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(54) **Improvements in control systems for hand propelled vehicles.**

(57) A trolley control system for use in supermarkets and the like which includes an outlet (10) having normally retracted stops (30) closable on the approach of a trolley (28), a sensor (32) to sense a trolley (28) approach to prevent passage thereof, and retractable to open the outlet (10) and allow passage of the trolley on payment of a deposit. At the other end of the system is an inlet (18) to a reception area (20) for returned trolleys having a detector which initiates a refund of a deposit.

Identification devices may be provided on the trolleys to effect validation of a trolley before a refund is made.

A card system (in place of tokens or money) may be used and the cards may be so called charge-cards by which the deposit may be charged and then credited to a customers account.

The outlet sensor may be optical so as to be responsive to a reflective device on a trolley and unresponsive to a person.

Trolleys may be counted in and out.

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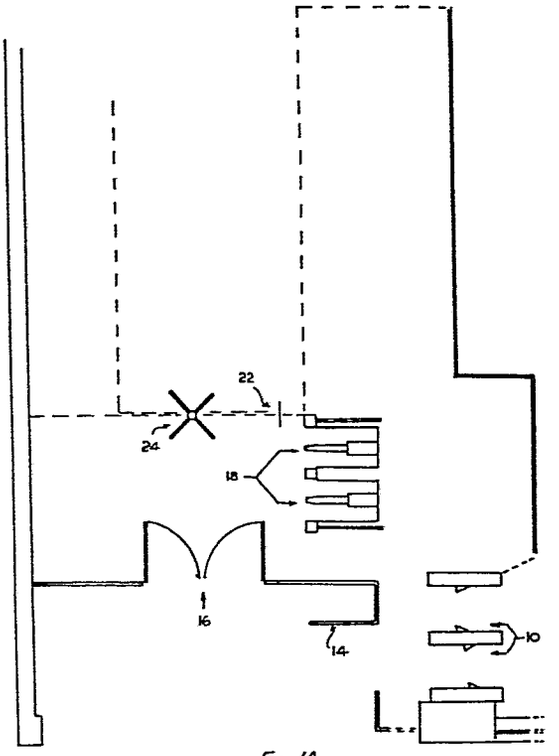

Fig. 1A

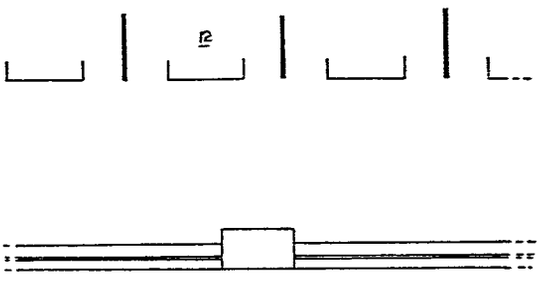

Fig. 1B

Specification

Improvements in Control Systems for Hand Propelled Vehicles

This invention relates to a control system for hand propelled vehicles, more especially but not exclusively shoppers' trolleys as used in supermarkets and the like.

It is a common practice in supermarkets to provide a trolley storage area from which a shopper can remove a trolley for use. It is not easy, however, to encourage the shopper to return the trolley to the storage area after it has been used and unloaded. Arrangements are known for paying out a coin or cash token when a trolley is returned to storage through an access gate equipped with sensors, which coin or cash token may be refund of a deposit paid when the trolley is initially taken, but such known arrangements are liable to abuse, often because the sensors at the storage access gate can readily be deceived.

It is an object of this invention to provide an improved control system for trolleys and like hand propelled vehicles, generally referred to hereinafter as trolleys.

According to the invention, there is provided a

control system for trolleys which comprises:-

a) an outlet having normally retracted stops closable when the approach of a trolley is sensed in order to prevent passage thereof and retractable to open the outlet in order to permit passage of the trolley on payment of a deposit by presentation to a sensor at said outlet of a coin, token or card; and

b) an inlet to a reception area for returned trolleys, said inlet having a trolley detector which, possibly in conjunction with re-presentation of a card, initiates refund of said deposit.

The system preferably also includes:-

c) one or more identification devices on the trolleys which, in conjunction with an identification device sensor at the inlet, effect validation of a returned trolley before the refund is initiated.

Thus, the stops at the outlet will normally be retracted and the outlet will include a sensing device which senses approach of a trolley and closes the stops to prevent passage thereof. At other times, therefore, free passage will be available through the outlet, i.e. for persons without trolleys, and the said sensing device will be designed to be responsive to approach of a trolley and not to approach of a person. Desirably, the stops will also be retracted if a trolley is initially approached to the outlet

and then withdrawn.

In addition to the advantage of encouraging return of trolleys, not only by a shopper who has used one but also possibly by any other person finding a loose trolley, the one or more identification devices on the trolleys minimise risk that a deposit will be refunded due to fraudulent activation of the trolley detector. If desired, a trolley detector, such as the previously mentioned sensing device sensing approach of a trolley, may also be provided at the outlet in order to establish trolley validation when a trolley passes therethrough.

While the following arrangement is wholly non-limitative, it is envisaged that the trolley outlet will usually be located between the checkout area and the exit doors of a supermarket or the like, and the trolley inlet will be located just inside the store entrance. In general, therefore, a trolley will be freely available from storage on entry to the store, and the deposit will be payable solely to encourage return to storage after the trolley has been used.

In a preferred system, therefore, the outlet will have retractable stops which, even when closed to prevent passage of a trolley, still leave sufficient clearance between them for a person to walk through without a trolley. If stops are provided which fully close the

outlet, safety devices must be incorporated in the mechanism to avoid risk of injury to a person passing through the outlet simultaneously with actuation.

While the use of coins and tokens exchangeable for cash will be clear without explanation, it is necessary briefly to refer to use of the system using cards. Such cards may be either one of two types. Firstly, cards may be employed which are all the same and have uniqueness only in relation to the store, e.g. as a cheque guarantee card, being cards issued to a store user on application and following a status check. These cards are fed through the system like tokens, since the user does not have to retain the same card all the time. Secondly, cards may be credit cards unique to a shopper, having an identifying number or code marked thereon. Such a card will be read by the sensor on presentation at the outlet, and make a deposit charge on the customer's account. On re-presentation at the inlet when a validated trolley is returned, the deposit charge will be cancelled. These cards of the second type, therefore, are not fed through the system.

A preferred outlet consists of spaced pillars with retractable stops on both sides at a trolley catching height. The sensing device at such outlet for sensing approach of a trolley may then be of the electric,

magnetic, electromagnetic, infra-red or optical type, the last-mentioned depending on the use of a retro-reflective mirror surface (tape) on the trolley to which the light beam is uniquely responsive, i.e. so that persons or items other than trolleys are not sensed to cause closure of the stops. The sensor which causes retraction of the stops may be any conventional type of sensor for validating coins, tokens or cards, as commonly employed in coin-freed, card-actuated mechanisms in other fields.

At the inlet, the trolley detector may be mechanical or of any of the types above referred to. Preferably a mechanical detector is employed which, when actuated, operates a limit switch which activates a sensing device, such as an optical sensor, responsive to an identification device, such as a selective reflector, provided on the trolley. Only after initial detection and subsequent trolley validation is the deposit refunded. If desired, two validation checks, e.g. magnetic and optical, may be carried out. The trolley may be guided into cooperation with a mechanical detector by floor tracks. The latter may be so designed as to restrict rearward or upward movement of the trolley, thereby to prevent withdrawal of a trolley after operation of the detector (possibly in an endeavour to obtain a plurality of refunds). Alternatively or additionally, the inlet may be equipped with non-

return flaps.

If desired, the sensors at trolley outlet and inlet may feed counters for checking the number of returned trolleys against those passing through the exit.

A practical arrangement of trolley control system in accordance with the invention will now be described by way of example with reference to the accompanying drawings, in which:-

Figure 1 is a plan of a shop floor utilising the system of the invention;

Figure 2 is a plan view of a trolley exit arrangement;

Figure 3 is an end elevation of the trolley exit arrangement;

Figure 4 is a side elevation of one interior side of a trolley exit;

Figure 5 is a plan view of a trolley entrance arrangement;

Figure 6 is an end elevation of the trolley entrance arrangement; and

Figure 7 is a side elevation of one interior side of a trolley entrance.

In Figure 1, a trolley exit (or outlet) arrangement 10 is located between the checkout area 12 and the automatic exit doors 14 from the store. The latter are adjacent the automatic entrance doors 16, which lead to

a trolley entrance (or inlet) arrangement 18 from which trolleys can be entered into a trolley storage area 20. Adjacent is a non-return, bypass gate 22 for trolley entrance, and a turnstile 24 for use by shoppers entering the store. A shopper can freely take a trolley from the storage area 20 after passing through the turnstile 24.

The object of the system is that a shopper can only exit from the store with a trolley after paying a deposit at a trolley outlet 10. Having unloaded the trolley, the shopper must return the trolley to the storage area by pushing it through a trolley inlet 18 in order to gain refund of the deposit. Gate 22 enables trolleys to be returned without refund.

As shown in Figures 2, 3 and 4, a trolley outlet 10 comprises two spaced pillars 26 amply spaced to pass a trolley 28. However, at a trolley catching height, said pillars are provided on their interior facing walls with retractable stops 30. When these are closed together, the remaining passageway is insufficient to pass the trolley 28, although it is still wide enough for passage of a person. The stops 30 are normally retracted. Sensing devices 32 (see Figure 4) sense the approach of a trolley, but not persons or other items, and initiate closure of the stops 30 to prevent passage of the trolley 28. It is then necessary to insert a coin or token into

a coin operated mechanism entrance 34, behind which is located a coin sensor, in order to initiate retraction of the stops 30 to open the outlet and permit passage of the trolley 28.

At a trolley inlet 18, shown in Figures 5 to 7, a railed passageway has a floor track 36 which includes a locking plate 38 provided with a non-return trolley lock 40 and a mechanical trolley detector 42. The last-mentioned is conveniently a pivoted arm which is deflected by a trolley passing over it. This pivoted arm operates a limit switch which activates a sensing device (not shown) which identifies the presence of a trolley and causes a coin to be fed into a cup 44 (Figure 6) as refund of the previously paid deposit. The trolley lock effectively prevents withdrawal of a trolley after the detector 42 has been activated; additionally, however, non-return flaps 46 may also be provided at the trolley inlet, which leads directly into the trolley storage area.

The sensing devices described may feed counters for checking the passages of trolleys at the outlets and inlets.

In accordance with a further aspect of the invention, identification devices, such as elements of retro-reflective tape, are applied to the trolleys. Thus, at the inlet 18 especially, where deposit refund takes place,

the not shown sensing device may be an optical sensing device selectively responsive to the identification devices, thereby to ensure that a refund is only obtainable for a valid trolley, i.e. not only any trolley but a trolley of that store bearing the correct identification. The trolley approach sensing devices 32 at the trolley outlet may be selectively responsive in similar manner, thereby also to provide trolley validation at said outlet.

In Figure 6, the reference 48 denotes access doors enabling servicing and repair of the deposit refund mechanism.

Clearly, other forms of identification device and alternative sensing devices operating on electric, magnetic, electromagnetic or infra-red principles may be employed to provide both trolley sensing and trolley validation simultaneously, and such a sensing device employed at the trolley inlet may render the mechanical detector unnecessary.

It is also possible within the scope of the invention to operate the trolley control system with cards, as previously explained. This may require the addition of a card sensor at the trolley inlet if the card has to be re-presented in order to obtain deposit refund.

In an alternative arrangement the trolley stops may be left in the trolley arresting position at all times with the insertion of a coin or token.

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Patent Claims

1. A control system for trolleys which comprises:-

a) an outlet having normally retracted stops closable when the approach of a trolley is sensed in order to prevent passage thereof and retractable to open the outlet in order to permit passage of the trolley on payment of a deposit by presentation to a sensor at said outlet of a coin, token or card; and

b) an inlet to a reception area for returned trolleys, said inlet having a trolley detector which initiates refund of said deposit.

2. A control system as claimed in claim 1 which further includes one or more identification devices on the trolleys which, in conjunction with an identification device sensor at the inlet, effect validation of a returned trolley before the refund is initiated.

3. A control system as claimed in claim 1 wherein the stops are retracted upon the withdrawal of a trolley from the outlet.

4. A control system as claimed in claim 2 in which a trolley detector or sensing device is provided at the outlet in order to establish trolley validation when a trolley passes therethrough.

5. A control system as claimed in any of the preceding claims in which a gap is left between the retractable stops

in their closed position, which gap is insufficient to prevent the passage of a trolley but is sufficient to permit a person to walk through without a trolley.

6. A control system as claimed in any of the preceding claims in which the sensing device at the outlet for sensing the approach of a trolley is an optical detector using a retro-reflective mirror surface on the trolley to which a light beam is uniquely responsive so that persons or items other than trolleys are not sensed.

7. A control system as claimed in claim 6 in which two separate validation checks are carried out before payment.

8. A control system as claimed in any of the preceding claims in which means is provided to prevent withdrawal of a trolley after operation of the detector and additionally or alternatively the inlet is equipped with non-return flaps.

9. A control system as claimed in any of the preceding claims in which the sensors at the trolley outlet and the trolley inlet feed counters for checking the number of returned trolleys against those passing through the exit.

10. A control system as claimed in any of the preceding claims wherein cards are employed which are all the same and are issued to a store user and the system includes a card receptor to receive cards in place of tokens or coins (or cards are employed in the form of credit cards unique to a shopper, having an identifying number or code marked thereon and the card receptor includes a reader for reading a card on presentation at the said outlet, and means is provide to make a deposit charge on the customer's account which charge on representation of the card at the said inlet when a

validated trolley is returned, will be cancelled.

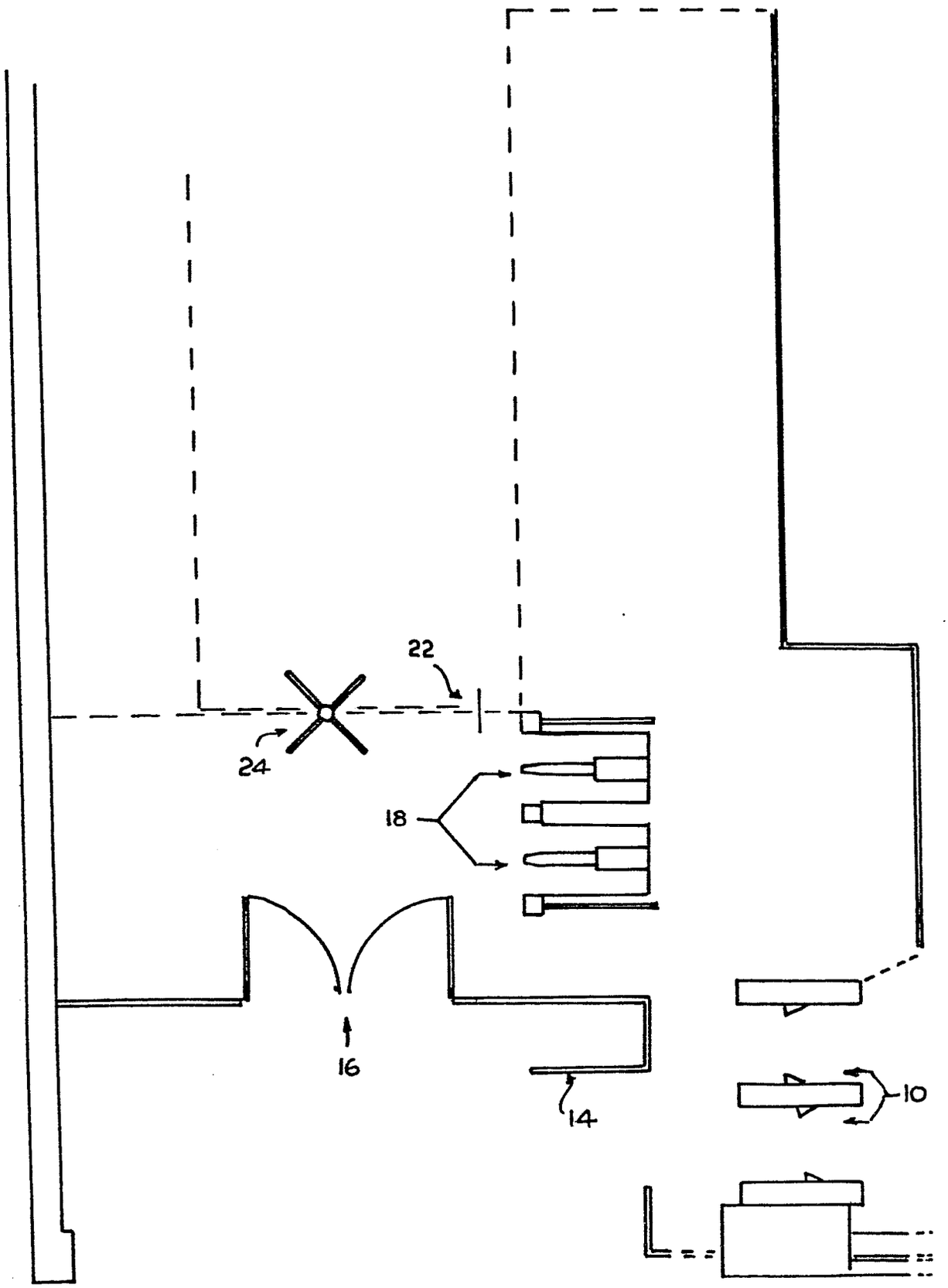

Fig. 1A

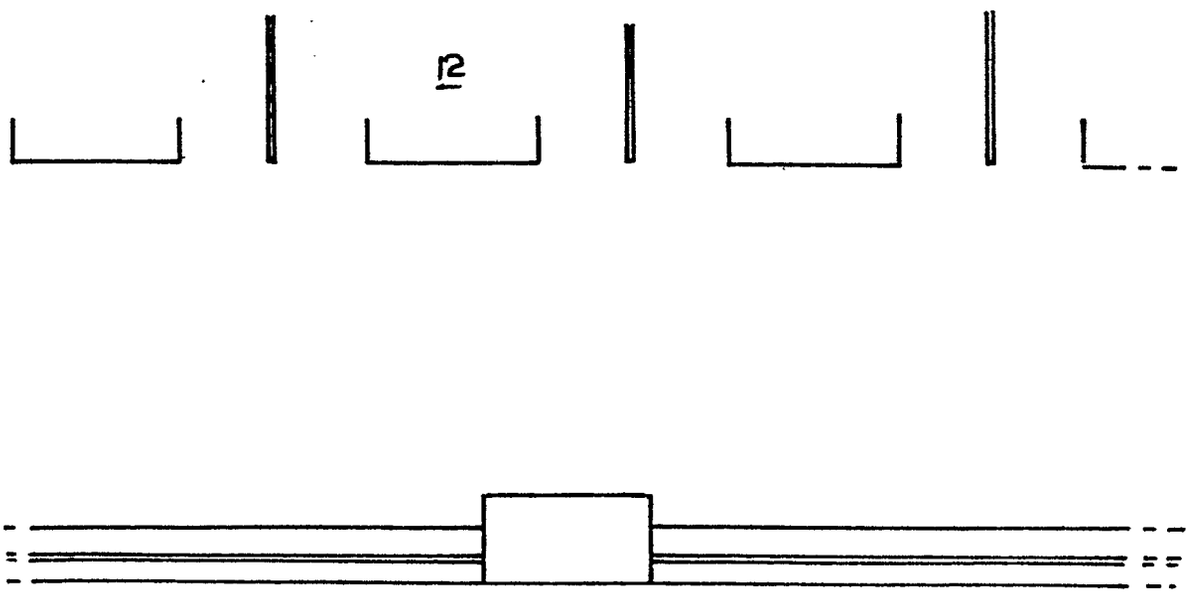

Fig. 1B

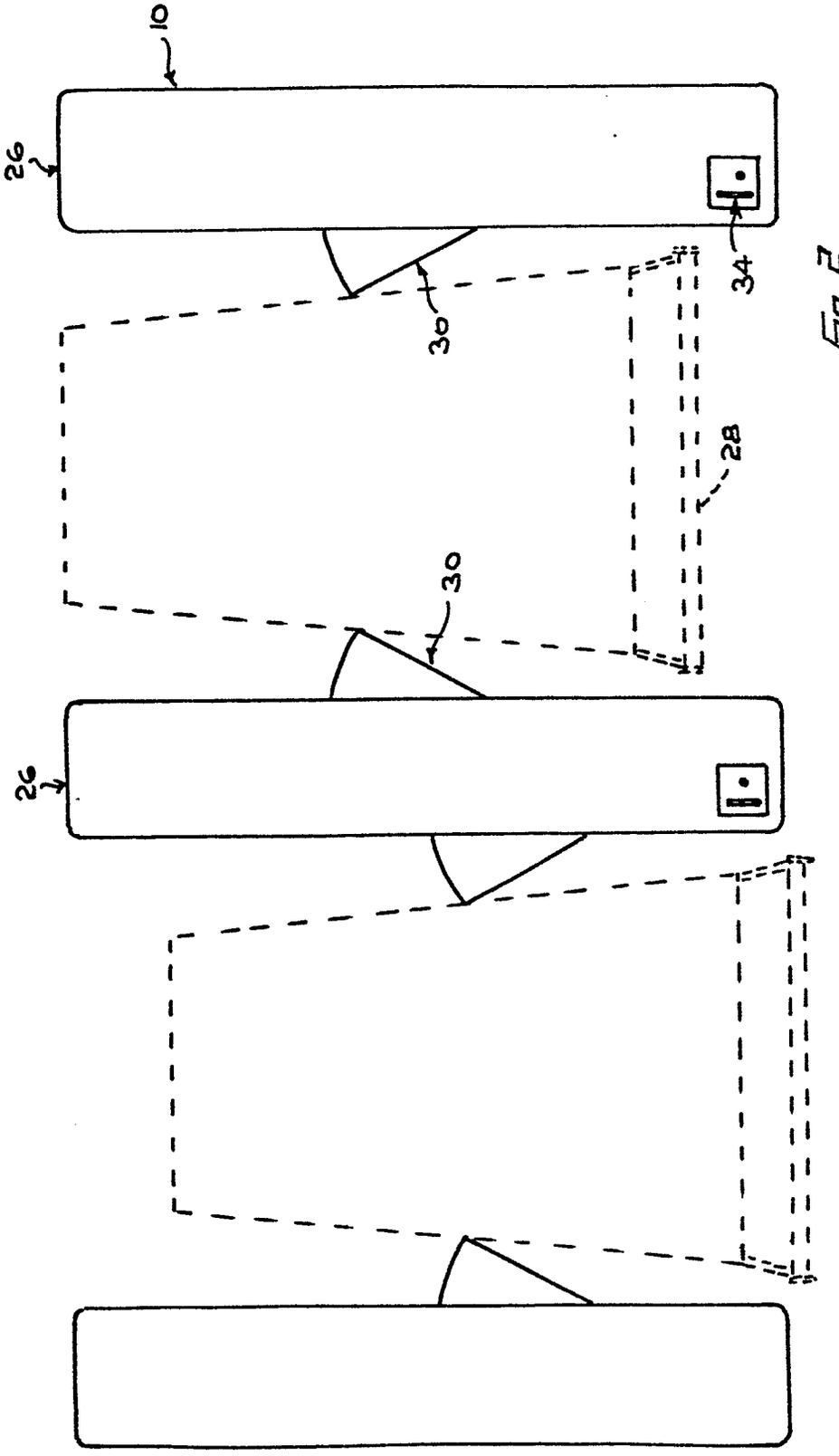

Fig. 2

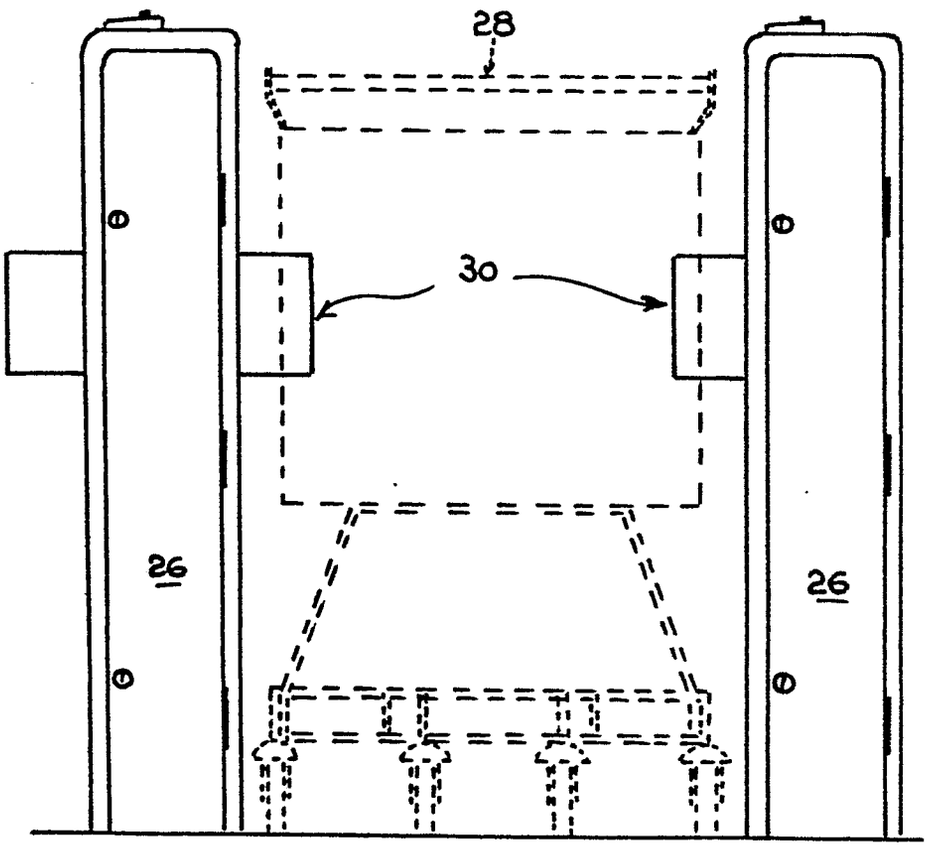

Fig. 3

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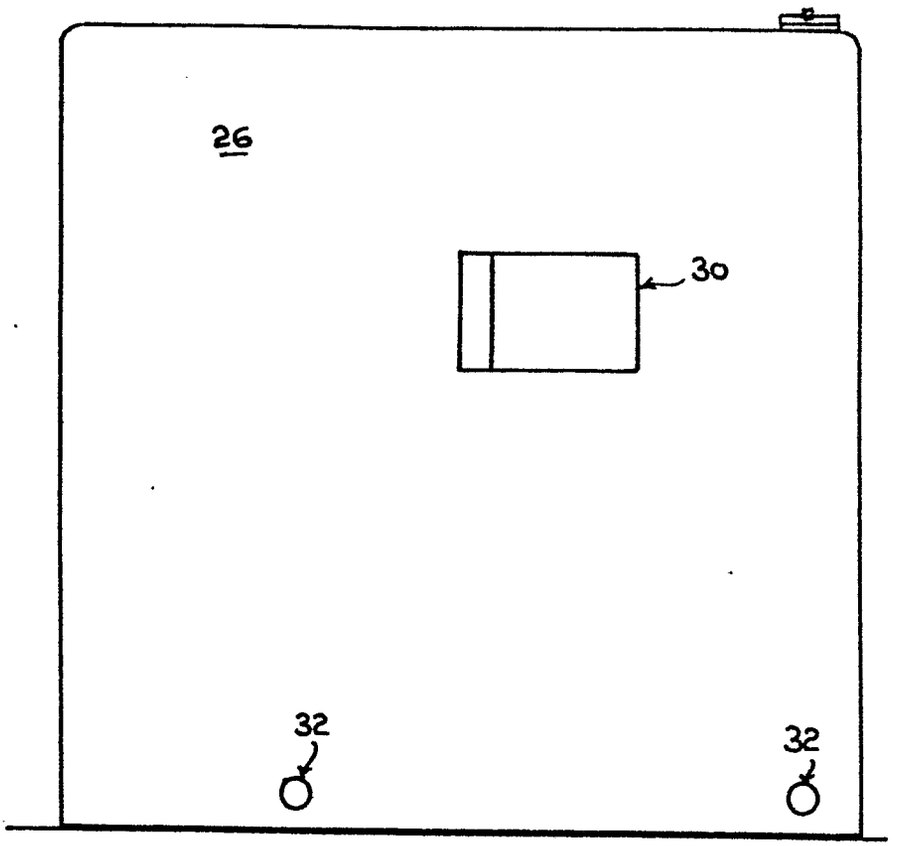

Fig. 4

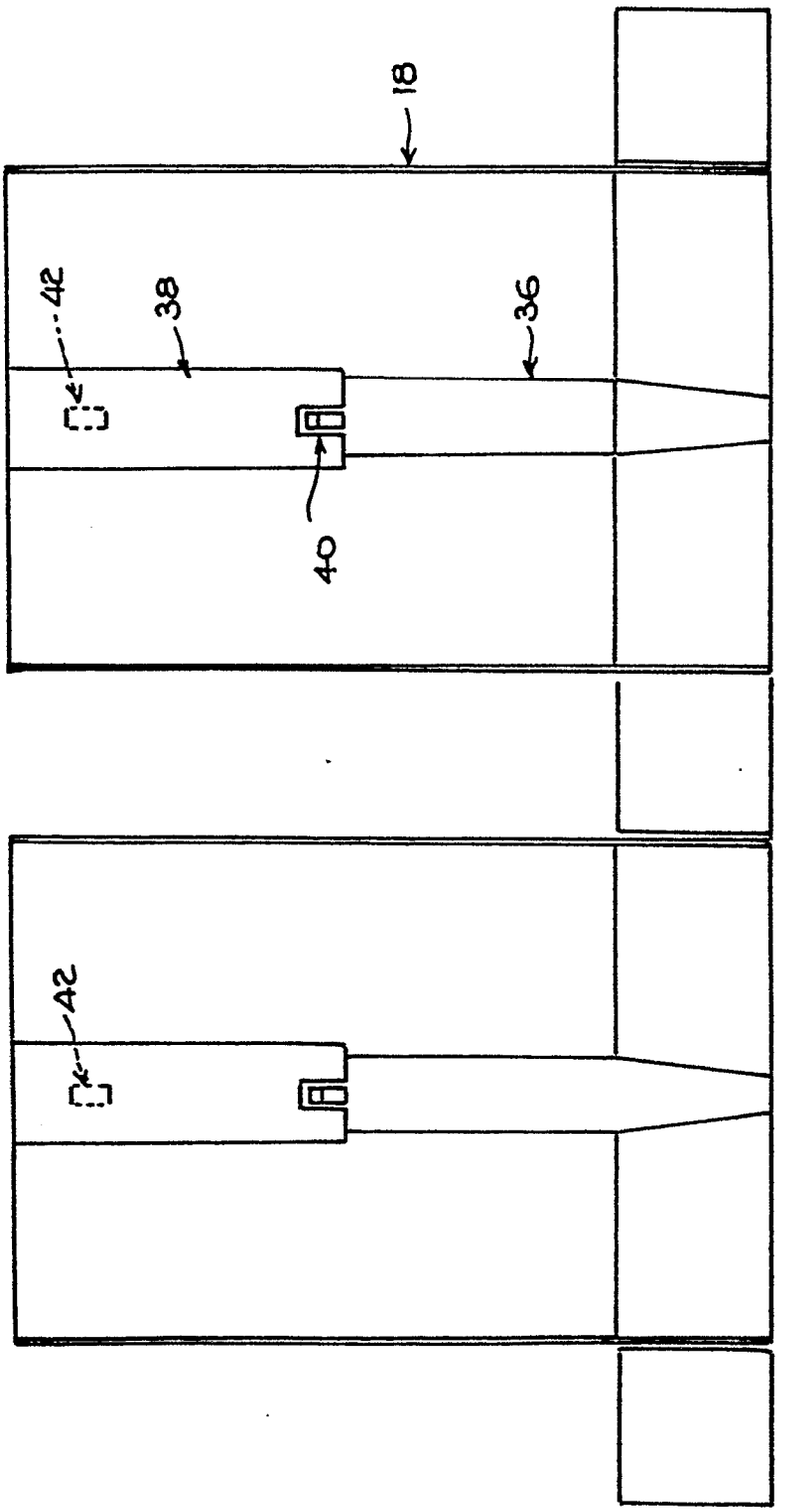

Fig. 5

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TROLLEY RETURN

DEPOSIT

REFUND

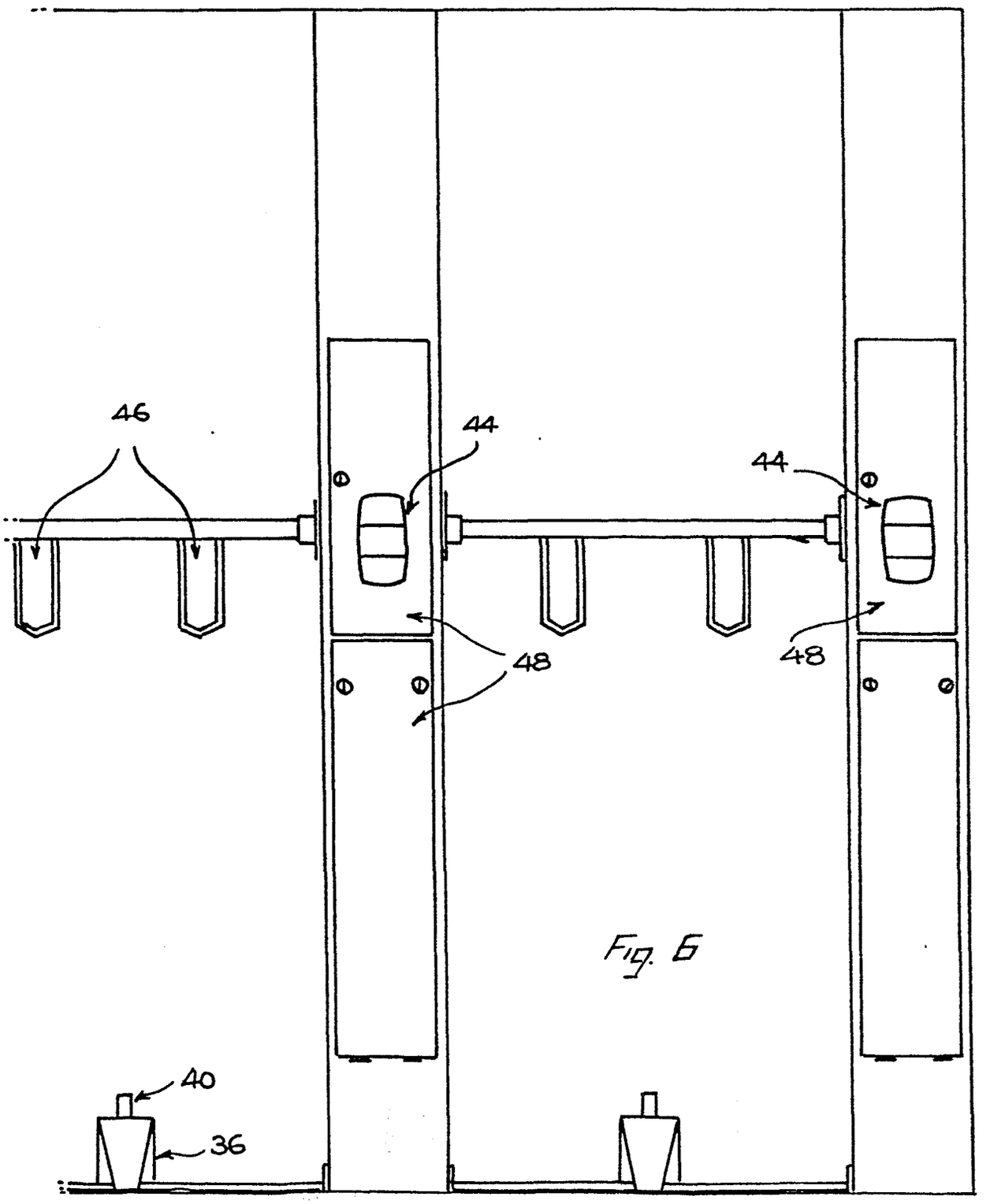
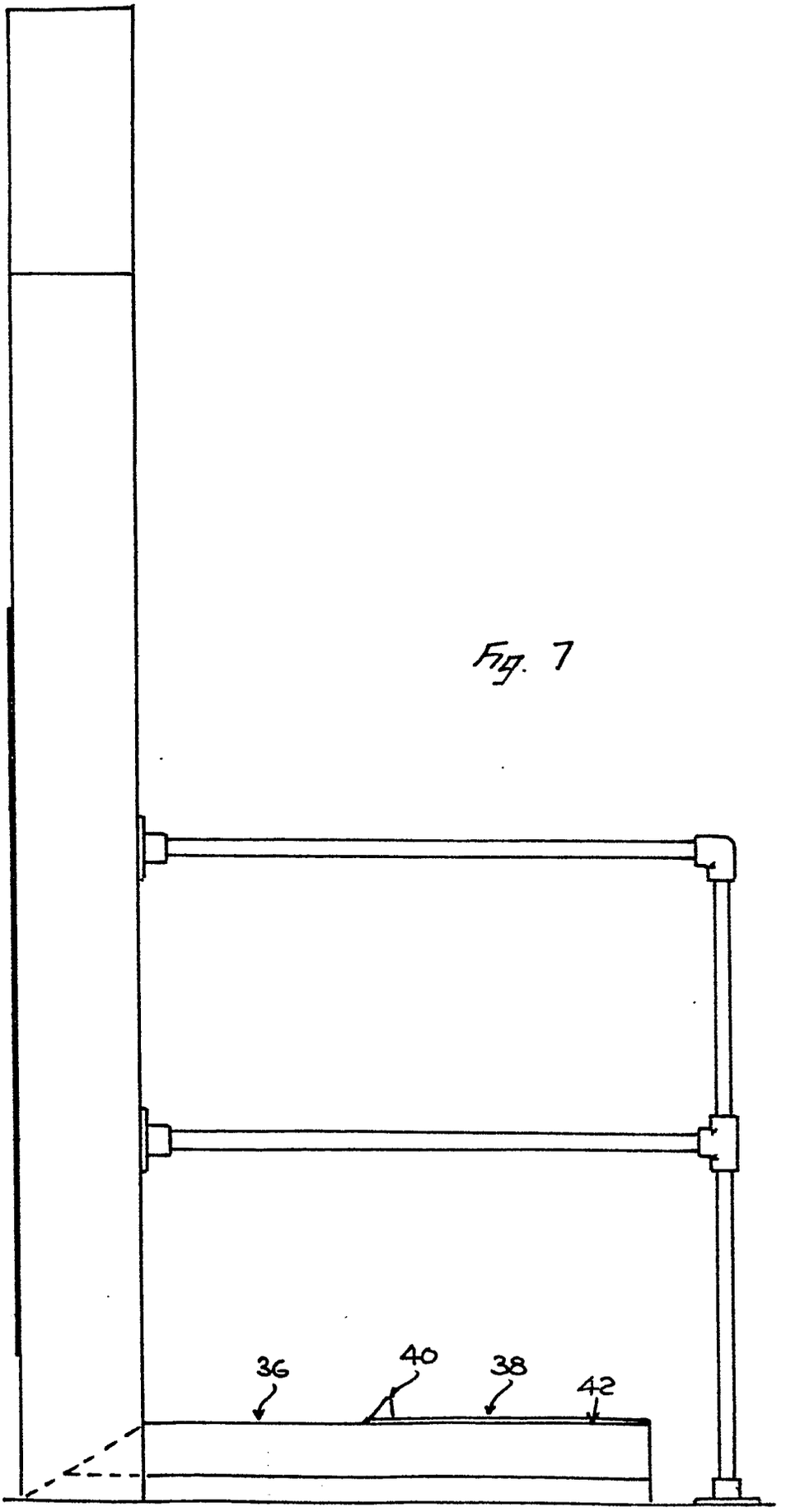


Fig. 6

Fig. 7



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EUROPEAN SEARCH REPORT

0077690
Application number

EP 82 30 5571

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	GB-A-2 065 624 (BYDALE ENGINEERING LTD) *Page 2, line 97 - page 5, line 96; figures 1,2,3,3A*	1,3	G 07 F 7/06 G 07 F 17/00 A 47 F 10/04
Y	DE-A-2 125 869 (G.HEHEMANN) *Page 4, paragraph 1; page 7, paragraph 3 - page 8, paragraph 1; figures 1,2*	1,10	
A	EP-A-0 025 754 (SUPERMARKET SYSTEMS) *Page 1, line 1 - page 11, line 14; figures 1-7,9-14*	1,2,6-9	
A	US-A-3 882 982 (R.M.SMITH) *Abstract; column 1, lines 25-65; figure 1*	1,6,8	
A	US-A-3 938 638 (R.D.MOULE) *Abstract; column 2, lines 16-21; figure 1*	1,8	
A	US-A-3 283 868 (S.E.KUHNS) *Column 2, lines 29-38; column 3, lines 33-42*	1	
A	US-A-3 837 455 (A.J.HURT) *Abstract; figure 1*	1,8	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

G 07 F 7/06
G 07 F 17/00
G 07 F 17/14
A 47 F 10/04

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11-01-1983	RUDOLPH H.J.

CATEGORY OF CITED DOCUMENTS

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