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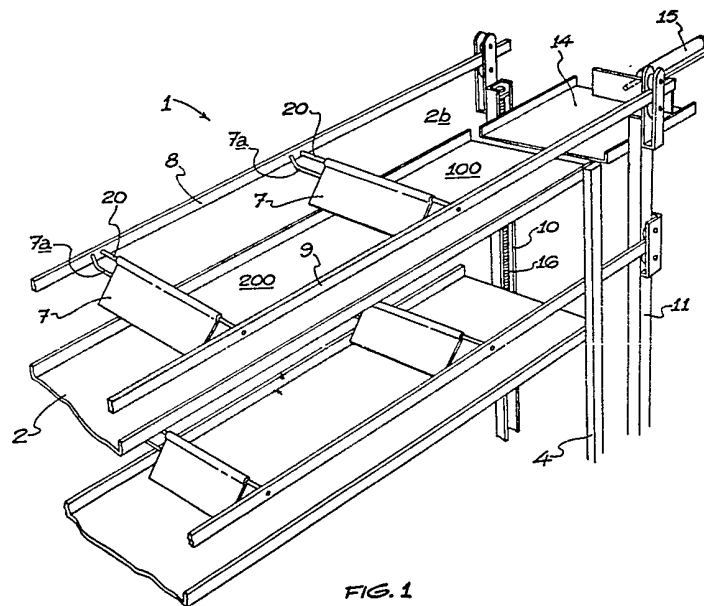
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B8A  
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(54) An apparatus for storing articles

(57) An apparatus for storing articles has a longitudinal support means (2) for the articles having a loading end (2b) and a discharge end. A plurality of substantially parallel and spaced-apart flap members (7) are pivotally mounted above, and in a transverse direction relative to, the support means. The flap members (7) are adapted for reciprocal movement in a direction substantially parallel to the support means (2). Respective L-shaped bars (7a) maintain each flap member (7) in a first position of use. When the flap members (7) are moved in the direction of the discharge end, they positively engage with a respective article on the support means (2) so as to push the article in the direction of the discharge end. When the flap members (7) are moved in the direction of the loading end (2b), each flap member (7) is pivotally displaceable from said first position of use to a second position of use to enable each flap member (7) to be out of positive engagement with a respective adjacent article. Preferably, each flap member (7) when in the first position of use is at an angle of between 20° and 60° relative to the support means (2) and in the direction of the discharge end.



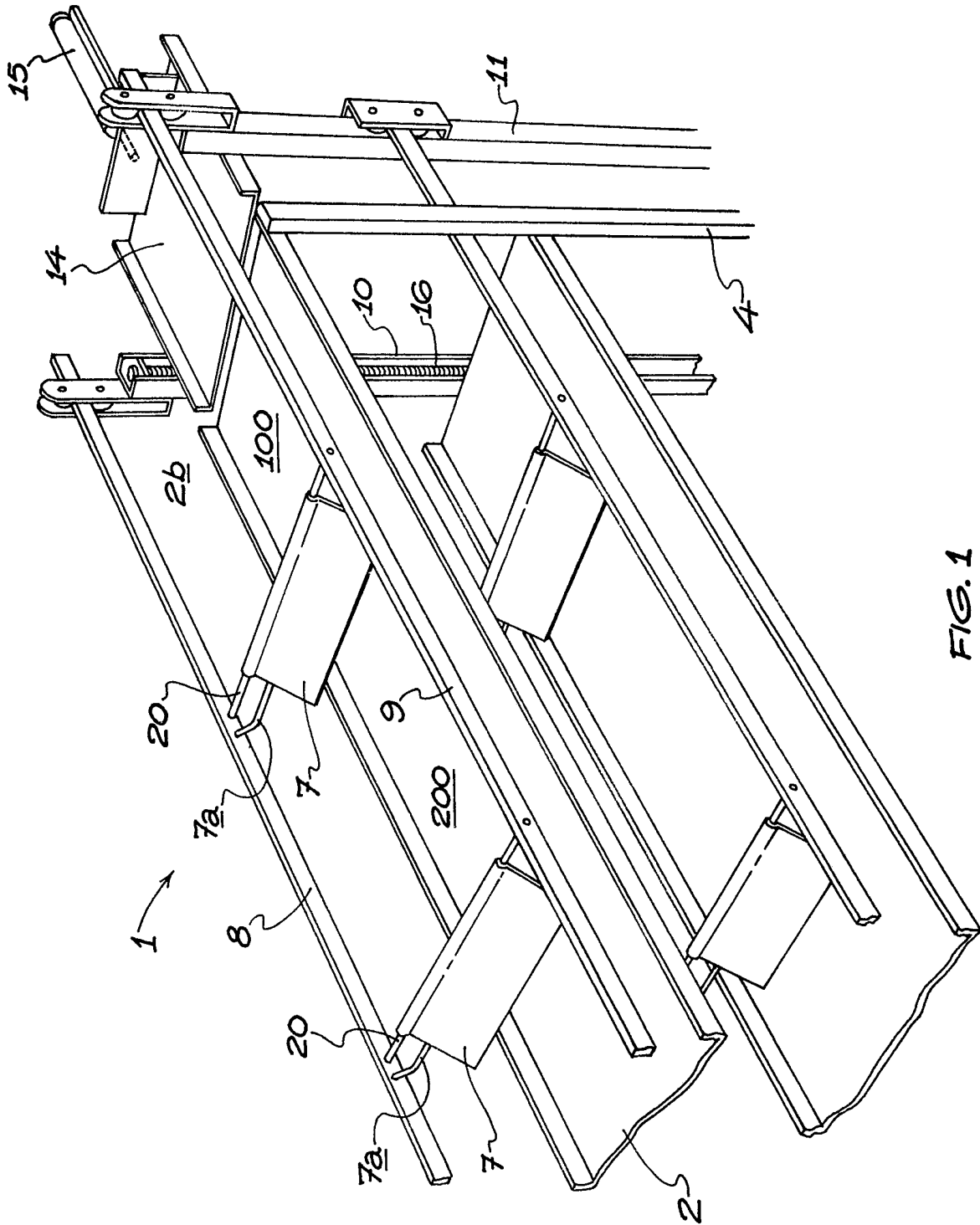


FIG. 1

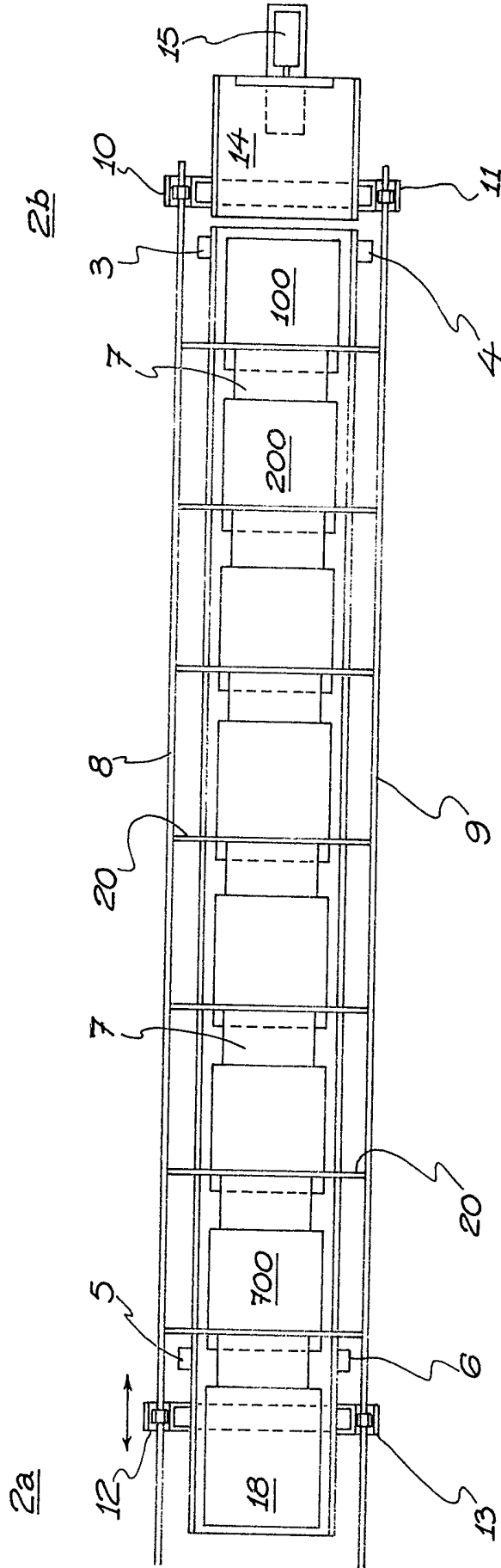


FIG. 2

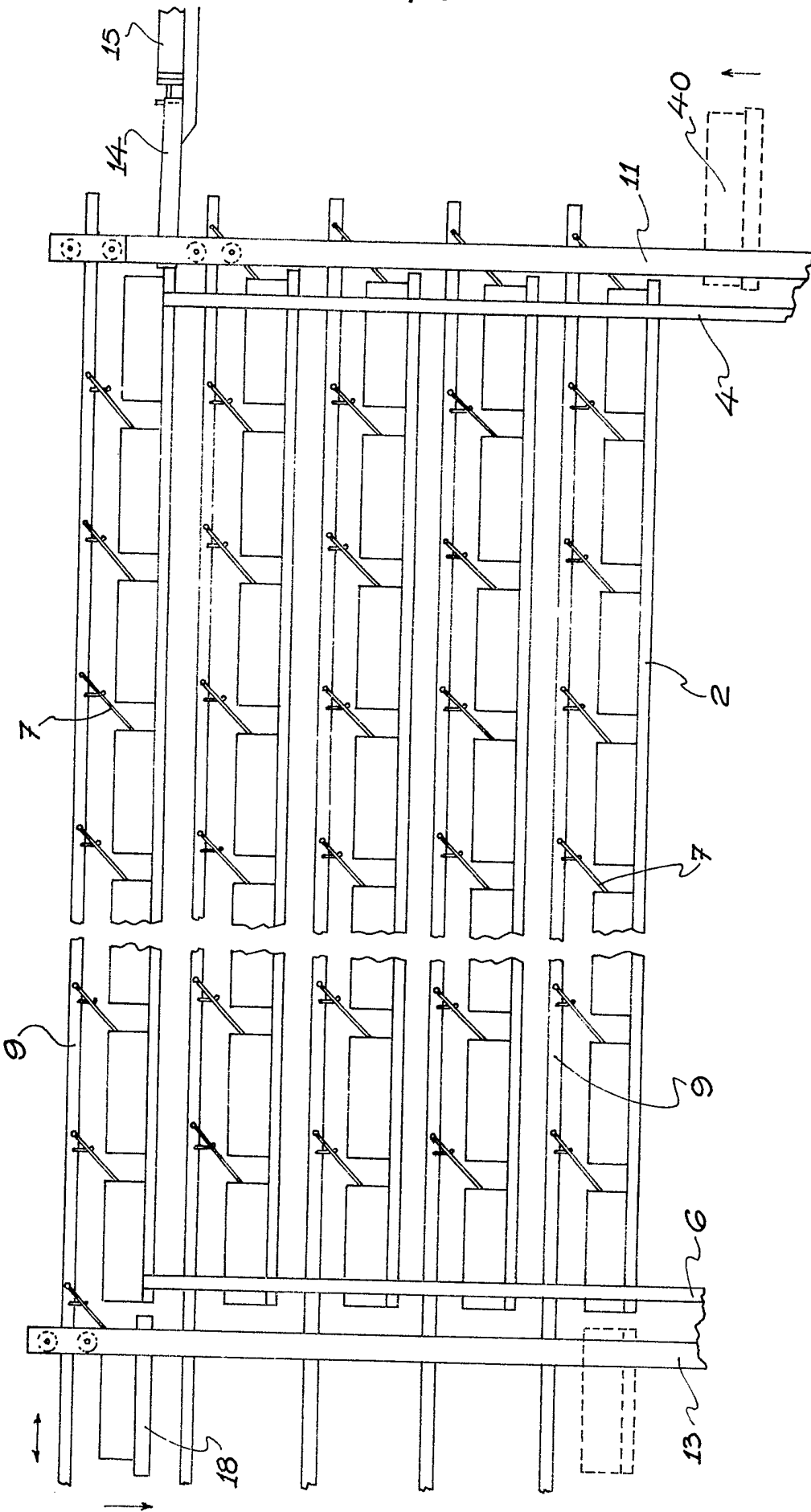


FIG. 3

## SPECIFICATION

**An apparatus for storing articles**

5 This invention relates to an apparatus for storing articles.

In particular, it relates to a storage system which may be used for curing cheese.

10 The automated large-scale production of cheese has resulted in a number of problems not least of which is the storing and curing of the cheese. The curing of the cheese involves basically the single step of allowing the cheese, which is usually in the form of a wheel, to remain in a cold room for a

15 known period of time, say 24-36 hours. It is important that the cheese be subject to as little disturbance as possible. Furthermore, it is preferable that each wheel of cheese should not be in contact with an adjacent wheel of cheese during curing.

20 Heretofore, each wheel of cheese was manually placed on a shelving system in an organised and known manner and subsequently manually removed when it was necessary to package the cheese. A proposal to automate the storage and

25 curing of cheese has been made wherein each wheel of cheese is placed on a conveyor belt which is relatively slow moving. However, there are a number of disadvantages in using a conveyor belt not least of which is the cost which is relatively high having regard to the fact that a conveyor having a length of approximately four miles would be required.

It is an object of the present invention to overcome these problems.

35 The invention therefore provides an apparatus for storing articles which apparatus comprises a longitudinal support means for the articles, the support means having a loading end and a discharge end; a plurality of substantially parallel and

40 spaced apart flap members pivotally mounted above, and in a transverse direction relative to, the support means; means for reciprocally moving the flap members in a direction substantially parallel to the support means; means for maintaining each

45 flap member in a first position of use to enable each flap member, when moved in the direction of the discharge end, to positively engage with and move a respective article in the direction of said end; and wherein each flap member is pivotally

50 displaceable from said first position of use to a second position of use to enable each flap member, when moved in the direction of the loading end, to be out of positive engagement with a respective adjacent article.

55 The invention will be understood in greater detail from the following description of a preferred embodiment thereof given by way of example only and with reference to the accompanying drawings in which:-

60 *Figure 1* is a perspective view of a first end of a pair of devices according to the invention;

*Figure 2* is a plan view of one of the devices of *Figure 1*; and

65 *Figure 3* is an elevation of a plurality of devices located one above another and in side-to-side rela-

tionship to form a matrix.

70 Referring now to the drawings in which non-essential detail has been omitted for reasons of clarity, there is shown an apparatus according to the invention generally shown as 1. The apparatus 1 essentially comprises a support means or shelf 2 mounted on support legs 3, 4, 5 and 6, the shelf 2 having a discharge end *2a* and a loading end *2b*; and a plurality of flaps 7 mounted for reciprocal

75 movement between a pair of bars 8, 9. The bars 8, 9 are in parallel and spaced-apart relationship and are mounted on bar support legs 10, 11, 12 and 13. The flaps 7 are mounted above, and in a transverse direction relative to, the shelf 2. Furthermore,

80 the flaps 7 are in parallel spaced-apart relationship.

Reciprocal movement of the flaps 7 may be achieved in a number of well known ways. For example, the bars 8, 9 may be of hollow section each having a chain (not shown) therein. Each of the

85 flaps 7 may be hingedly mounted on a respective bar 20 the free ends of which bar 20 are suitably attached to the chains. A motor (not shown) may be mounted adjacent one end of the apparatus 1 for providing reciprocating movement of the chain in the direction of the ends *2a*, *2b*. The movement of the chain has the effect of moving the flaps 7 in the direction of the ends *2a*, *2b*.

In the present Specification, movement of the flaps 7 in the direction of the discharge end *2a*

95 may be regarded as forward movement; movement in the reverse direction i.e. towards the loading end *2b* may be regarded as rearward movement.

Also located on the chains slightly forwardly of

100 each bar 20 is an L-shaped bar *7a*. The L-shaped bar *7a* serves to support its associated flap 7 at an angle between 20° and 60° relative to the normal and in a forward direction. The exact angle is determined by the location of the bar *7a*.

105 Located rearwardly of the shelf 2, i.e. at the end *2b*, is an elevator 14 having a pneumatically or hydraulically driven ram 15 located thereon. The elevator 14 is mounted between a pair of rotatable screw members 16 housed in the legs 10, 11 which are of hollow section. A second motor (not shown) may be used to reversibly rotate the screw members 16 to enable the elevator 14 to be raised or lowered as required.

110 Located forwardly of the shelf 2, i.e. at the end *2a*, is a second elevator 18 similarly constructed and mounted on a second pair of screw members housed in the legs 12 and 13 which are also of hollow section. However, there is no ram mounted on the elevator 18. A third motor controls the reversible rotation of the second pair of screw members thereby enabling the elevator 18 to be raised or lowered as required.

120 In a typical installation, approximately ten apparatus 1 according to the invention are mounted one above the other and at an appropriate distance apart on each set of legs, 3, 4, 5, 6 to form a system of apparatus according to the invention. However, it will be appreciated that only one elevator 14 and only one elevator 18 are necessary for the

130 system but a separate motor is required to drive

each pair of chains associated with each apparatus 1. Furthermore, in side-by-side relationship, further systems according to the invention may be mounted to form a matrix.

5 The apparatus 1 according to the invention operates as follows. It is desired to cool and cure wheels of cheese which are coming off a cheese production line. A first wheel of cheese 40 may be loaded manually or automatically on to the elevator 14. The elevator motor is activated to raise the elevator 14 to the level of the shelf 2 (see Figure 1). The elevator motor is halted, the ram 15 is activated to push the wheel of cheese off the elevator 14 and on to the shelf 2. The wheel of cheese now occupies the space shown as 100 (Figures 1, 2) of the shelf 2. It is desired to place a second wheel of cheese on the same shelf 2. The elevator 14 is again activated to bring the second wheel of cheese to the shelf 2 in the manner described above. While carrying out this operation, the chains are activated so as to move the flaps 7 rearwardly. In doing so, one of the flaps 7 contacts the first wheel of cheese 40 occupying the space 100, but being hinged, is displaced by the first wheel of cheese 40 to a substantially horizontal orientation and passes gently over the first wheel of cheese 40. Having cleared the first wheel of cheese 40, the flap 7 rests against the L-shaped bar 7a at an angle between 20° and 60° relative to the normal. The chains are now activated and the edge of the flap 7 contacts the first wheel of cheese 40 and pushes it forwardly along the shelf 2. By providing appropriate controls associated with the motor which drives the chains, the flap 7 pushes the first wheel of cheese along the shelf 2 to a distance approximately equal to the distance between adjacent flaps. The first wheel of cheese is now in the space referred to as 200 and the space 100 is free to receive the second wheel of cheese from the elevator 14. The process of moving the flaps 7 forwardly and rearwardly is continued for as long as necessary until the shelf 2 is full of wheels of cheese. If it is desired to remove the first wheel of cheese 40 from the shelf 2, then with the first wheel of cheese already in the space referred to in Figure 2 as 700, the next forward movement of the flaps 7 pushes the first wheel of cheese onto the elevator 18 which, of course, should be in position to receive the wheel of cheese 40. The elevator 18 is lowered to ground level and the first wheel of cheese 40 is removed manually or automatically as desired.

In the case of a system of devices 1, then as soon as one shelf is filled with wheels of cheese, the next shelf may be filled in a similar manner. It will be appreciated that the number of spaces on each shelf 2 is limited only by the space available for the system and the ability of the motors to enable the flaps 7 to move the wheels of cheese along the shelf 2.

In the case of a matrix of systems, it will be clear that a considerable quantity of wheels of cheese may be stored therein. Again, the size of the matrix is limited only by the space available. Usually, space is limited as it is desirable to cure the cheese

in a cold room. However, having regard to the rate of production of wheels of cheese per day, an approximately sized matrix may be designed so that the matrix is full at all times while enabling continuous removal and placement of wheels of cheese thereon in an orderly and predetermined pattern.

Furthermore, it will be appreciated that although the article being stored in the device according to the invention is a wheel of cheese, any suitable article may be stored therein. Furthermore, the residence time of the article in the device, system or matrix may be varied having regard to the combined movements of the flaps and the elevators. In the case of a system or matrix of devices according to the invention, any article occupying the space nearest the removal elevator may be removed as desired.

As described above, the flaps 7 are preferably at an angle of between 20° and 60° when pushing the wheel of cheese forwardly. By having the flaps 7 so angled the distance the flaps 7 move when reciprocating is less than when the flaps 7 are normal relative to the shelf 2. Thus, a greater number of wheels of cheese may be stored on the shelf.

The actual angle selected is dependent on the height of the pivot of the flap 7 above the shelf 2; the height of the article; the stroke of the flaps 7 when reciprocating; and the length of each flap 7.

In the case of articles which are fragile, it would be preferable to provide a positive lift for the flaps 7 so that when they are moved rearwardly, they are displaced so as not to touch the articles.

#### CLAIMS

1. An apparatus for storing articles which apparatus comprises a longitudinal support means for the articles, the support means having a loading end and a discharge end; a plurality of substantially parallel and spaced-apart flap members pivotally mounted above, and in a transverse direction relative to, the support means; means for reciprocally moving the flap members in a direction substantially parallel to the support means; means for maintaining each flap member in a first position of use to enable each flap member, when moved in the direction of the discharge end, to positively engage with and move a respective article in the direction of said end; and wherein each flap member is pivotally displaceable from said first position of use to a second position of use to enable each flap member, when moved in the direction of the loading end, to be out of positive engagement with a respective adjacent article.

2. An apparatus as claimed in claim 1 wherein the maintaining means holds each flap member, when in the first position of use, is at an angle of between 20° and 60° relative to the support means and in the direction of the discharge end.

3. An apparatus as claimed in claim 1 or claim 2 wherein means is provided for pivotally displacing each flap member from the first position of use to the second position of use.

4. An apparatus as claimed in claim 3 wherein the displacing means for each flap member is the

respective adjacent article over which each flap member passes when moving in the direction of the loading end.

5. An apparatus as claimed in any of claims 1-4  
5 which further comprises an article loading means locatable at the loading end of the support means and an article unloading means locatable at the discharge end of the support means.

6. An apparatus as claimed in claim 5 wherein  
10 the loading means comprises a first elevator incorporating means for pushing an article thereon onto the support means and the unloading means comprises a second elevator.

7. An apparatus substantially as hereinbefore  
15 described with reference to and as illustrated in the accompanying drawings.