides is controlled by the rotary cam 20. The rotary cam 20 is secured in the cassette and the cam has two tracks,

one for engaging cam follower 22 for causing movement of the guides and the second track for cam follower 24 attached to the support 30. This cam allows opposite relative movement of the guides and the support for a
5 superior stripping action.

The Figure 2, 3, 4, 5 and 6, show the movement imparted to the guides in the support arrangement for stripping of the banknote. In Figure 2, the guides 26 and
10 27 are aligned with the opening slot and have received the banknote 40. The guides 26 and 27 are oversized for receiving banknotes of differing widths. In this case, the depth of the "U-shaped" guides is sufficient for receiving the largest banknote centered in the slot as well as the
15 smallest width banknote centered in the slot. The movable support 30 in Figure 2 is located to one side of the banknote slot 12 and is positioned intermediary the guides 26 and 27. The guides are in contact with the movable stop 31 controlled by link arm 35. The stop 31 moves to a clear
20 position when link arm 35 pivots, allowing the guides to move past the stop 31.

In Figure 3, the rotary cam has now caused the support arrangement 30 to move towards the stack of
25 banknotes 13. In this position, the support now forms a stop for the stack of banknotes and the received banknotes are now in contact with the stack.

Figure 4 shows how the guides 26 and 27 are moved
30 by the cam 20 in a direction away from the stack of banknotes 13 and the received banknote is stripped from the guides. In this way, both the support 30 and the guides 26 and 27 move relative to one another and reduce the amount of space required to strip a banknote 40 from the guides 26
35 and 27. Furthermore, there is very little displacement of the stack of banknotes to add a banknote to the stack, such that the energy requirements for the stacking operation is

reduced and essentially constant, regardless of the size of the stack of banknotes.

5 The movement of guides 26 and 27 and the support 30 are controlled by the cam. In the embodiment shown, support 30 moves first and guides 26 and 27 move thereafter. Other arrangements are possible to achieve the relative movement therebetween.

10 Figure 5 shows how the guides have now been brought back to an initial position and the "U-shaped" stops 37 engage the banknote which has now been stripped from the guides.

15 Figure 6 shows how the support member 30 is now moved back to the opposite side of the guides in preparation for receiving of a banknote. The banknote slot 12 is now aligned with the slot 6 in the housing and is in a position for receiving a further banknote.

20 With the arrangement as described in Figures 2 through 6, improved space efficiency is accomplished as the guides move into the space formally occupied essentially by the support 30 and the support 30 moves through the guides to strip a banknote from the guides. The space generally shown as A in Figure 4, is the maximum amount of space required in the cassette for the relative movements of the guides and support member. This space is less than the space required if the support member was designed to only move relative to fixed guides 26 and 27 which would also require a large shift in the stack of banknotes.

35 Figure 7 shows details of the rotary cam 20. The rotary cam is engageable with a motor drive 50 shown in Figure 1 and causes the cam followers 22 and 24 to impart the desired action to the guides 26 and 27 and the support 30. The motor 50 is part of the device which receives a banknote cassette. Figure 7 shows the scissor-type

arrangement used to move the guides 26 and 27 in the manner described in Figures 2 through 6. The cam follower 22 moves within the cam channel 23 and imparts the desired action to the scissor-type linkage arrangement generally shown as 25. The motor shaft 51 drives the rotary cam.

Figures 8 and 9 illustrate the movement of the support member 30 from the banknote receipt position of Figure 8 to the extended position for stripping of a banknote from the guides shown in Figure 9. The support member 30 is spring biased to provide a force maintaining the cam follower 24 in contact with the cam surface 29 at the end of cam member 20.

For a better understanding of the working of the components, the guides 26 and 27 are not shown but would be attached to plate 39. Plate 39 to the right hand side of Figure 10 has been cut away to skew the linkage 25.

The cam 20 has cam followers 22 and 24 located 180° apart relative to the cam and as such cam surface 25 and cam track 23 have a similar profile. The 180° phase difference causes the opposite desired movement. With this arrangement, the size of the cam can be kept smaller. The cam also allows considerate flexibility in importing the desired drive action for the linkages and the timing of these actions including accordation of the linkages. The single cam is driven in a single direction by motor 50 and is cost effective, as well as highly reliable.

With this arrangement, movement of the support 30 in one direction and movement of the guides 26 and 27 in the opposite direction provides more efficient use of the space within the cassette and it also serves to reduce the force necessary to effectively strip a banknote from the guide arrangement. As can be appreciated in the present structure, the guides move away from the stacked banknotes and thus, the extent that the support member has to move

and displace the stacked banknotes is reduced and the distance that the stacked banknotes moves, is reduced to approximately the thickness of a banknote. In this way, there is more room in the cassette for storing of banknotes
5 as the amount of space for moving the stack to add a banknote is almost negligible.

Figure 10 is a perspective view illustrating the action of the rotary cam controlling support 30 and the
10 guides 26 and 27. Support 30 is shown as a transparent component to illustrate the components therebelow.

Although various preferred embodiments of the present invention have been described herein in detail, it
15 will be appreciated by those skilled in the art, that variations may be made thereto without departing from the spirit of the invention or the scope of the appended claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A cassette for receiving and storing banknotes comprising a housing having a slot opening for longitudinally receiving banknotes between two opposed guides such that the guides engage opposite sides of a received banknote, a storage arrangement to one side of said guides and an actuator located to the opposite side of said guides and cooperating with said guides for engaging a banknote received in said guides and moving the received banknote into said storage arrangement, and a drive arrangement connected to said actuator and said guides for causing said guides and said actuator to move to a banknote into the storage arrangement by causing said actuator to move through said guides by moving the actuator in one direction and move said guides in an opposite direction.
2. A cassette as claimed in claim 1 wherein said drive arrangement includes a rotary cam which controls movement of both said guides and said actuator.
3. A cassette as claimed in claim 2 wherein said actuator is a platform member which in a banknote receipt position closes one side of said guides and acts as a flat support for a received banknote.
4. A cassette as claimed in claim 1 wherein said drive arrangement moves said guides in a direction away from said storage arrangement after moving the actuator toward the storage arrangement.
5. A cassette as claimed in claim 1 wherein said storage area includes a spring unit for providing a spring bias urging received banknotes, maintained in a stack, against a stop and allowing movement of said stack of

received banknotes to accommodate a new banknote to said stack when said actuator moves through said guides.

6. A cassette as claimed in claim 5 wherein said stop is defined by said guides and is movable with said guides.

7. A cassette as claimed in claim 4 wherein said guides and said actuator have a common stop arrangement aligned with said slot for defining a banknote receipt position whereby the relationship of said guides and said actuator is consistent when said guides and said actuator are in said banknote receipt position.

8. A cassette as claimed in claim 1 wherein during movement of said guides and said actuator to said banknote load position said guides move to a position of said platform for receipt of a banknote as said actuator moves to the position of said guides for receipt of a banknote.

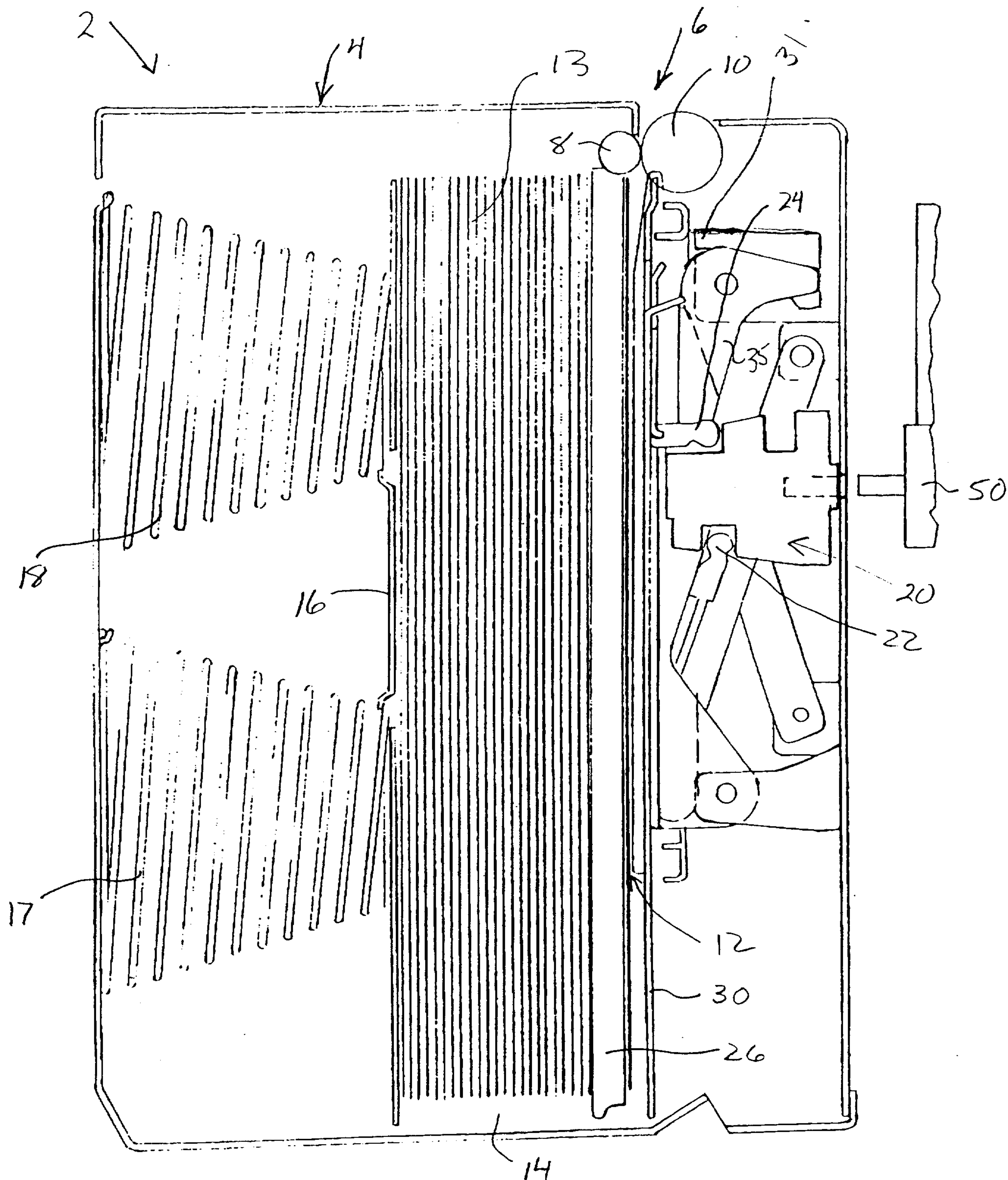
9. A cassette as claimed in claim 8 wherein each guide retaining banknotes in said banknote storage area and said stop faces move with said guides.

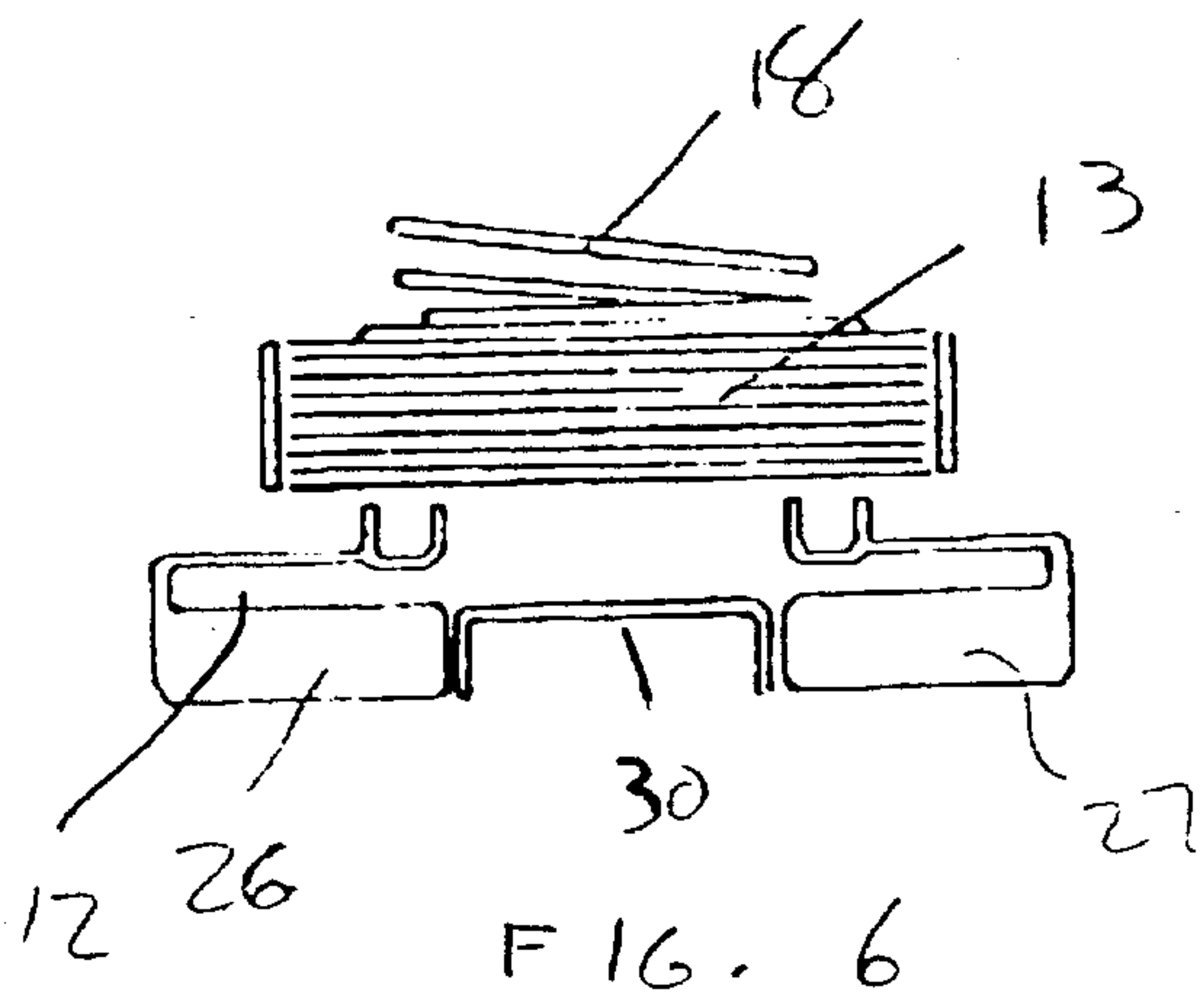
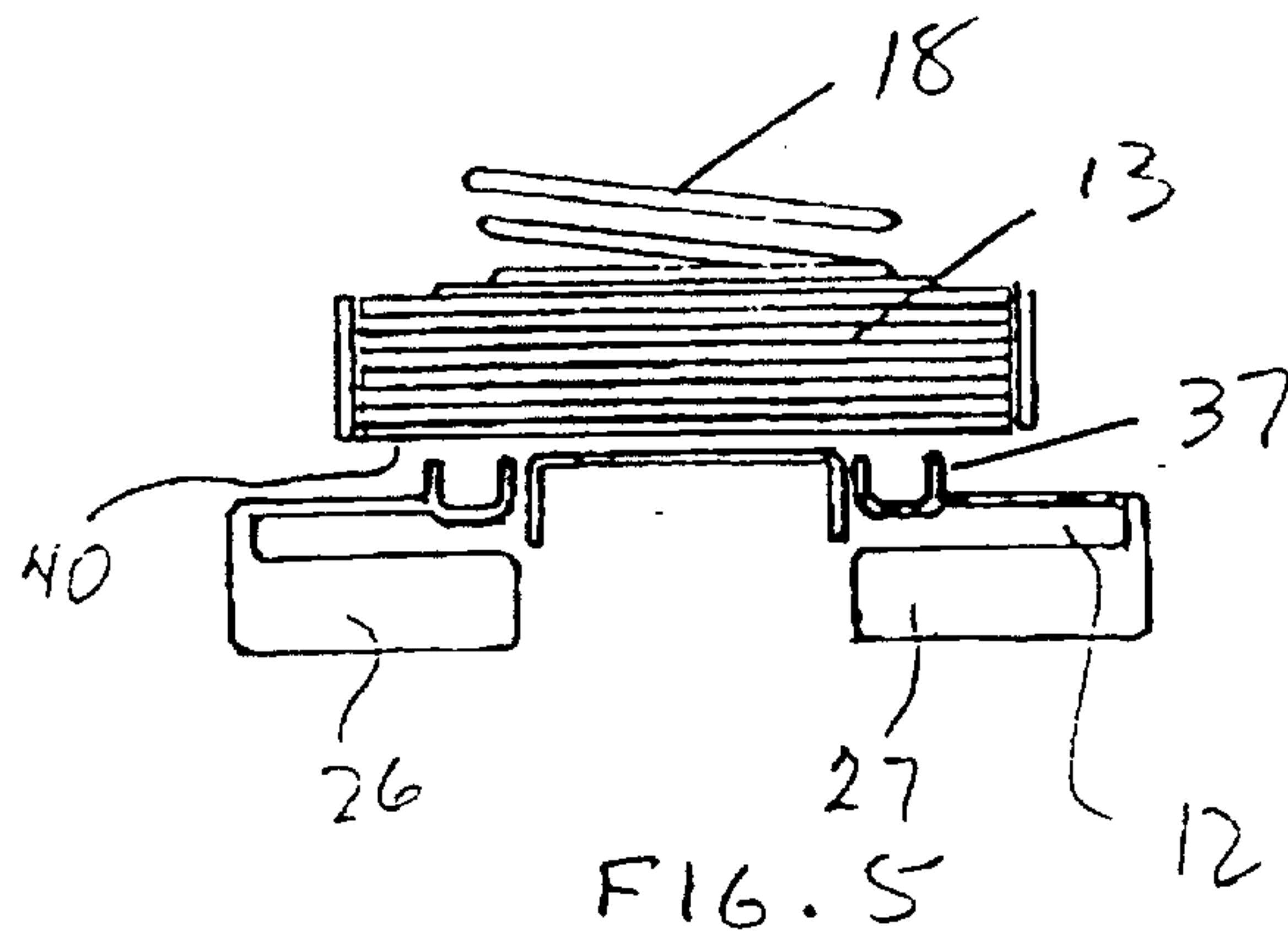
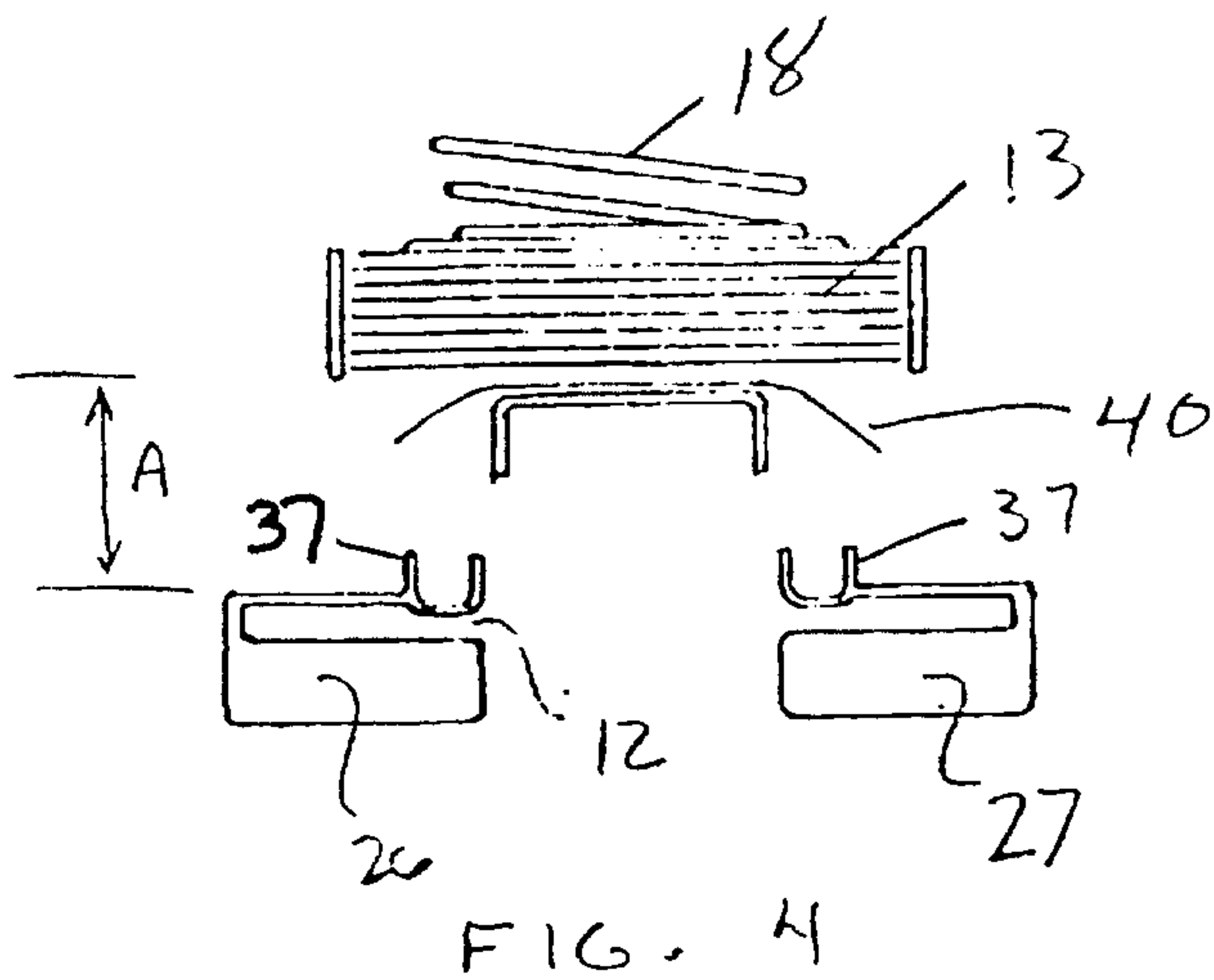
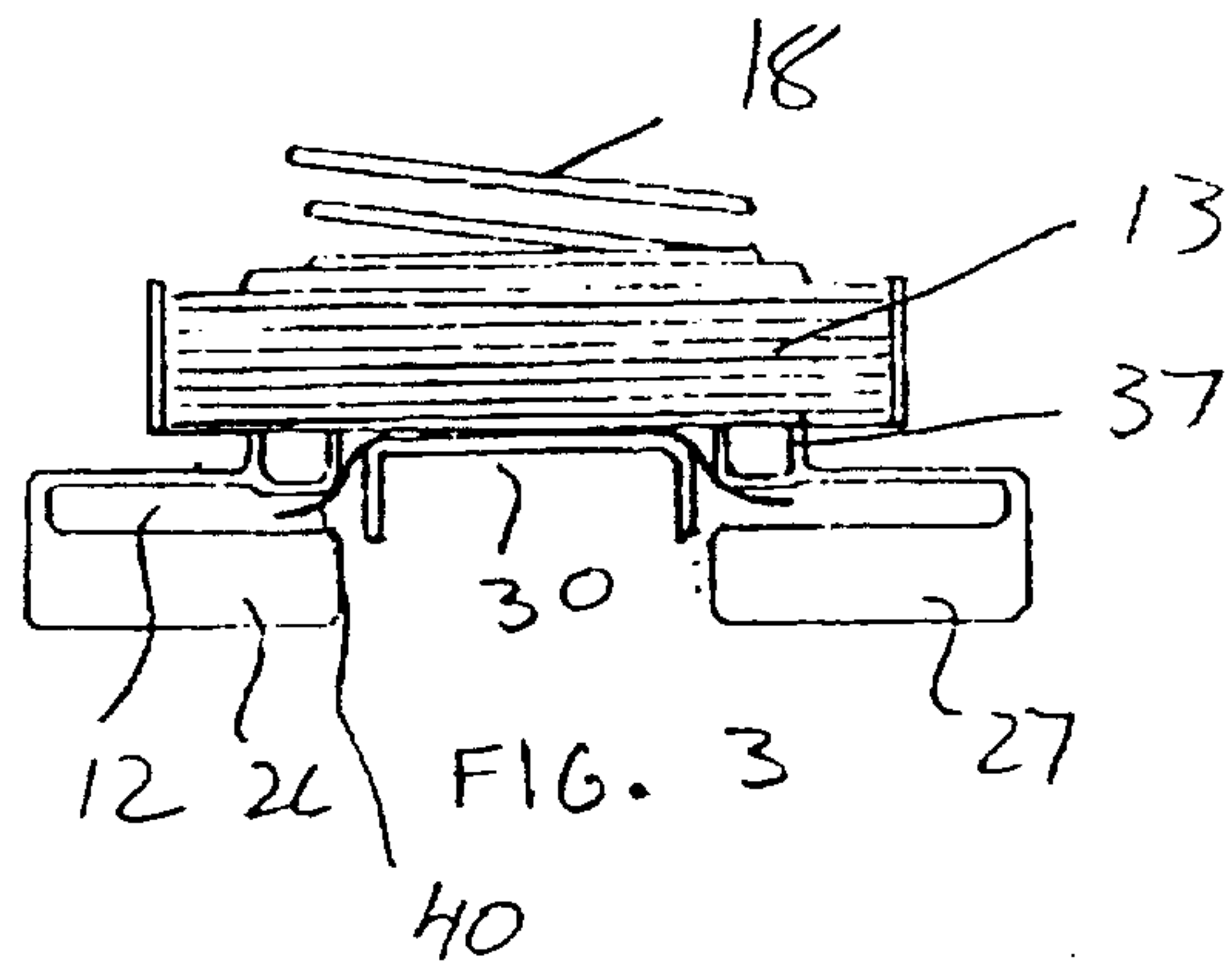
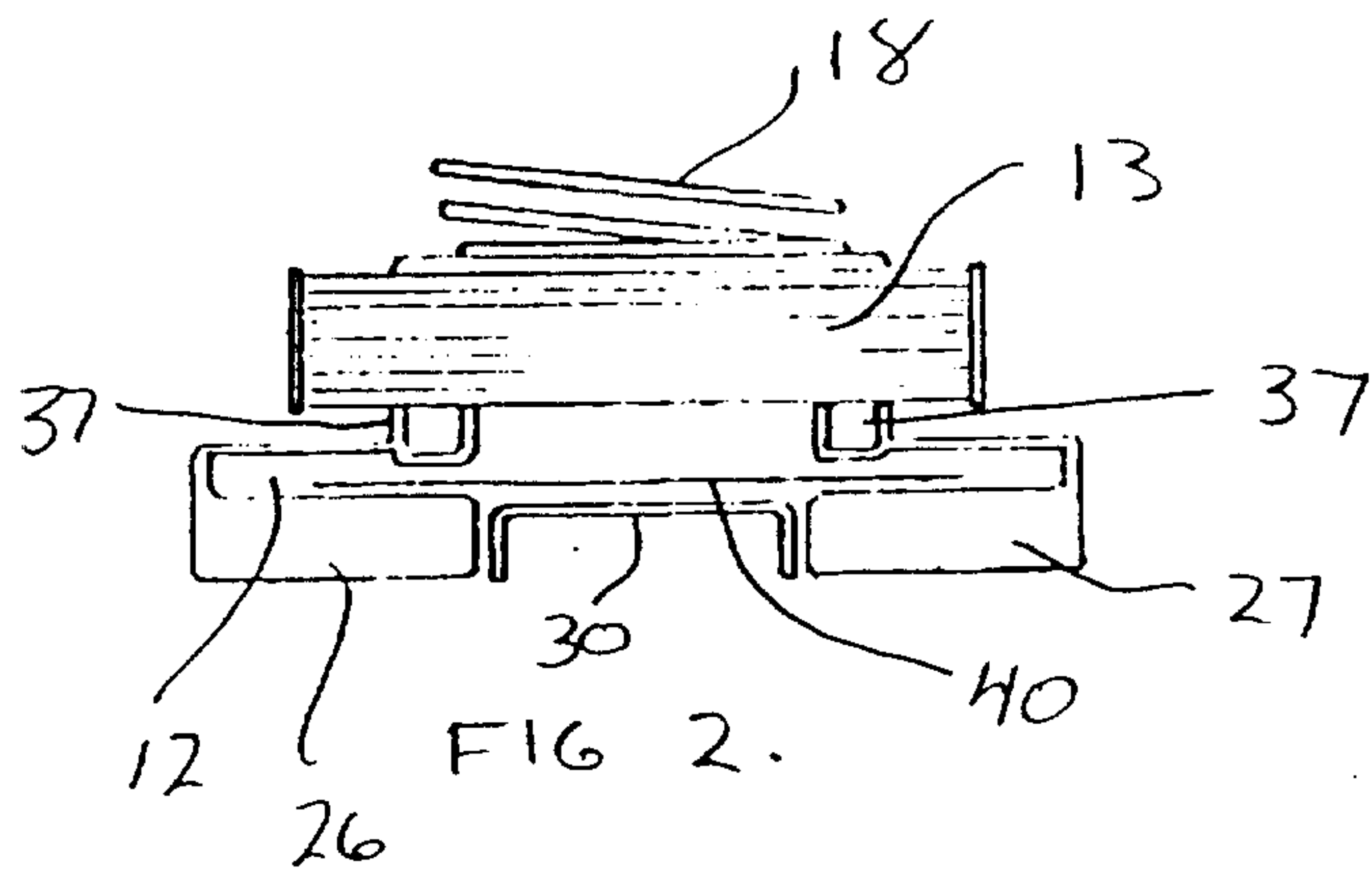
10. A banknote cassette comprising
a housing defining an enclosure having a slot opening in a wall thereof through which a banknote can be longitudinally inserted into said cassette,
a banknote receiving arrangement associated with said slot opening comprising opposed guides in an initial position for engaging the sides of a received banknote and a support member in an initial position located between and to one side of said guides,
a banknote storage arrangement located to the side of said guides opposite the initial position of said support member, said banknote storage arrangement receiving banknotes removed from said guides,

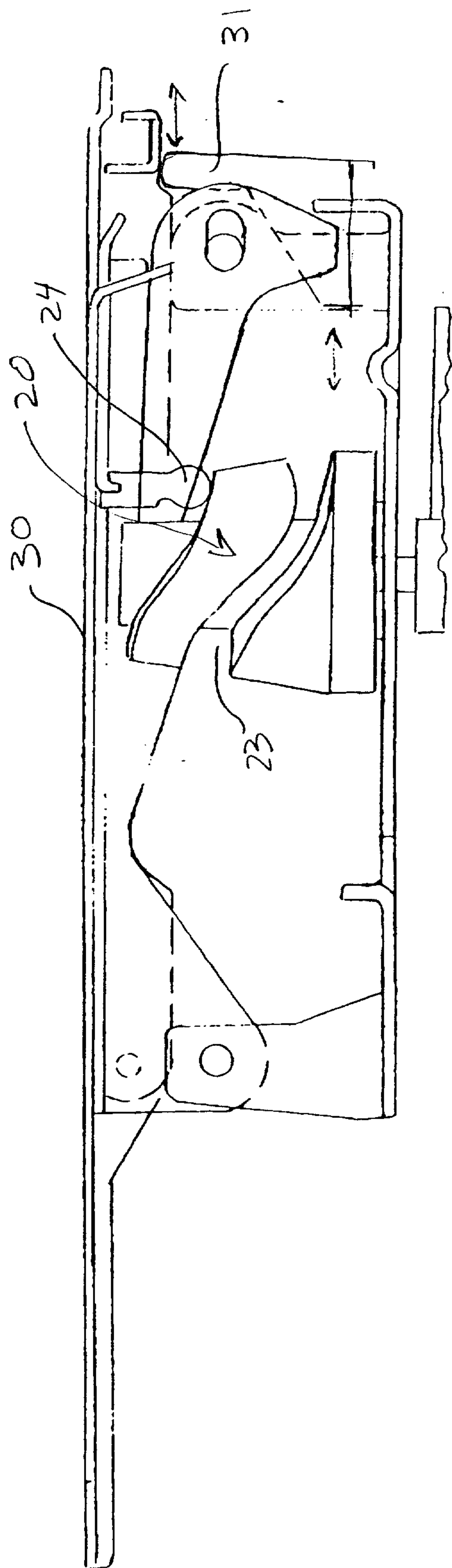
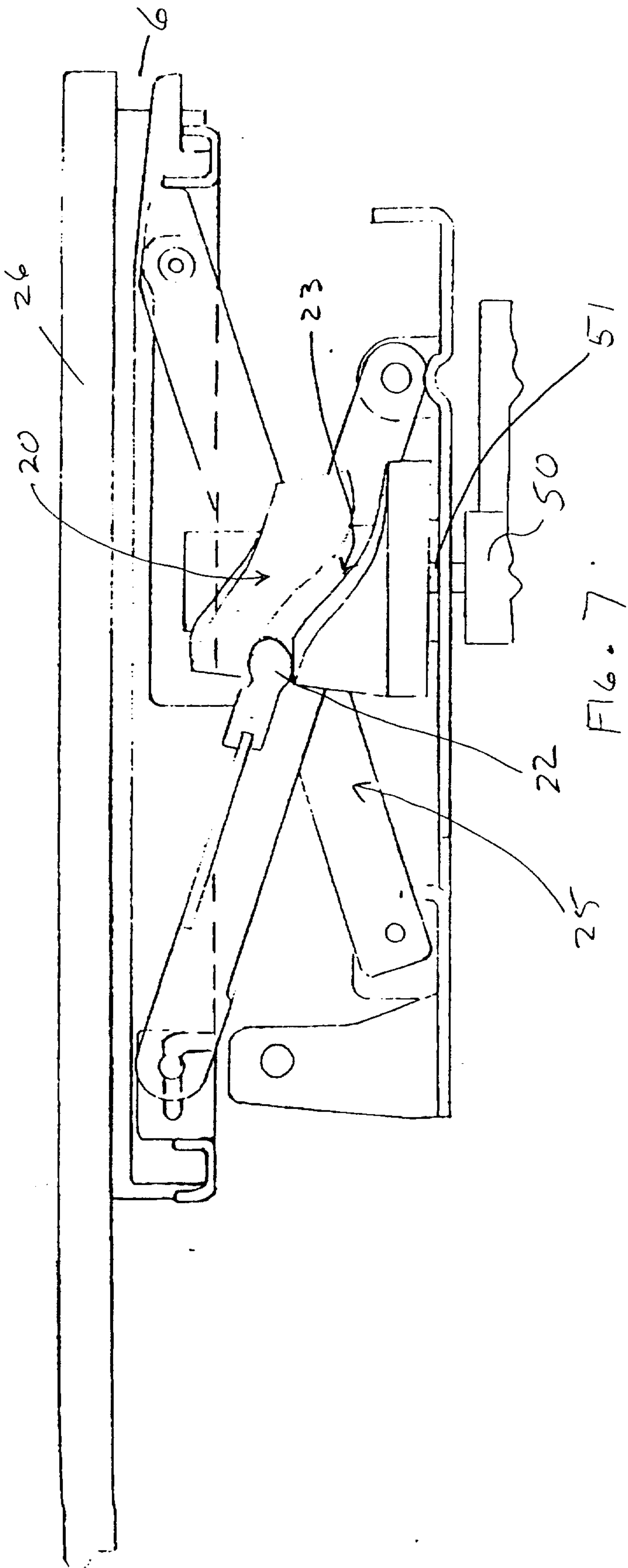
a drive arrangement for moving said guides towards said initial position of said support member and for moving said support member towards the initial position of said guides and through said guides to remove a received banknote from said guides and locate said received banknote in said storage area and thereafter return said guides and said support member back to said initial positions.

11. A cassette as claimed in claim 10 wherein said drive arrangement includes a rotating cam member which controls movement of both said support member and said guides during movement from and return to said initial positions.

FIGURE 1







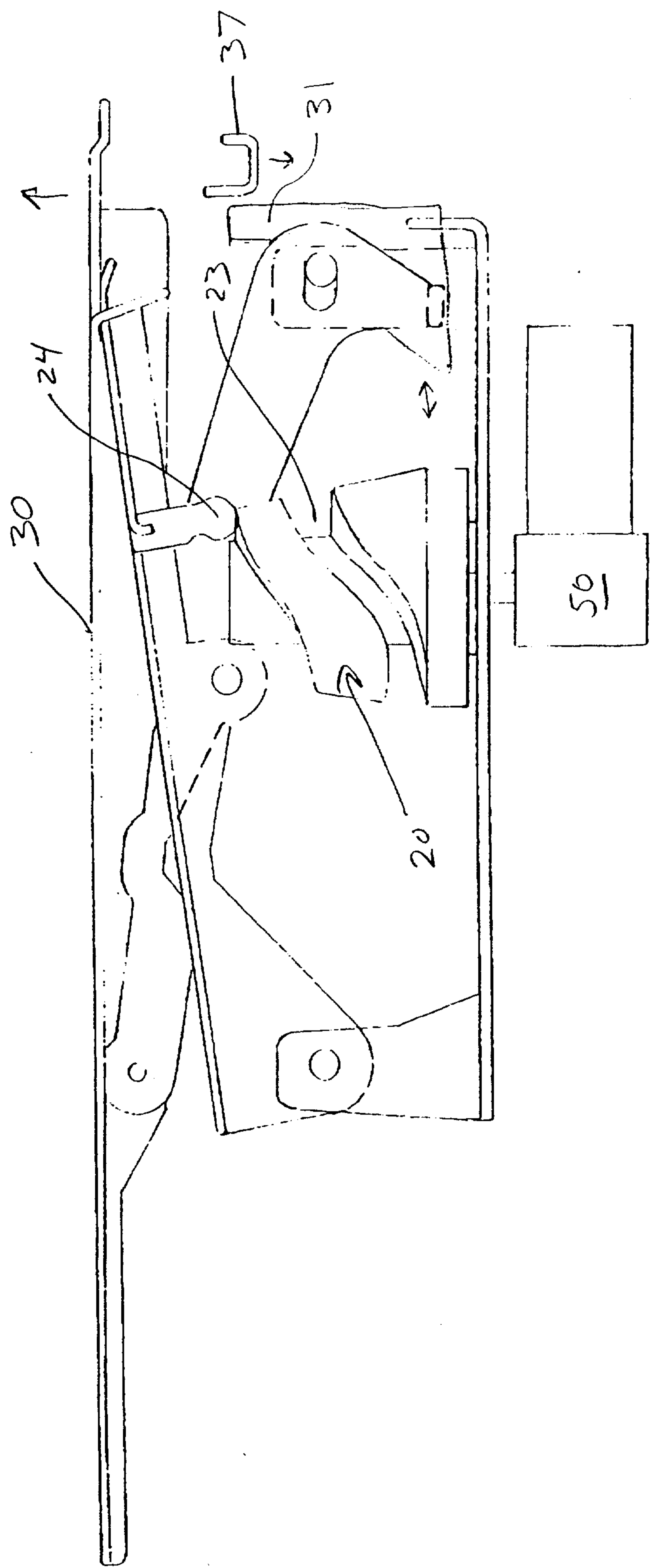


FIG. 9

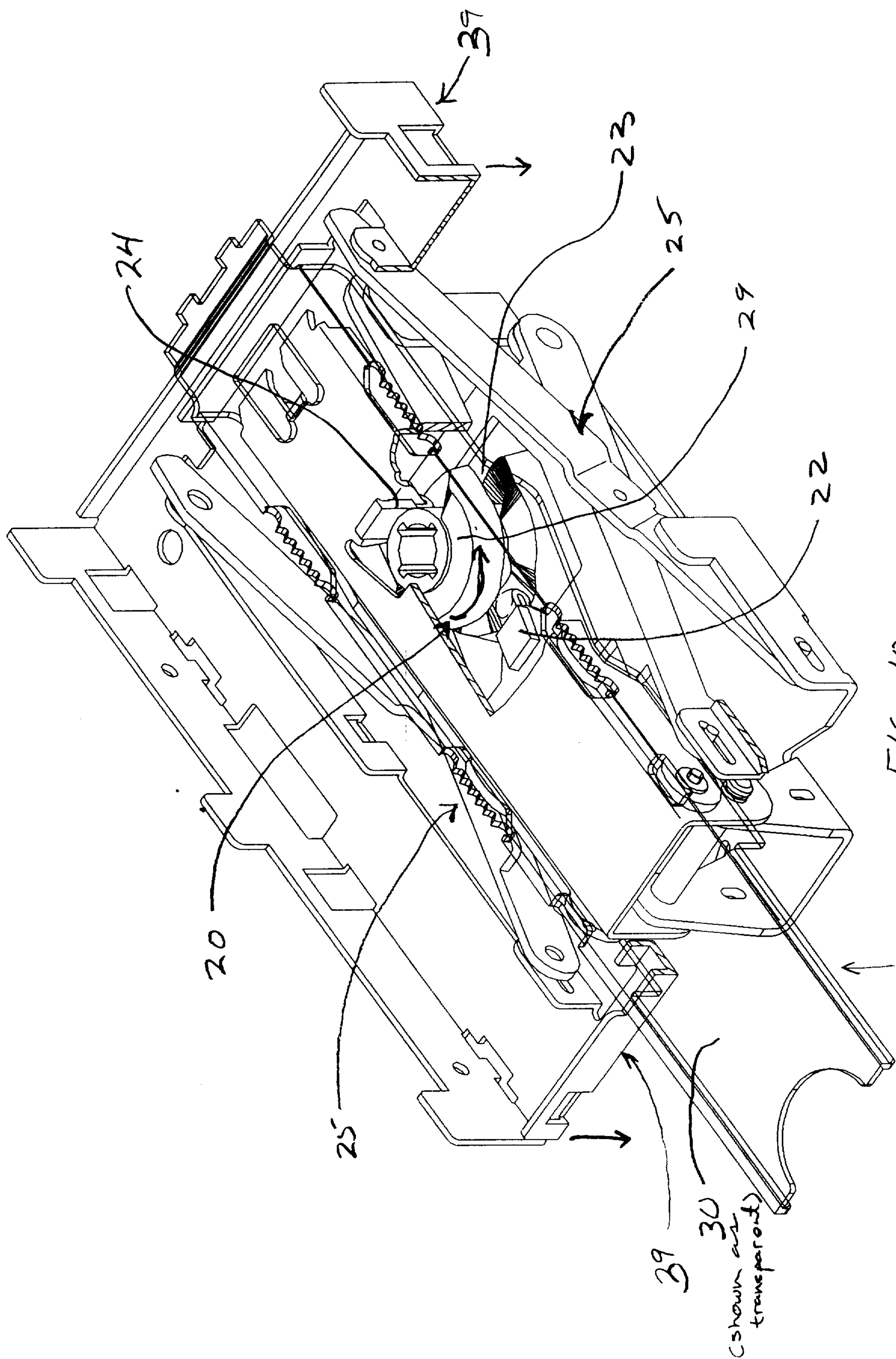


FIG. 10