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(54) Retarding device

(57) A retarding device for retarding letters moving along a conveying path (1) has two spaced apart elasticated belts (2, 3) which are driven at a predetermined speed. The belts (2, 3) are normally spaced so that letters pass between the belts (2, 3) without being gripped. A diverter member (6) is associated with one of the belts (2) and is movable into a position in which it causes a letter passing between the belts (2, 3) to be gripped by the belts and retarded to their speed. The diverter member (6) is arranged so that the trailing edge of a gripped letter is displaced so that a closely following letter will overlap the previous letter.

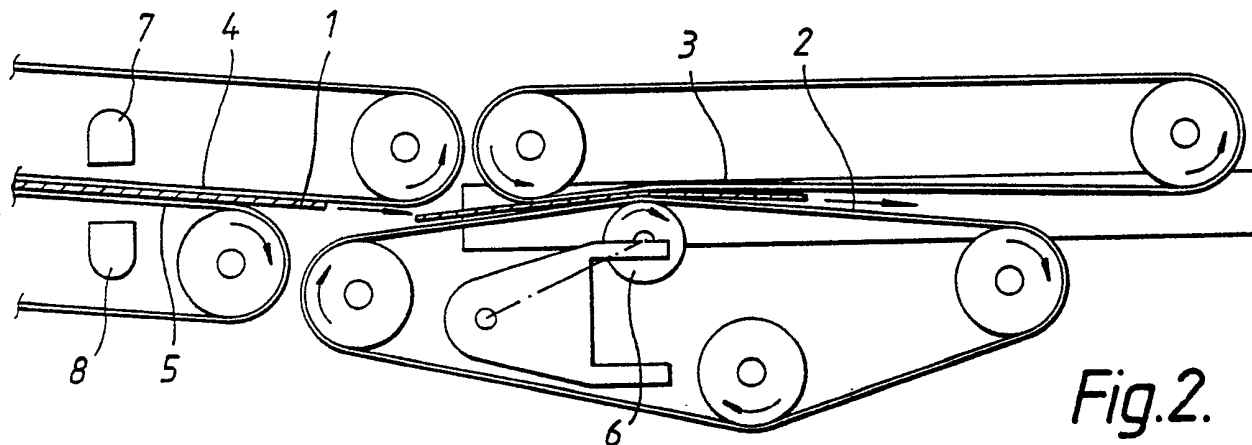
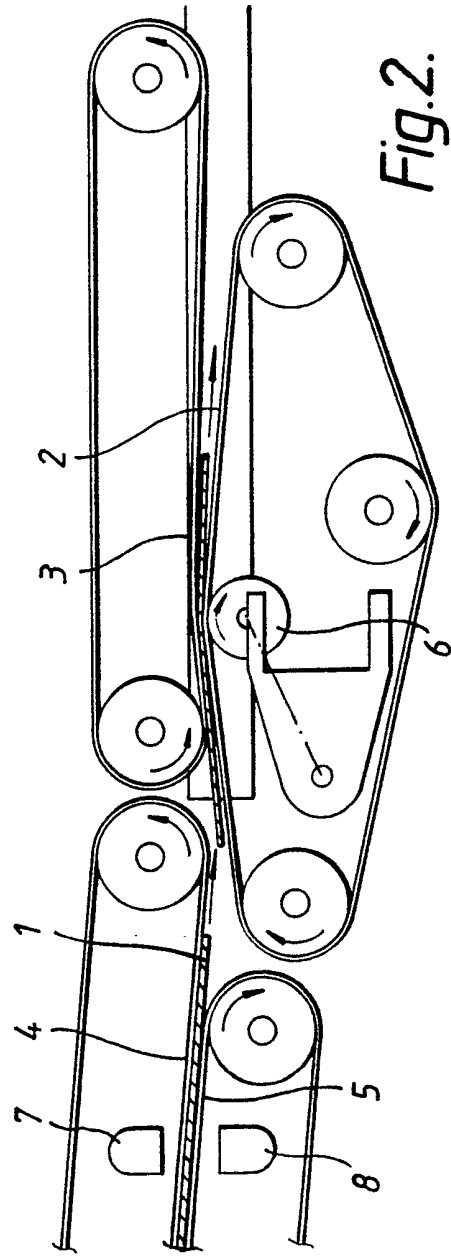
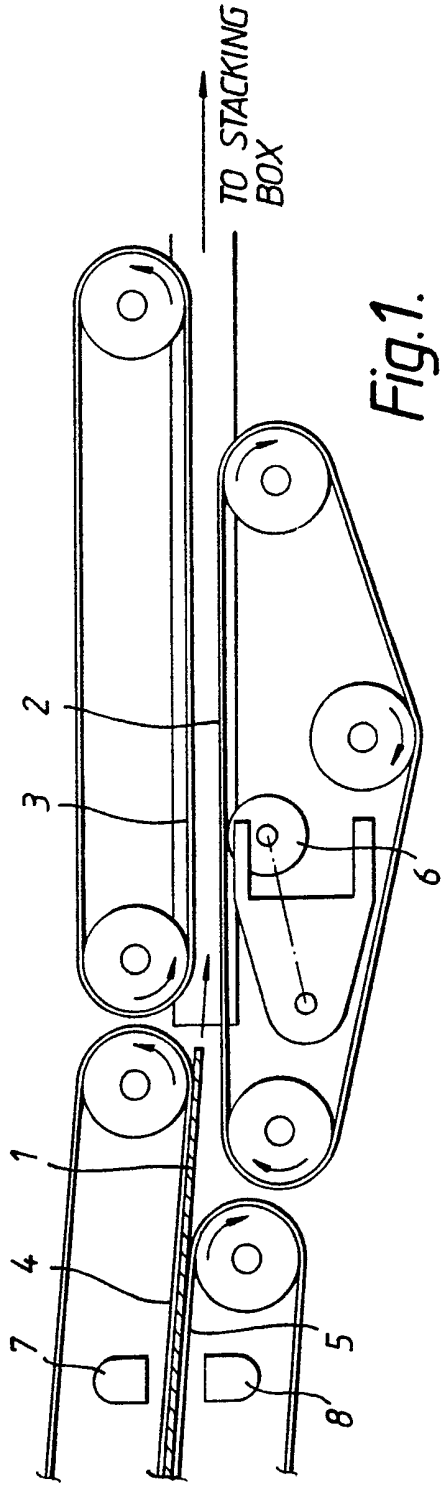


Fig.2.

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1982.

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RETARDING DEVICE

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The invention relates to a retarder for retarding flat sheet-like items moving along a conveying device and has particular, but not exclusive, application to postal items.

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In one method of sorting postal items, letter sorting machines transport letters by way of sandwiching the letters between pairs of moving belts. After processing in the sorting machine the letters must be presented in a format for rapid removal from the machine. One such format comprises stacks which are formed in stationary devices known as stacking boxes. On being stacked in a stacking box, the velocity of each letter is, of course, reduced from belt speed to zero and with feed speeds of up to 3.5 metres per second the letters may simply be fired into the rigid box, the inertia of each letter being absorbed by the body of the box. The main disadvantage of this is that the speed of the letters and hence that of the moving belts is limited to a maximum value as crumpling or deflection of the letters will result if the velocity at impact with the box is greater than the above mentioned speed. This limitation thus limits the maximum speed, and hence the throughput, of a letter sorting machine.

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The invention has for an object the provision of a retarder which overcomes the above disadvantage.

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According to the present invention, a retarder for retarding flat sheet-like items moving along a conveying path comprises two spaced, flexible, endless, tensile elements arranged to be driven at the desired retarded speed and which are normally spaced to allow the items to pass between the elements without being gripped, a diverter member associated with one of the elements and being movable into and out of a position in which it causes the associated element to cooperate with the other element to grip an item therebetween to slow the item

1 down to the speed of the two elements and a detection
system to detect an item approaching the two elements and
momentarily to operate the diverter member to cause the
item to be gripped between the two said elements.

5 Preferably the diverter member is arranged, in
conjunction with an end support of the other element, to
cause the trailing end of the gripped item to be
displaced so that a closely following item may overlap
the item.

10 One embodiment of the invention will now be
described, by way of example, with reference to the
accompanying drawings, in which

Figure 1 is a diagrammatic illustration of a
retarder for use in a letter sorter machine; and

15 Figure 2 is a similar illustration but with the
retarder in a later stage of operation.

Referring to the drawing the retarding device is
placed adjacent to a faster moving infeed system (1) for
example a high speed belt infeed from a letter sorting
20 machine. The retarding system comprises a pair of slow
moving elasticated belts (2) and (3) rotating in opposite
directions, the adjacent faces being parallel and spaced
a small distance apart, and the belts being positioned
such that a letter can pass between the two faces of the
25 belts. The retarder receives the letter from the infeed
system at an angle slightly less than 180° . In addition
the ends of the two belts (4) and (5) forming the high
speed infeed system adjacent to the retarder are
staggered with respect to each other and the ends of the
30 two slow speed belts (2) and (3) closer to the high speed
infeed system are correspondingly staggered such that the
gap between the adjacent ends of the belts on one side of
the conveying path is approximately the same as that
between the adjacent ends of the belts on the other side.
35 One of the belts (2) has an internally mounted diverter
member (6) in the form of a roller diverter, which is

1 movable into and out of a position which causes the inner
face of the elastic belt (2) to be deflected towards the
other belt (3). The diverter is provided with a suitable
activator (not shown) such as a rotary or a linear
5 solenoid, which is in turn controlled by a timer which
receives a signal from a photobeam detection system (7)
and (8). The detection system is located such that it
will detect a letter approaching the retarder. The
roller diverter (6) is cantilevered from a static
10 yoke-shaped frame (7) on which is also mounted the
activator. The yoke shaped frame has a secondary
function as a stop for the movement of the roller
diverter.

In use, the highspeed infeed belts will deliver a
15 stream of singulated letters and as the letters approach
the retarder they are detected by the detection system
which supplies a signal to the timer. This will cause
the solenoid to be successively activated and
deactivated. The timing will be such that as each letter
20 passes between belt (3) and the point of action of the
diverter roller, the latter will move towards the other
belt to trap the letter and slow it down to the speed of
the slow belts (2) and (3). In addition due to the
letter entering the gap between the slow belts at a
25 slight angle to these belts, the trailing edge of the
letter is, on activation of the diverter, reorientated
such that this trailing edge is deflected. If, as in
practice would be the case, the first letter is
immediately followed by a second incoming letter, that
30 second incoming letter will rapidly approach the first
letter as it will be travelling at a speed in excess of
that of the first letter and overlap it. In this way
successive letters become "tiled". The roller diverter
is now momentarily deactivated and reactivated to engage
35 the second letter and similarly slow this down.

Typically this system can be used with an infeeder

1 having a belt speed of 5 metres per second. A preferred retarder belt speed is 3.5 metres per second, the critical value for stacking letters in a box, and a preferred spacing for the retarder belts is 12 mm.

5 By means of the above described retarding device the rate of sorting in the sorting machine may be successfully increased without damage to the letters.

Modifications to the precise arrangement shown are possible. In particular, the staggering of the infeed
10 and retarder belts may be changed.

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CLAIMS:

1. A retarder for retarding flat sheet-like items moving along a conveying path comprising two spaced apart flexible endless tensile elements arranged to be driven at a desired speed, the elements being normally spaced so as to allow the items to pass through the elements without being gripped, and a diverter member associated with one of the elements, movable into and out of a position in which it causes an item passing through the elements to be gripped and retarded to the speed of the elements.

2. A retarder as claimed in claim 1, wherein when the diverter member is in the said position it causes the associated element to cooperate with the other element to grip an item therebetween.

3. A retarder as claimed in claim 1 or 2, and including a detection system to detect an item approaching the two elements and momentarily to operate the diverter member to cause the item to be gripped.

4. A retarder as claimed in claim 1, 2 or 3, wherein the diverter member is arranged to operate so as to cause the trailing end of a gripped item to be displaced so that a closely following item may overlap the item.

5. A retarder as claimed in any one of claims 1 to 4, wherein the diverter member is in the form of a roller.

6. A retarder as claimed in claim 5, wherein the diverter member is cantilevered from a yoke shaped frame which also acts as a stop for movement of said diverter member.

7. A retarder as claimed in any one of claims 1 to 6, wherein the ends of the elements which receive items are staggered with respect to each other.

8. A retarder as claimed in any one of claims 1 to 7, wherein the elements are arranged to be driven at

a speed between 3.25 m/s and 3.75 m/s and preferably 3.5 m/s.

9. A retarder substantially as hereinbefore described with reference to the accompanying drawings.

5 10. A system for sorting flat sheet-like items comprising an infeed having two spaced apart flexible endless tensile elements arranged to be driven at a first speed and a retarder as claimed in any one of claims 1 to 9.

10 11. A system as claimed in claim 10, wherein said retarder receives an item from the infeed at an angle slightly less than 180° with respect to the conveying path.

15 12. A system as claimed in claim 10 or 11 wherein the infeed elements are arranged to be driven at a speed between 4.5 m/s and 5.5 m/s and preferably at 5 m/s.

20 13. A system for sorting flat sheet-like items substantially as hereinbefore described with reference to the accompanying drawing.