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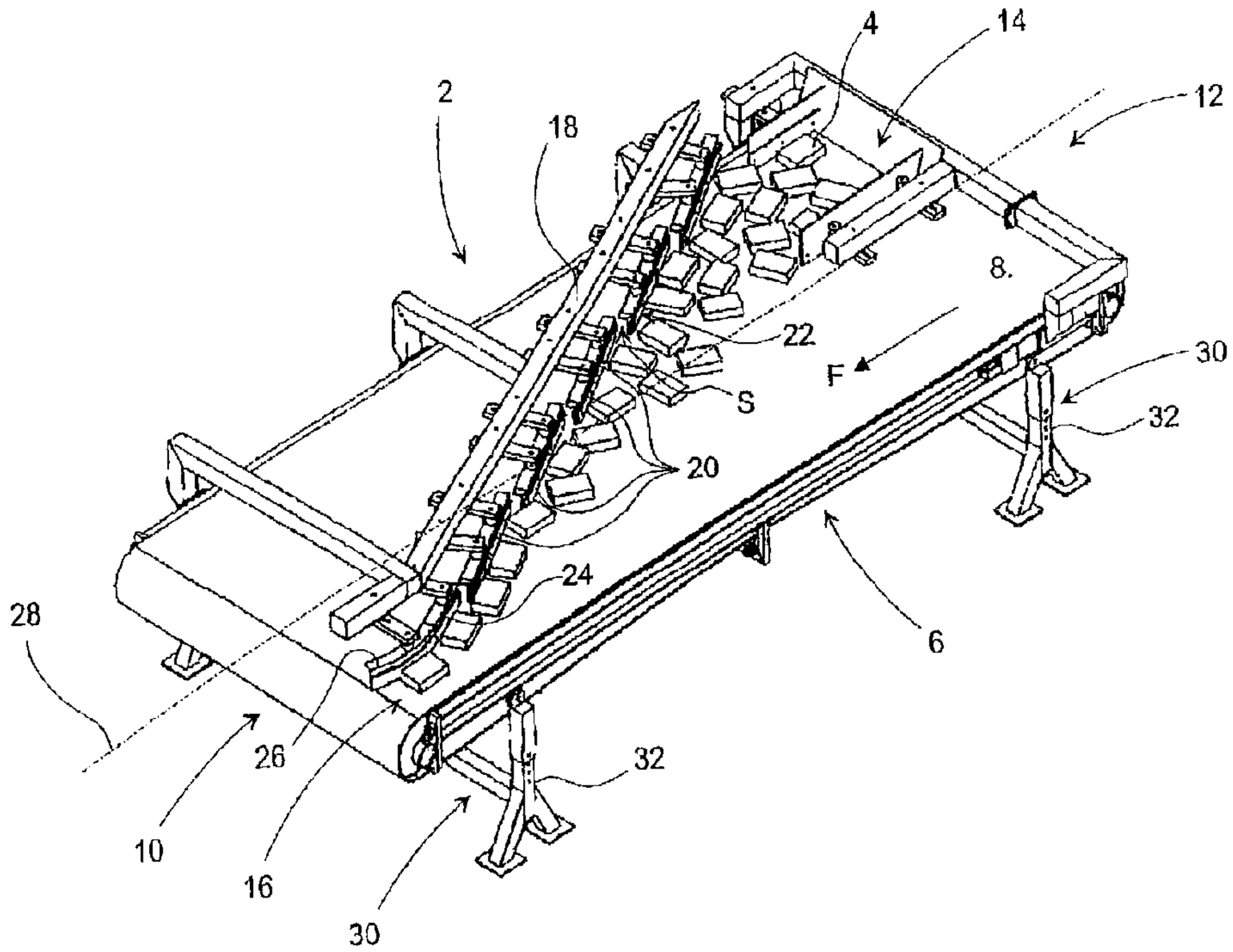


(57) Abrégé/Abstract:
In connection with making cast paving bricks of concrete with a rectangular basic shape, sometimes there is performed a finishing treatment of the bricks by "rumbling" where the bricks otherwise organised on pallets or a casting board are transferred to a cylindrical drum where these are tumbled for the purpose of achieving a surface with a particular appearance. It has appeared that rumbled bricks, for price reasons, are preferred to be delivered in bulk, as a subsequent manually performed palletising is a relatively expensive element. Thus there is indicated a sorting unit including a conveyor with a conveyor belt over the surface of which, between a receiving area for the bricks and a delivery area, there are mutually spaced guide bars disposed obliquely in relation to the direction of movement of the conveyor, by which the bricks are guided in a row with the same orientation for subsequent palletising by machine.

ABSTRACT

In connection with making cast paving bricks of concrete with a rectangular basic shape, sometimes there is performed a finishing treatment of the bricks by "rumbling" where the bricks otherwise organised on pallets or a casting board are transferred to a cylindrical drum where these are tumbled for the purpose of achieving a surface with a particular appearance. It has appeared that rumbled bricks, for price reasons, are preferred to be delivered in bulk, as a subsequent manually performed palletising is a relatively expensive element. Thus there is indicated a sorting unit including a conveyor with a conveyor belt over the surface of which, between a receiving area for the bricks and a delivery area, there are mutually spaced guide bars disposed obliquely in relation to the direction of movement of the conveyor, by which the bricks are guided in a row with the same orientation for subsequent palletising by machine.

(Fig.1)

Sorting Plant for Sorting Items Fed in Bulk

The present invention concerns a sorting unit for sorting items supplied to a sorting unit in bulk, preferably paving bricks with a rectangular basic shape.

The need for special sorting units arises in particular in connection with production facilities for cast paving bricks, where the cast items are subjected to a finishing treatment before transporting to stock or to the end user. Under normal circumstances, such cast block bricks may be laid out on a casting board in formation where they may be palletised relatively easily after drying without any sorting in advance.

Certain types of paving brick, however, after hardening of the concrete, are subjected to a finishing treatment in the form of "rumbling", where the bricks otherwise arrayed on the casting board are transferred to a cylindrical rotating drum, and the bricks receive a kind of mellowness in that they are bumping against each other during the tumbling/rolling, whereby the edges of the brick are slightly blurred, and the surface is imparted a special, slightly worn appearance.

After the above treatment, the said paving bricks will be led out from the drum and are subsequently found in bulk, i.e. in a pile without any special arrangement of the bricks. In some cases, one has subsequently performed palletising of the bricks which is a particularly costly job, as individual bricks must be handled manually and laid upon a pallet, with the result that the price for rumbled bricks arranged on pallets is considerably greater than for similar bricks delivered in bulk. The advantage of delivering the bricks on pallets is that these are more easily handled/laid out than if they are only delivered in bulk, where they e.g. are tilted off a truck upon the ground in a pile, from where they are transported/handled manually to the final laying site.

The need for rumbled paving bricks of concrete laid on pallets before delivery is thus great, but until now the purchasers of said types of paving bricks have refrained from having these delivered in palletised condition to a greater extent due to the somewhat higher delivery price for said bricks. Furthermore, it is to be noted that for the producer/wholesaler of the paving

bricks delivered in bulk, it may sometimes be difficult to determine the accurate number of bricks delivered in connection with orders of a given number of square meters when the bricks are in bulk. On the part of the producer/provider, it is also necessary to be able to deliver the paving bricks in palletised condition.

US 3,866,739, Sikorski, discloses an apparatus for unscrambling containers, where a take away conveyor, a shunting bar converging toward said take away conveyor; means for conveying containers to and along the shunting bar toward the take away conveyor; means for vibrating the shunting bar to assure free flow movement of the containers flow the bar onto the take away conveyor; and means on the bar for effecting spinning of the containers which contact the bar by being propelled there toward by said conveying means, and wherein said means for effecting spinning comprises a frictional cushioning strip attached to and providing a facing of substantial thickness along the bar. The cushioned bar is mounted as a deflector across the path of side by side progressive speed advancing conveyors to divert containers randomly placed thereon toward single file orientation on a maximum speed take away conveyor. Oscillation of the bar jogs the containers to prevent jamming.

US 4,889,224, Denker, discloses a conveyor system, which receives products in random order at its inlet end and delivers product in a serial aligned order at its outlet end. The conveyor system comprises first and second endless belt conveyors, which are longitudinally aligned and positioned such that the product exiting the first conveyor is received on the second conveyor. The first conveyor is of a greater width than the second and at the location where they meet is a third endless belt conveyor moving in a direction perpendicular to the longitudinal flow direction of the other two. The machine that feeds products to the first conveyor is set at a desired product flow rate in terms of products-per-minute and the speed of the first conveyor is set to handle that capacity. The second belt is driven at a speed equal to or greater than the product-per-minute rate times the product length. As misaligned products flowing on the first conveyor are intercepted by the transversely positioned third conveyor, the products are rotated as they are urged onto the second conveyor so that the length dimension of the products is generally aligned with the second conveyor.

In accordance with the invention there is provided a sorting unit for sorting items in bulk, the

sorting unit having a planar conveyor with a substantially horizontally extending conveyor belt movable in a conveying direction F between a rear end defining a receiving area for receiving items in bulk and a front end defining a delivery area for delivering said items in an organized manner. A horizontal support beam is spaced from the conveyor belt and oriented obliquely in relation to the conveying direction F of the conveyor belt, the support beam extending between the receiving area and the delivery area. A plurality of downwardly extending guide bars are supported by the horizontal beam in spaced parallel relationship and are inclined relative to the support beam. A front side of the guide bars is oriented to face against the conveying direction F of the conveyor belt with the underside of the guide bars spaced from and parallel to the conveyor belt.

The effect of the sorting unit is surprising since it appears that the paving bricks with rectangular basic shape which are supplied in the receiving area are evenly distributed on the conveyor belt and are moved against the inclined guide bars, initially with an arbitrary side edge sliding against the front side of the guide bars. The spacings between the guide bars, however, provide that the paving bricks at the latest, before they reach the delivery area, are guided so that their longest side edge is running in parallel with the front sides of the guide bars.

With the purpose of delivering the now arrayed paving bricks into a straight row in the delivery area for further organising in a palletising facility, the guide bar in the delivery area may be rounded so that its free end is oriented with inclination towards the centre axis of the conveyor.

With the purpose of ensuring an efficient and rapidly effected organising of the supplied paving bricks, the front sides of the guide bars can be provided with a friction inducing surface coating. In this case, the paving bricks are guided relatively quickly/early in their course through the sorting unit as described above. The surface coating furthermore serves the purpose of protecting the guide bars against wear.

Depending on the size and weight of the brick type processed in the sorting unit, it will sometimes be necessary to perform a change in the inclination of the support beam in relation to the conveying direction of the conveyor, which is made possible by the support beam

Depending on the size and weight of the brick type processed in the sorting unit, it will sometimes be necessary to perform a change in the inclination of the support beam in relation to the conveying direction of the conveyor, which is made possible by the support beam being mounted adjustable on the sorting unit. The same is the case with regard to the width of the delivery area, and sometimes it will also he necessary to perform a change in inclination of the guide bars relative to the support beam, which is possible by the guide bars being mounted so that they are adjustable.

Depending on the size and weight of the bricks, the spacings between respective guide bars may be of great significance for the desired organising of the paving bricks being sliding against the front side of the guide bars. This spacing between the guide bars can thus be adjustable.

In connection with supplying the paving bricks in bulk, their order is arbitrary. In order that the paving bricks are placed upon their largest surfaces, it may sometimes be advantageous that the conveyor/transporting unit inclines slightly, typically so that the course of the belts between the supply area and the delivery area is slightly rising. This inclination is dependent on the size of the bricks and of the speed with which the belts are conveyed in the direction of movement. With the purpose of making the sorting unit as flexible as possible, it may thus be provided on an underframe having legs that are adjustable. Hereby is achieved a reasonably large liberty with regard to the inclination of the conveyor.

In connection with organising the said paving bricks prior to palletising, a quality test is performed before the paving bricks leave the sorting unit, the test typically being performed manually by a person situated in the sorting area who is sorting off/removes the paving bricks that are damaged and unsuited for use. With the intention that the work can be performed with some certainty regarding the quality, a suitable conveying speed for the conveyor belt will be in the area 0.8 to 1.6 m/s, typically in the range 1.0 - 1.4 m/s, and preferably with the range 1.1 - 1.3 m/s. The precise speed to be preferred will depend on the brick size processed in the sorting unit, which is why the sorting unit may furthermore be provided with means for the stepless regulation of the belt speed.

The invention wilt be explained in more detail below with reference to the accompanying drawings, where:

Fig.1 is perspective view of a sorting unit according to the invention as seen obliquely from above,

Fig. 2 is a top view of the sorting unit shown in Fig. 1, and

Fig. 3 is a side view of the sorting unit shown in Figs. 1 and 2.

The sorting unit 2 shown in Fig. 1 is supplied paving bricks 4 in bulk and includes a conveyor 6 with a substantially horizontally extending conveyor belt 8 with a front end 10 and a rear end 12, where the rear end 12 includes a receiving area 14 for the supply of said items in bulk which are laid upon the conveyor belt. The sorting unit 2 furthermore includes a delivery area 16 at the front end 10, and between the receiving area 14 and the delivery area 16 there is provided a support beam 18 oriented obliquely in relation to the moving direction F of the conveyor, including a plurality of downwardly extending guide bars 20 that are mutually spaced apart, in spaced parallel relationship and inclined relative to the beam 18 and having a front side 22 oriented to face against the direction of conveying F of the conveyor. The undersides of the guide bars 20 are extending substantially in parallel with and immediately above the surface of the conveyor belt 8.

On the support beam 18, there is a guide bar 24 in the delivery area 16 which is rounded, the free end 26 of which is inclined towards the centre axis 28 of the conveyor.

The front side 22 of the guide bars 20 is furthermore provided with a friction inducing surface coating 30 which furthermore serves to protect the guide bars against wear from the brick items sorted in the sorting unit 2.

The sorting unit has the following mode of operation: The conveyor 6 is started with the belt 8 running in direction F, and paving bricks 4 with rectangular basic shape supplied to the receiving area 14, whereby they are moved against the inclined guide bars 20 by the movement of the conveyor, whereby the bricks are guided so that at least one of their sides is extending in parallel with and in contact with a front side 22 of one of the guide bars 20.

The guide bars are, as it appears from Figs. 1 and 2, evenly distributed along the support beam 18 and with an oblique course in relation to the direction of movement F of the conveyor which is deviating from the inclined orientation of the support beam 18. The front sides 22 of the guide bars 20 are mainly oriented in parallel, but the individual guide bars are staggered in parallel relative to each other, which means that the paving bricks are turned during their displacement in parallel with the front side faces 22 of the guide bars 18 so that they, before they are coming in abutment against the guide bar 24 in the delivery area, will be oriented with one long side of the rectangular basic shape in parallel with and in contact with a front side face 22 on the guide bars 20.

In the delivery area, the paving bricks will thus pass arrayed with the bricks in a row and oriented the same way, and it will here be possible to perform a manual sorting of the paving bricks 4 that are not fulfilling the quality requirements applicable for a delivery of this type of bricks.

As further appearing from Figs. 1 and 3, the conveyor 6 is disposed on an underframe 30 with longitudinally adjustable legs. The purpose with this is that sometimes it will be desirable that the conveyor 6 has a slightly rising course between the receiving area 14 and the delivery area 16 which will cause supplied brick items disposed standing on a side edge or an end edge are more liable to tilt so that they come to lie on their largest surface in order that these can be guided into a row as mentioned above.

It is preferred that the support beam 18 as well as the guide bars 20, 24 are mounted so that they are adjustable with regard to the included angle V they are forming with the centre axis 28 of the conveyor.

The guide bar 24 in the delivery area 16 is also adjustable with regard to the aforesaid angle and furthermore adjustable in the lateral direction of the conveyor with the purpose of adjusting the width B of the delivery area 16.

The speed of the conveyor belt 8 is steplessly adjustable by known measures within an interval in the range 0.8 - 1.6 m/s. Practical experiments in connection with using the sorting

unit for arraying the commonly occurring paving bricks with rectangular basic shape have shown that a preferred speed is within the range 1.1 - 1.3 m/s, and typically 1.2 m/s. With this speed is also achieved a rather secure manual quality control and sorting off of unsuited items from the paving bricks guided into a row.

Finally, it is to be noted that, probably in connection with sorting/organising other kinds of rectangular items, such as fruit cans in the consumption industry, there are sorting units that guide the said units into rows in connection with packing etc.

It is to be emphasized that the invention is of considerable importance within the field concerned which includes production of the rumbled paving brick that is palletised subsequently, before these art brought to the end user. After the said paving bricks have been guided into an array in the sorting unit according to the invention, it will be relatively simple to perform guiding into paths and dividing these paths into formations of the bricks, which in a relatively simple way may be laid upon a pallet.

CLAIMS

1. A sorting unit for sorting items in bulk, the sorting unit having

a planar conveyor with a substantially horizontally extending conveyor belt movable in a conveying direction F between a rear end defining a receiving area for receiving items in bulk and a front end defining a delivery area for delivering said items in an organized manner;

a horizontal support beam spaced from the conveyor belt and oriented obliquely in relation to the conveying direction F of the conveyor belt, the support beam extending between the receiving area and the delivery area, and

a plurality of downwardly extending guide bars supported by said horizontal beam in spaced parallel relationship and inclined relative to said support beam, a front side of said guide bars being oriented to face against the conveying direction F of the conveyor belt with the underside of the guide bars spaced from and parallel to the conveyor belt.

2. Sorting unit according to claim 1 in which a guide bar in the delivery area is rounded, and has a free end which is inclined towards a centre axis of the conveyor.

3. Sorting unit according to either claim 1 or 2, in which front sides of the guide bars are provided with a friction inducing surface coating.

4. Sorting unit according to any one of claims 1-3, having means for adjusting the inclination of the support beam relative to the conveying direction (F) of the conveyor.

5. Sorting unit according to any one of claims 1-4, having means for adjusting the width (B) of the delivery area.

6. Sorting unit according to any one of claims 1-5, having means for adjusting the included angle (V) of the guide bars relative to a centre axis of the conveyor.

7. Sorting unit according to any one of claims 1-6, in which the spacing (S) between the guide bars is adjustable.

8. Sorting unit according to any one of claims 1-7, in which the conveyor is disposed on an underframe having legs that are longitudinally adjustable.

9. Sorting unit according to any one of claims 1-8, in which the conveying speed of the conveyor belt is in the range 0.8 to 1.6 m/s.

10. Sorting unit according to any one of claims 1-8 in which the conveying speed of the conveyor belt is in the range 1.0 - 1.4 m/s.

11. Sorting unit according to any one of claims 1-8 in which the conveying speed of the conveyor belt is in the range 1.1 - 1.3 m/s.

12. Sorting unit according to any one of claims 1-8, in which the conveying speed for the conveyor belt on the conveyor is steplessly variable within a conveying speed in the range 0.8 – 1.6 m/s.

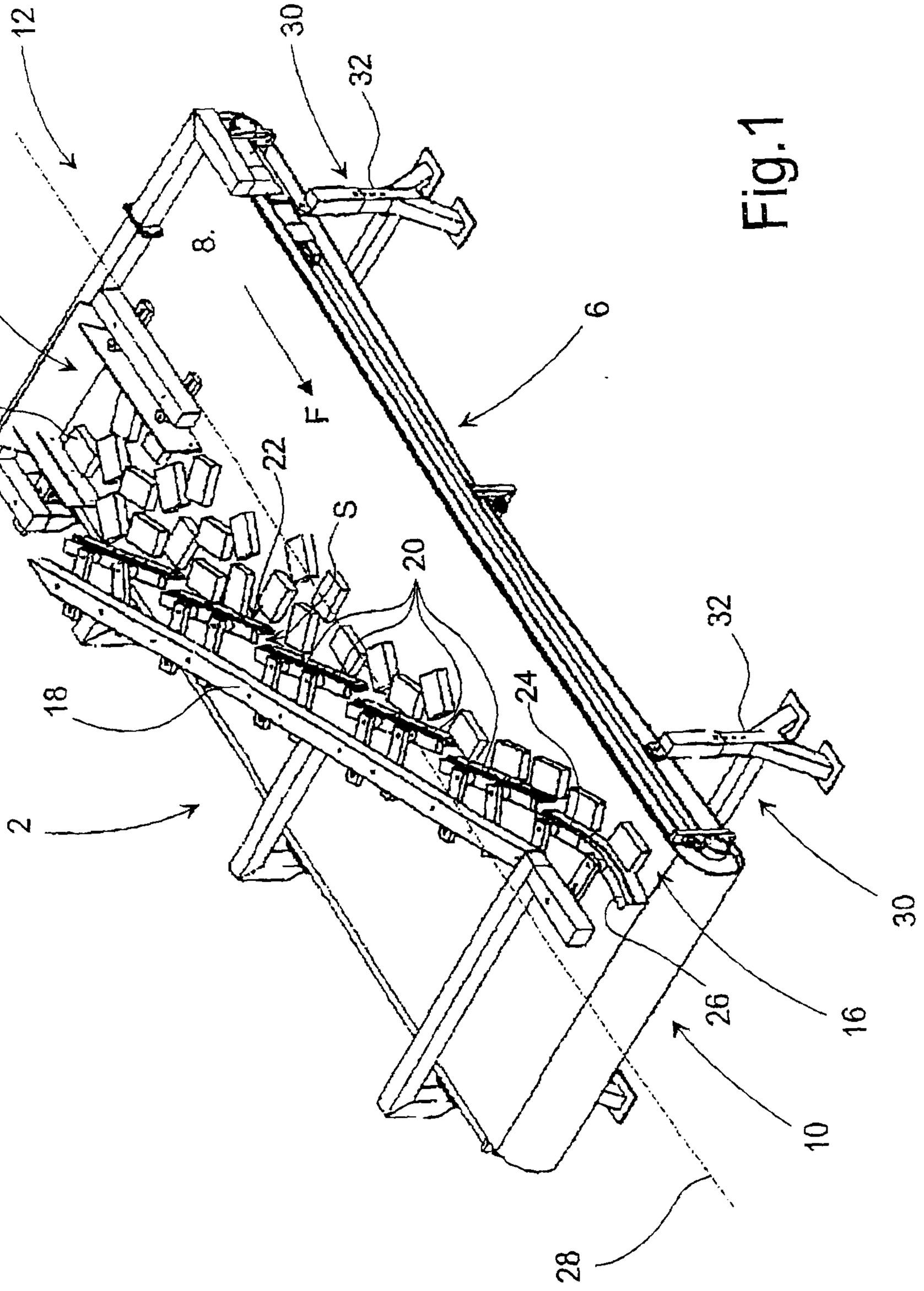


Fig.1

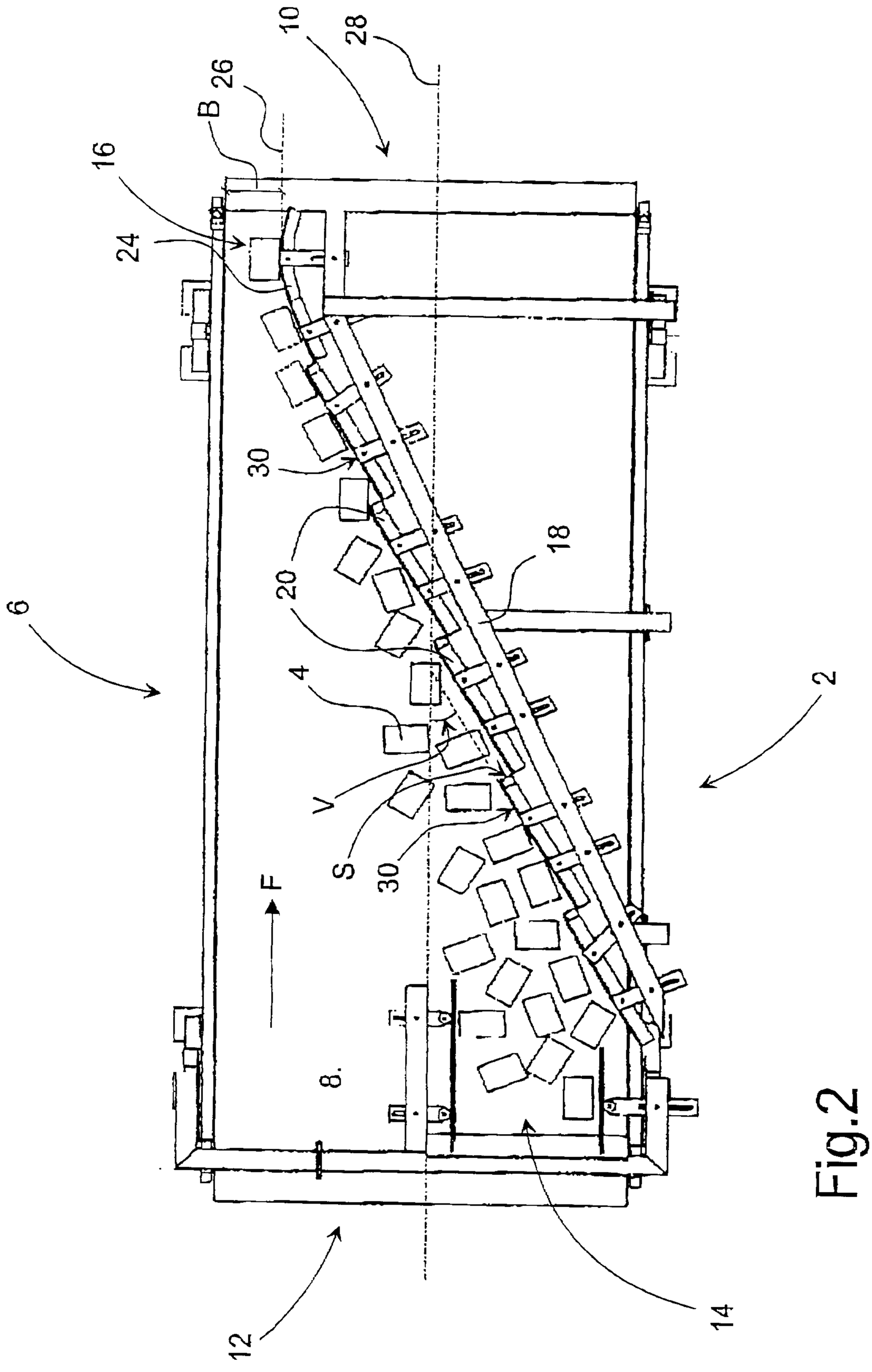


Fig.2

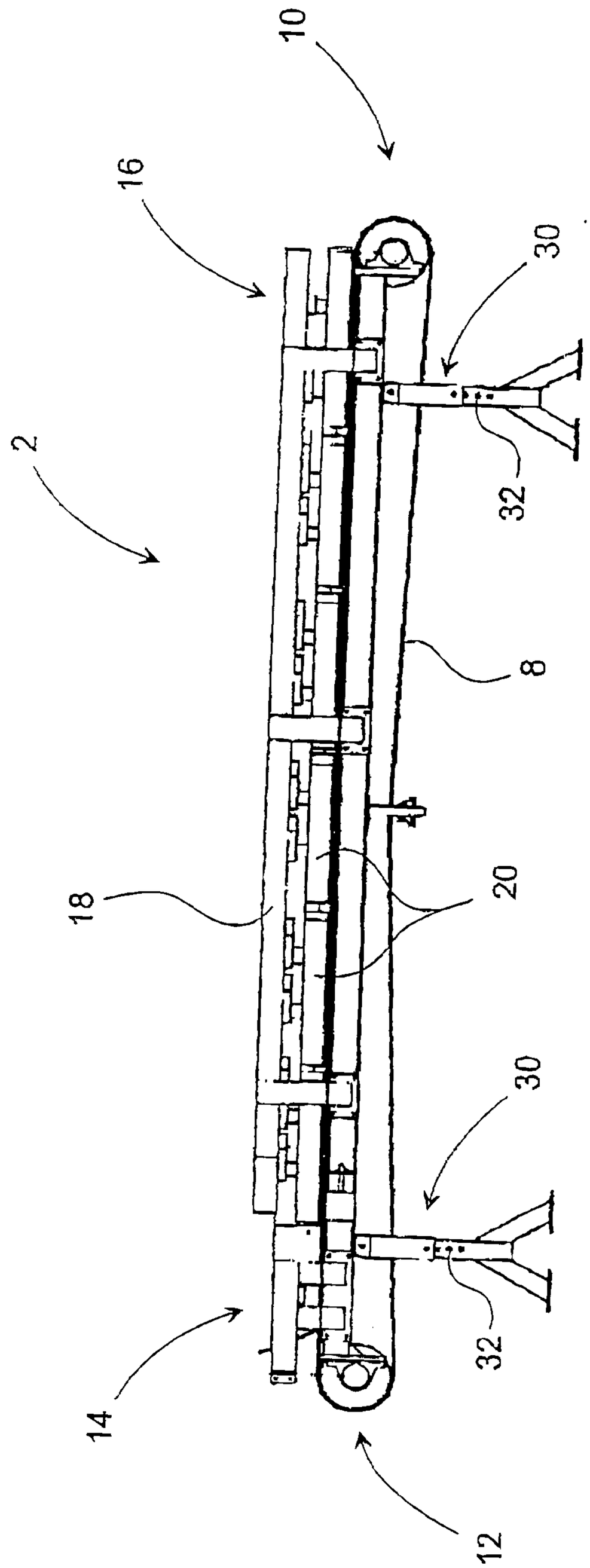
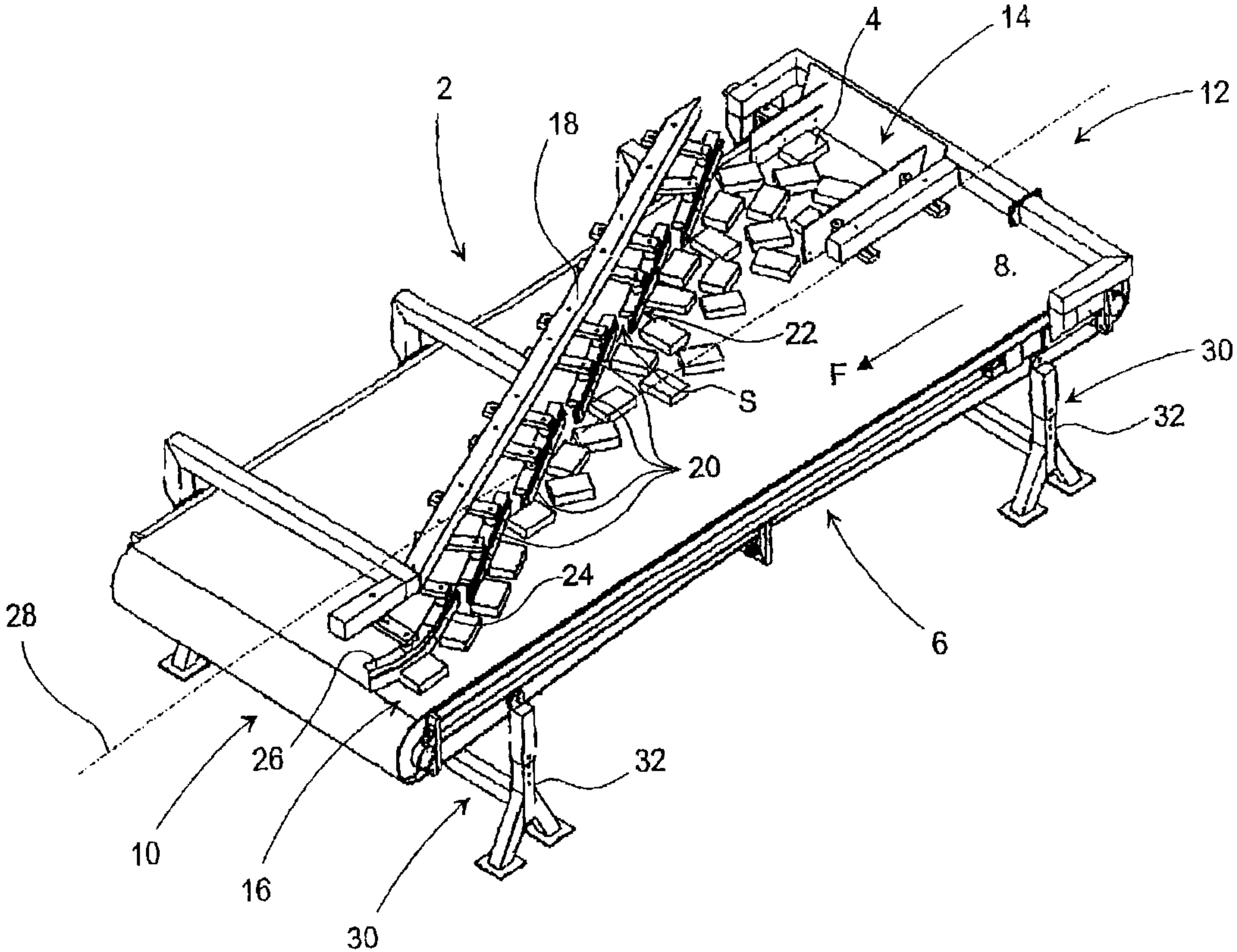


Fig.3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