July 22, 1969 J. E. TITMAS, JR 3,456,773

CASE DIVERTER

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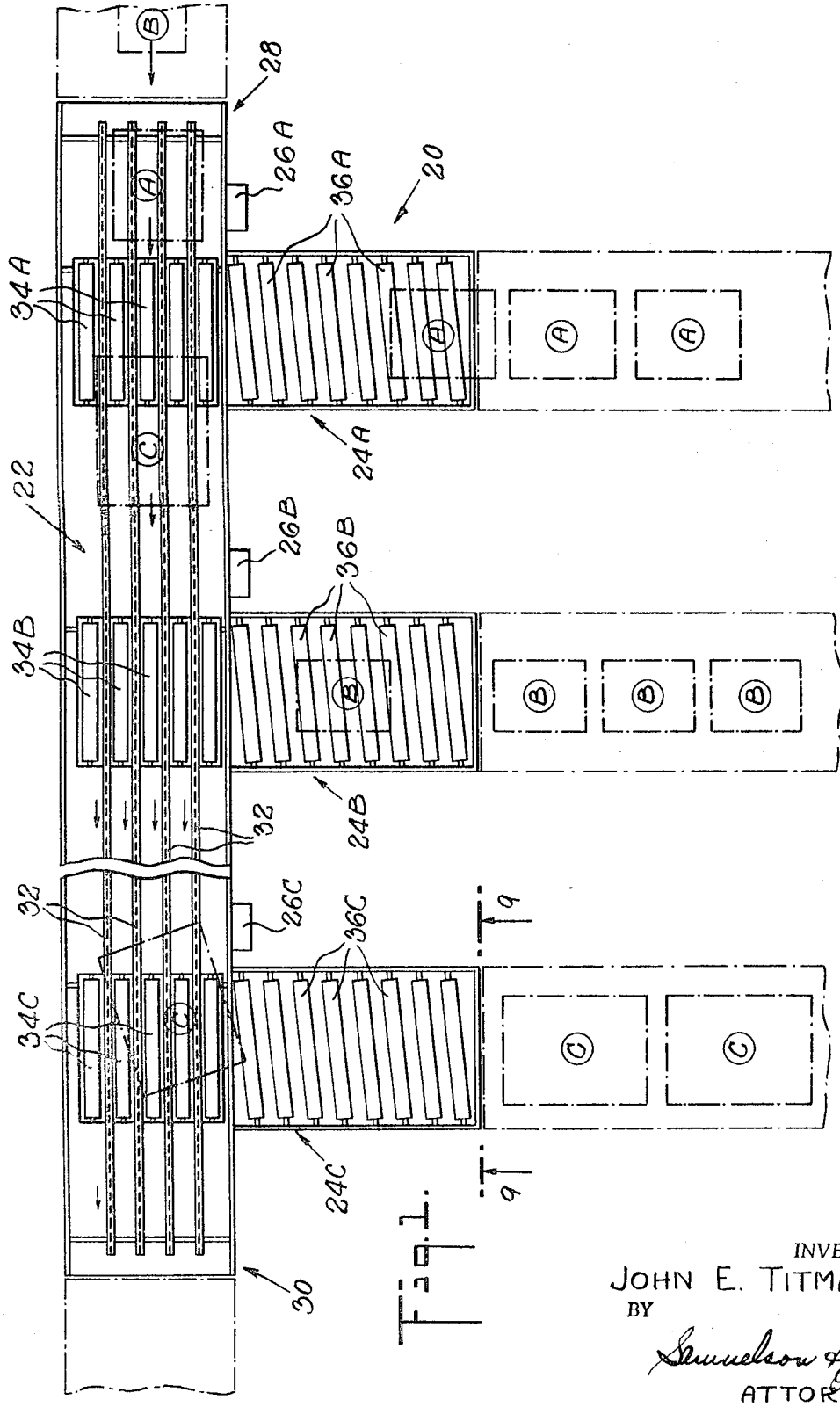


Fig. 1.

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CASE DIVERTER

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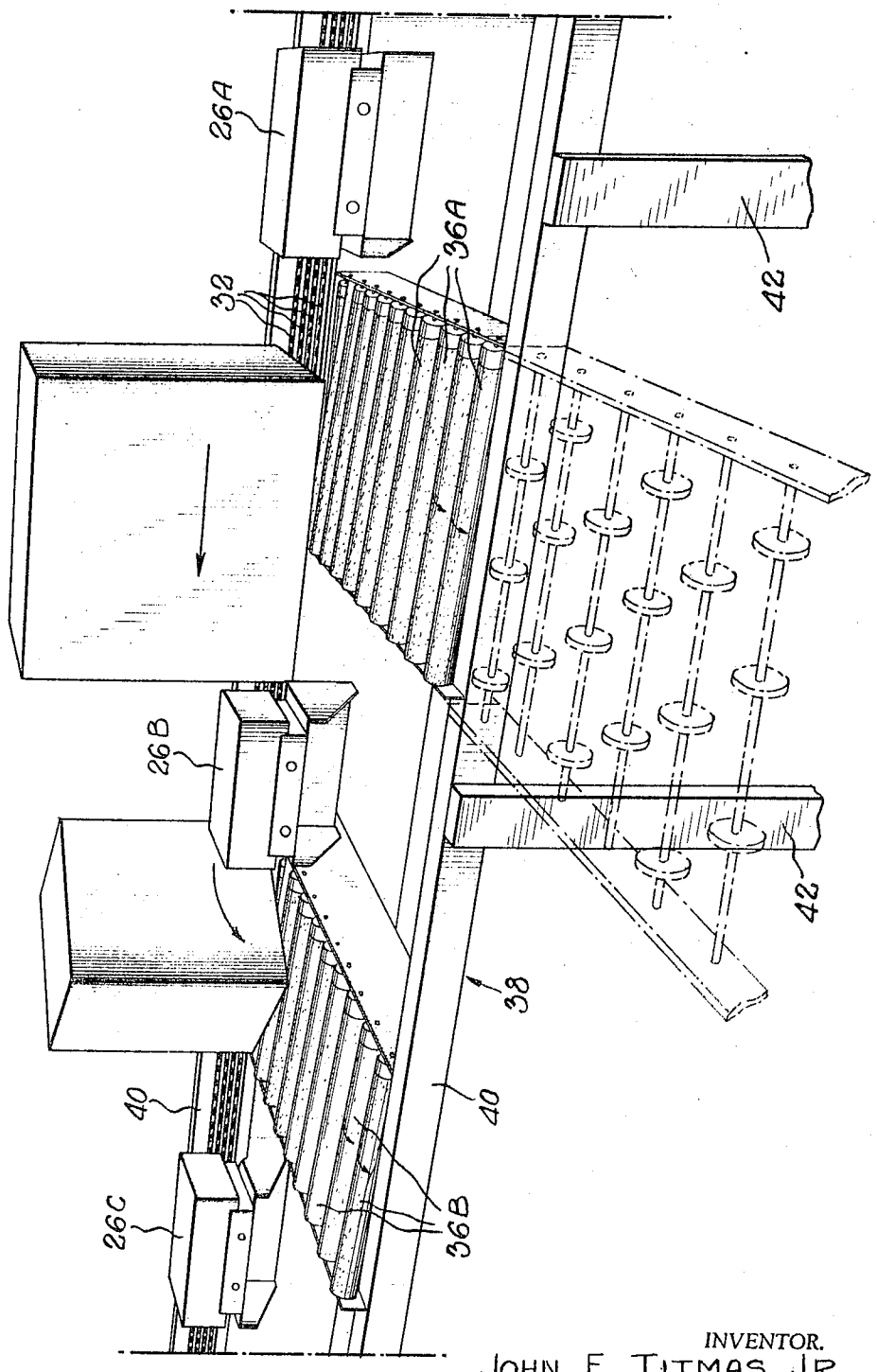


Fig. 2.

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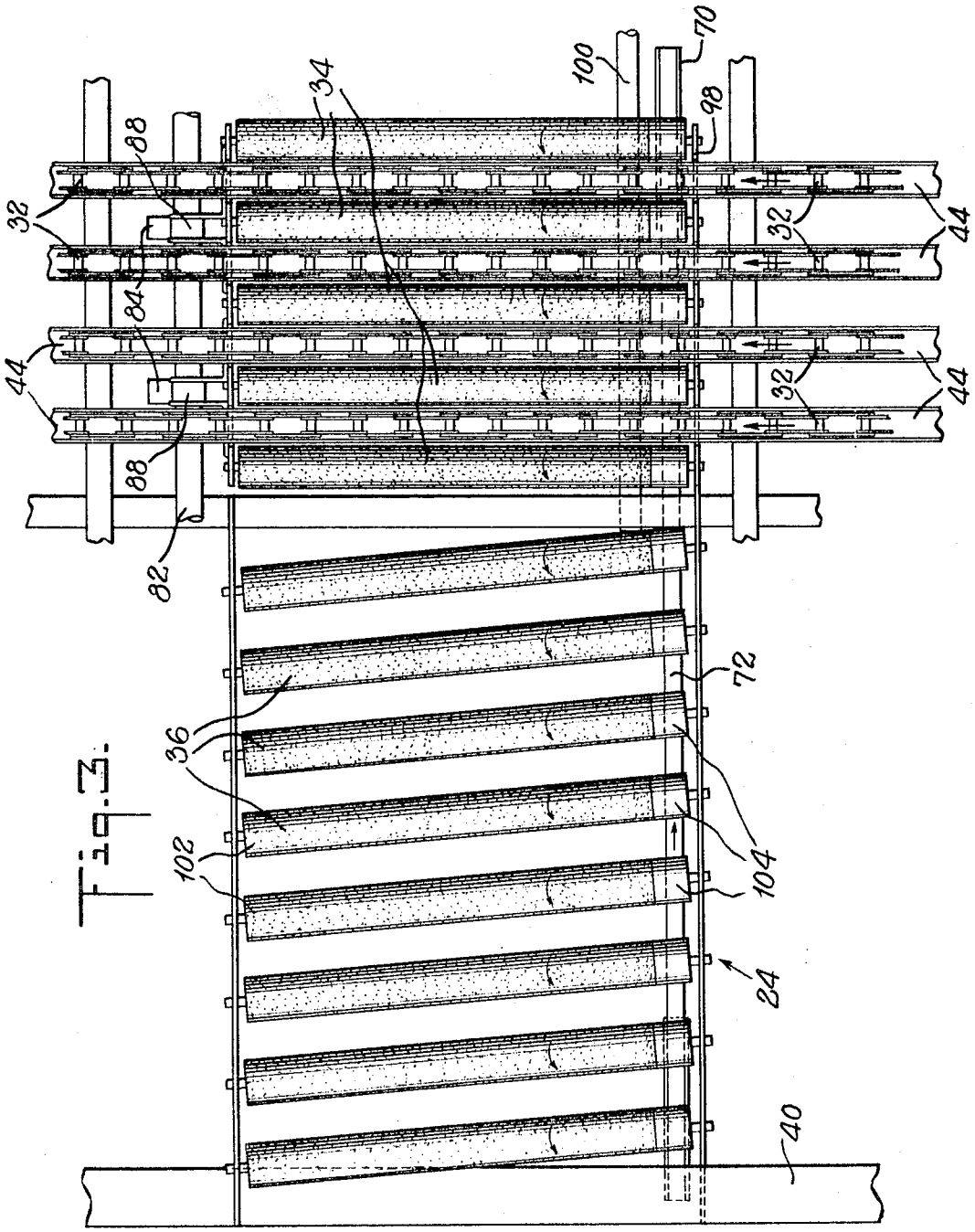


Fig. 3.

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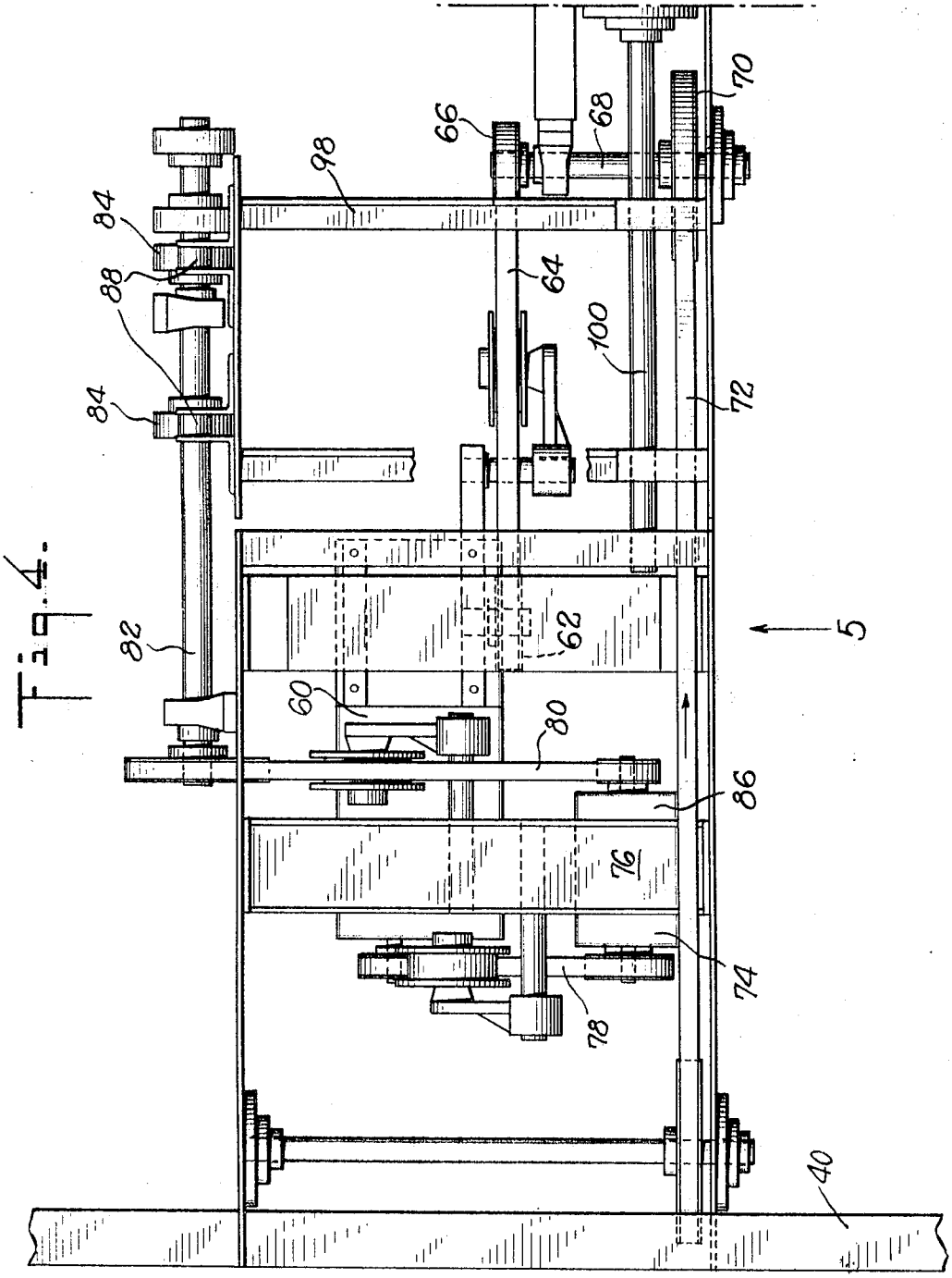


Fig. 4.

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CASE DIVERTER

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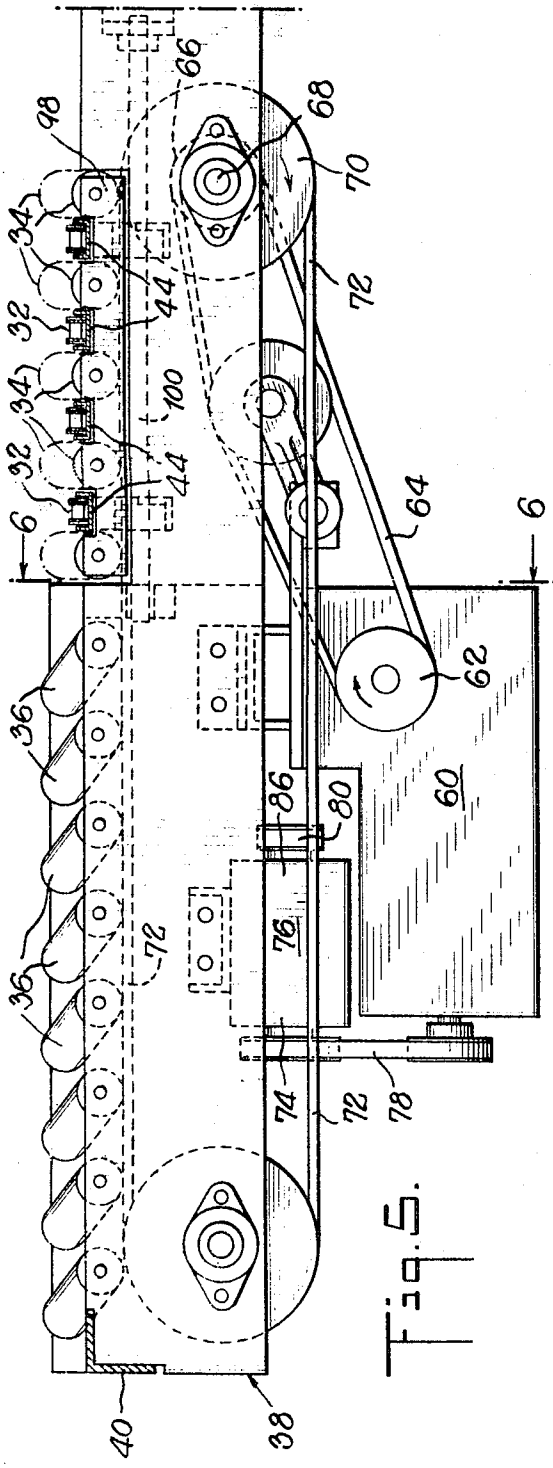


Fig. 5.

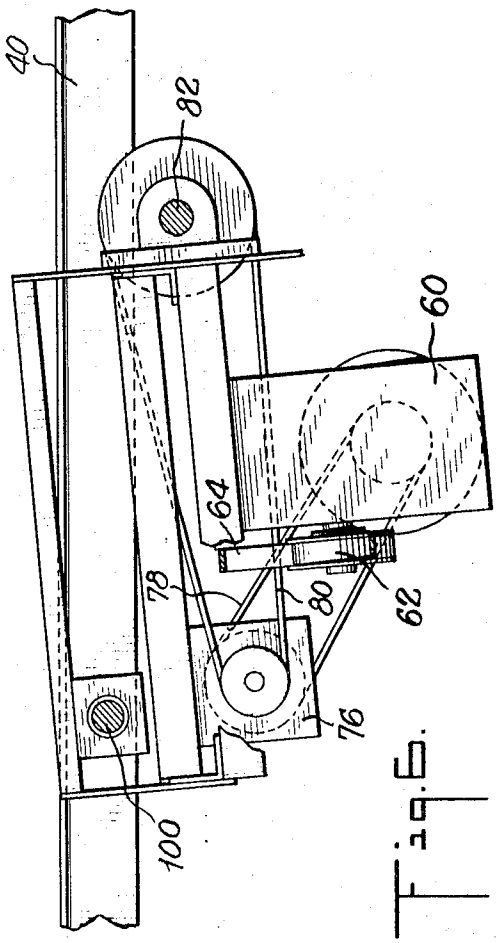


Fig. 6.

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CASE DIVERTER

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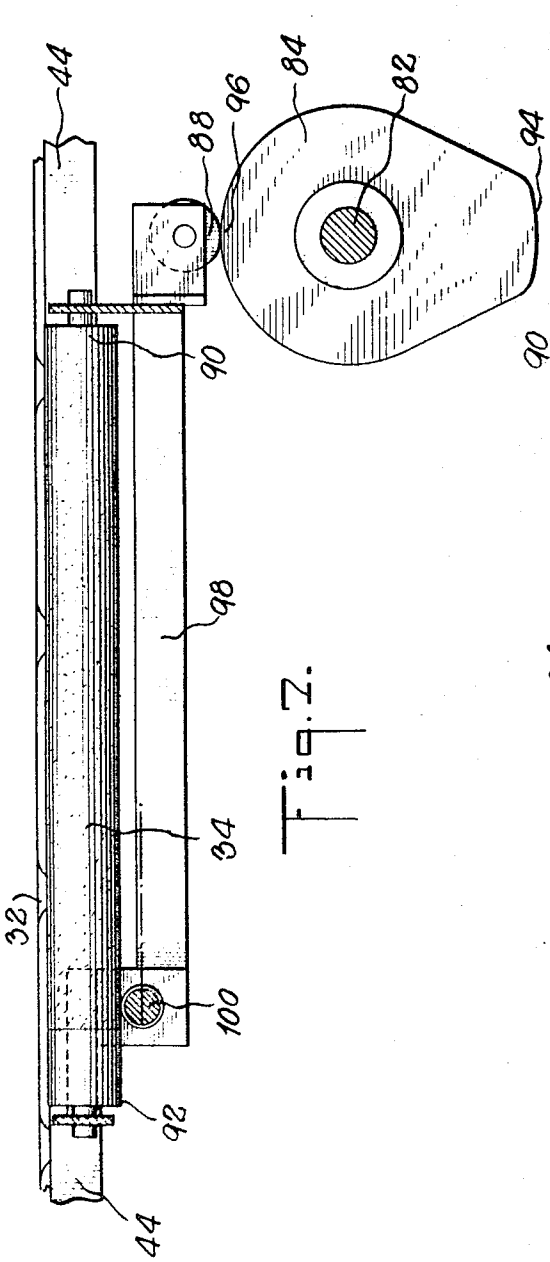


Fig. 7.

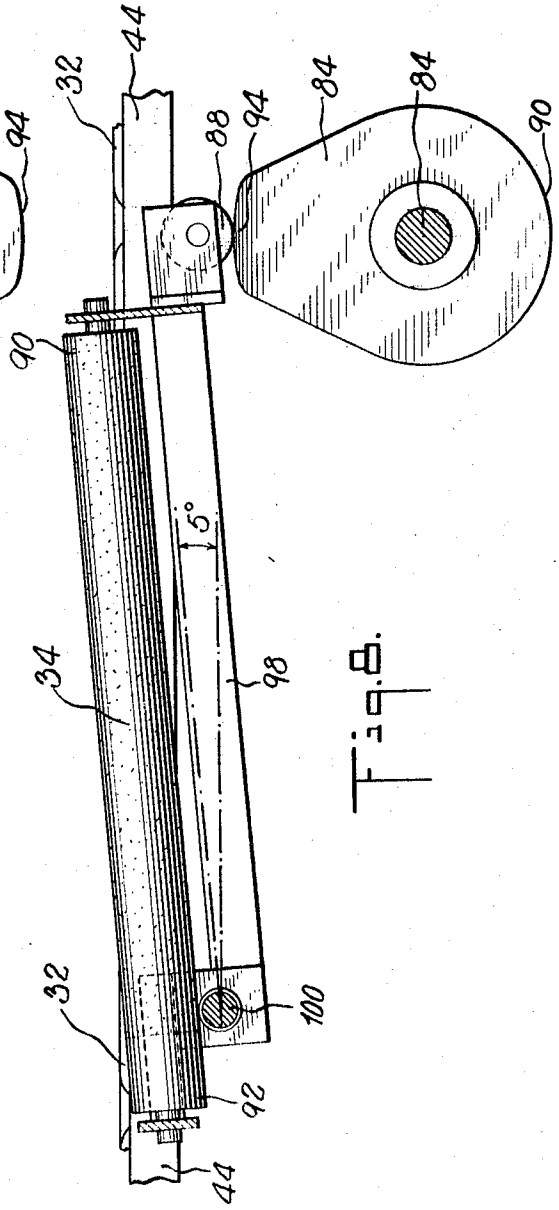


Fig. 8.

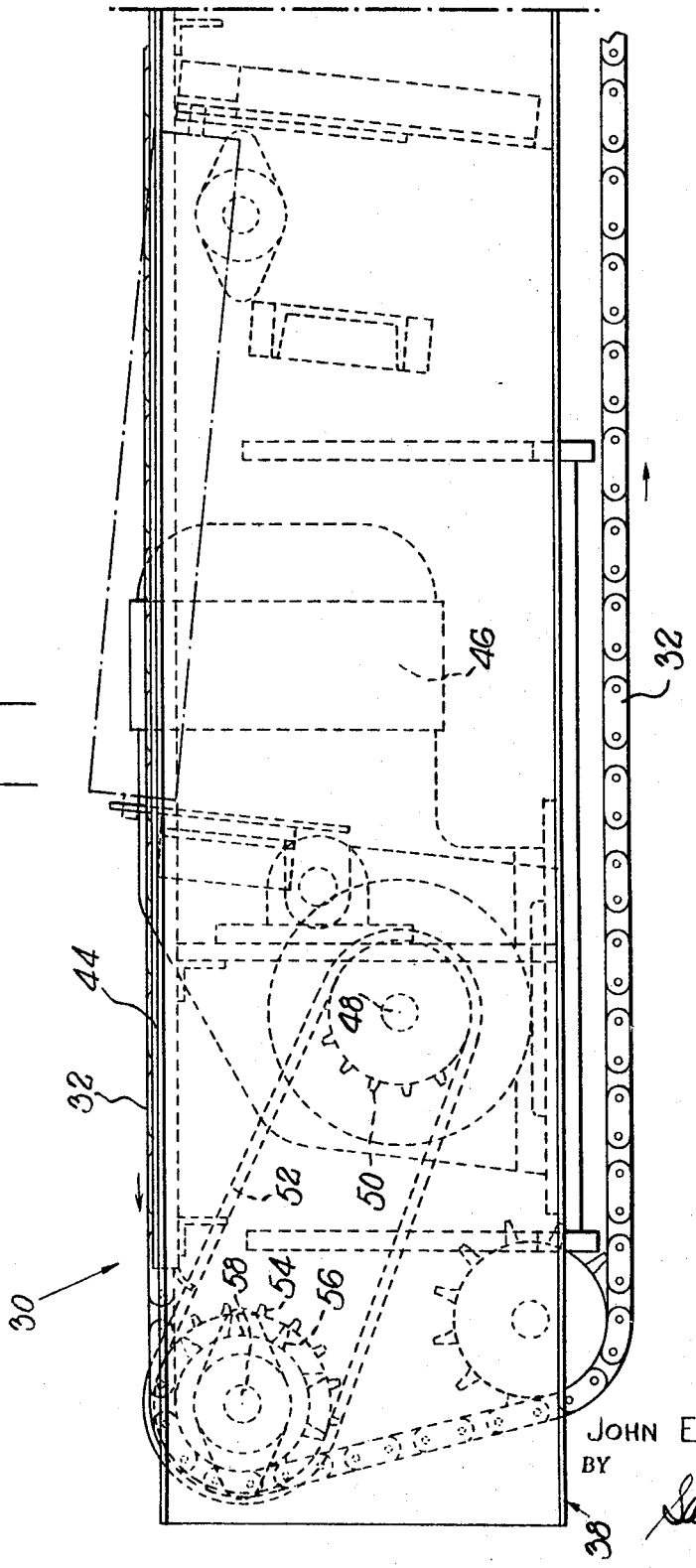
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Fig. 5.



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United States Patent Office 3,456,773 Patented July 22, 1969

3,456,773

CASE DIVERTER

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Filed Mar. 7, 1967, Ser. No. 621,294
Int. Cl. B65g 47/00, 37/00
U.S. Cl. 198—20 10 Claims

ABSTRACT OF THE DISCLOSURE

A case diverter for diverting selected cases from a main conveyor onto a spur conveyor while maintaining the relative positions of the faces of the case with respect to the direction of motion having means for detecting the cases to be selected for delivery to the spur conveyor, means for moving the leading ends of a plurality of rollers vertically upward between the moving means of the main conveyor to move the selected cases onto the spur conveyor, the rollers of the spur conveyor being skewed in both the horizontal and vertical dimensions to facilitate maintaining the orientation of the diverted cases so that the leading faces of the cases on the main conveyor remain the leading faces of the cases on the spur conveyor.

The invention relates to case diverters which transfer selected cases from a main conveyor to spur conveyors which are substantially perpendicular to the main conveyor. In particular, the invention is directed toward such case diverters wherein the orientation of the cases, which are diverted to the spur conveyors, is not changed, namely the leading face of the case as it moves on the main conveyor remains its leading face as it moves on the spur conveyor.

It is an important object of the invention to provide a case diverter which removes selected cases of product from a main conveyor and delivers them to a spur conveyor which is substantially perpendicular to the main conveyor without changing the orientation of the diverted cases or affecting the movement of other cases on the main conveyor.

It is a further object of the invention to provide such a case diverter wherein the diverting mechanism comprises a plurality of rollers which are raised into the stream of the main conveyor to raise the selected cases off the main conveyor and direct them onto the spur conveyor.

It is a still further object of the invention to provide such a case diverter wherein the rollers in the upper position are skewed in the vertical plane so that the leading ends are higher than the trailing ends and the axes of the rollers make an angle of about 5° with the horizontal members of the conveyor frame.

It is a still further object of the invention to provide such a case diverter wherein the rollers of the spur conveyor are skewed in both the vertical and horizontal planes so that the diverted cases are pulled around to maintain their orientation.

These and other objects, advantages, features and uses will be apparent during the course of the following description.

Broadly, the invention is directed toward sorting a mixed line of cases of products into a plurality of separate lines of cases of product to simplify the sorting of the individual products. Thus, the single main conveyor can deliver the cases to forming tables for the preparation of tier loads and pallet loads. If desired, the cases may also be coded to permit the formation of such loads

with a plurality of products in each tier or successive tiers.

The cases are preferably coded in the lower left corner of one side (near the leading face). A reader is located ahead of the case diverter and if the code calls for the case to be diverted at that point, the reader actuates the cam shaft and the diverter rollers are raised to engage the case and direct it onto the spur conveyor. If the code calls for the case to remain on the main conveyor, the reader actuates the cam shaft to lower the diverter rollers if they are up or to leave them down if they are down.

It is also within the contemplation of the invention to utilize height or width sensors or any other sensing means capable of distinguishing among the various cases moving on the main conveyor. Such sensing means may then be used to actuate the cam shaft and the diverter rollers, as required.

In the drawings, wherein there is illustrated a preferred embodiment of the case diverter of the invention;

FIGURE 1 is a diagrammatic plan view of the invention showing the main conveyor and three spur conveyors;

FIGURE 2 is a side elevational view of a portion of the main conveyor, two spur conveyors and case diverters of the invention;

FIGURE 3 is a plan view of a portion of the main conveyor, one spur conveyor and diverter;

FIGURE 4 is a plan view similar to that of FIGURE 3 with the rollers and chains removed to show the driving elements for the diverter and spur conveyor rollers and the cam shaft for raising and lowering the diverter rollers;

FIGURE 5 is a side elevational view, viewed in the direction of arrow **5** of FIGURE 4;

FIGURE 6 is a vertical sectional view, taken along lines **6—6** of FIGURE 5, viewed in the direction of the arrows;

FIGURE 7 is an enlarged elevational view of the cam showing a diverter roller in its lower position;

FIGURE 8 is a view similar to that of FIGURE 7 showing a diverter roller in its upper position; and

FIGURE 9 is an enlarged, side elevational view, viewed in the direction of arrows **9—9** of FIGURE 1, showing the head of the main conveyor with the motor for driving the main conveyor chains.

In the drawings, wherein, for the purpose of illustration, is shown a preferred embodiment of the invention, the numeral **20** designates the case distribution system generally. System **20** is seen to comprise (FIGURE 1) main conveyor **22**, spur conveyors **24A**, **24B** and **24C**, and code readers **26A**, **26B** and **26C**.

The suffix letters are used to indicate that different product cases are selected and directed onto the particular spur conveyor by its associated code reader. Otherwise, the spur conveyors will be designated as **24** and the code readers as **26**.

The cases of products enter the system at its tail **28** and are carried on chains **32** toward the head **30**. A case A is detected by code reader **26A** and rollers **34A** are raised to contact case A to direct it onto rollers **36A** of spur conveyor **24A**. When any code other than that of case A is read by code reader **26A**, the rollers **34A** are either lowered or left in the down position and the case proceeds on chains **32** until it reaches the proper spur conveyor.

In systems of the invention, there are occasional uncoded cases or cases whose code is improperly read by the code readers so that they are not diverted onto the appropriate spur conveyor. These cases are taken from

the head of the main conveyor and hand palletized or otherwise disposed of.

In FIGURE 2, there is a view of the frame **38** in which the conveyors are mounted and which comprises horizontal members **40** and vertical members **42**. Code readers **26**A, **26**B and **26**C are well known in the art and are, for example, model 420DS–2 manufactured by General Atronics Corp., Philadelphia, Pa.

Chains **32** are, preferably, of the extended pitch type because the flat top surface of this type chain increases the case stability at high speeds. The chains are mounted in U-shaped channels **44** which are affixed to frame **38**.

The cases are spaced apart by metering belts or rollers prior to their entering onto chains **32**. Chains **32** are driven by motor **46** which is mounted at the head **30** (FIGURE 9). The drive train comprises shaft **48** of motor **46** on which is mounted drive sprocket **50** which drives chain **52**. Chain **52** drives sprocket **54** which is located together with sprocket **56** on common shaft **58**. Sprocket **56** drives chain **32**. There is a socket **56** for each chain **32**.

Diverter rollers **34** are mounted between chains **32** (FIGURE 3) and their surfaces are preferably formed of material such as urethane or a metal roller painted with an anti-skid coating which has a high coefficient of friction and which is manufactured by 3M Company, St. Paul, Minn. This type of surface improves the operation since it reduces the likelihood of the diverted case's slipping. Rollers **34** and **36** run at a higher velocity than chains **32** so that the cases do not pile up at the spur conveyor and thereby block the main conveyor.

The drive train for rollers **34** and **36** and the cam shaft control for rollers **34** is illustrated in FIGURES 4–6 and the cam operation is illustrated in FIGURES 7 and 8. Motor **60** drives rollers **34** and **36** so that they run all the time. The drive train comprises sheave **62**, belt **64**, sheave **66**, shaft **68**, pulley **70** and belt **72** (FIGURE 4). All the rollers **34** and **36** are driven by belt **72** as can be seen in FIGURE 5.

When a code reader **26** calls for a case to be diverted to a spur conveyor **24**, clutch **74** connects transmission **76** to drive belt **78** which is connected to motor **60**. The rotation of transmission **76** moves belt **80** which is coupled to cam shaft **82**. As cam shaft **82** rotates it moves cams **84** to the upper position (FIGURE 8). When cams **84** reach the upper position, clutch **74** is released, brake **86** is actuated and the rotation of the cam shaft is stopped. When it is necessary to lower rollers **34**, brake **86** is released, clutch **74** is actuated and the cam shaft is rotated until cams **84** reach the position of FIGURE 7 at which point the clutch **74** is released and the brake **86** stops the rotation of the cam shaft.

Rollers **34** are moved by means of cam **84** which acts against follower **88**. It is seen from FIGURE 8 that the leading end **90** of roller **34** is raised above the other or trailing end **92** so that a portion of a roller **34** is above the level of chain **32** and thereby engages the case which overlies it. By the term "leading" end is meant the end of the roller nearer the head of the machinte. The rollers **34**, in their upper position, are skewed in the vertical plane so that their axes make a vertical angle of about 5° with the horizontal frame members.

Rollers **34** are mounted in carriage **98** as shown in FIGURES 7 and 8. When low spot **96** of cam **84** contacts cam follower **88**, carriage **98** which pivots on shaft **100** is in its lower position and rollers **34**, which are below the level of chains **32**, do not contact any cases which overlie them and the cases move along the main conveyor.

When high spot **94** of cam **84** contacts cam follower **88**, carriage **98** is pivoted upward about shaft **100** and rollers **34** contact the case which overlies it and moves it onto the spur conveyor.

Rollers **36** of the spur conveyor **24** are skewed both horizontally and vertically. Ends **102** are skewed with respect to ends **104** (FIGURE 3) by about 5° in the horizontal plane so that the axes of the rollers make a horizontal angle of about 5° with the vertical frame members. Ends **102** are higher than ends **104** so that the rollers are skewed in the vertical plane and their axes make a vertical angle of about 5° with the horizontal frame members. This configuration and the use of roller surfaces having a high coefficient of friction aid in moving the cases so that their orientation remains unchanged from the main conveyor to the spur conveyor, namely, the leading face of the case remains the leading face.

As various changes could be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A system for delivering selected cases of product from a main conveyor to at least one spur conveyor while maintaining the leading face of each selected case as it moves on the main conveyor as the leading face as it moves on the spur conveyor comprising:

a frame having horizontal and vertical members;

a main conveyor supported by said frame;

a plurality of rollers mounted in the frame in the stream of the main conveyor and movable to an upper position and a lower position with respect to the horizontal members of the frame so that in the upper position the plurality of rollers engages the case overlying it and in the lower position the plurality of rollers does not engage the case overlying it, said rollers having forward ends and rearward ends taken relative to the movement of said main conveyor;

means for moving the plurality of rollers to either the upper position or the lower position;

a spur conveyor making an angle with the main conveyor;

means for actuating the means for moving the plurality of rollers;

means for rotating the plurality of rollers;

the plurality of rollers being positioned such that when the rollers are in the upper positions and are rotated, the case overlying the plurality of rollers is moved from the main conveyor onto the spur conveyor;

the plurality of rollers being skewed in the vertical plane in the upper position so that the forward ends of the rollers are higher than the rearward ends; and

a second plurality of rollers which are skewed in the vertical plane so that the end of each roller of the second plurality of rollers in line with the forward ends of the plurality of rollers is higher than the other end thereof.

2. The invention of claim **1** wherein the spur conveyor comprises:

a second plurality of rollers which are skewed in the vertical plane so that the end of each roller of the second plurality of rollers in line with the leading ends of the plurality of rollers is higher than the other end thereof.

3. The invention of claim **1** wherein:

the plurality of rollers and the second plurality of rollers are formed of material having a high coefficient of friction; and

the axes of the rollers of the plurality of rollers in the upper position and of the second plurality of rollers make a vertical angle of the order of 5° with the horizontal members of the frame.

4. The invention of claim **1** wherein:

the plurality of rollers is formed of material having a high coefficient of friction; and

the axes of the rollers of the plurality of rollers in the upper position make a vertical angle of the order of 5° with the horizontal members of the frame.

5. A system for delivering selected cases of product

from a main conveyor to at least one spur conveyor while maintaining the leading face of each selected case as it moves on the main conveyor as the leading face as it moves on the spur conveyor comprising:

a frame having horizontal and vertical members;

a main conveyor supported by said frame;

a plurality of rollers mounted in the frame in the stream of the main conveyor and movable to an upper position and a lower position with respect to the horizontal members of the frame so that in the upper position the plurality of rollers engages the case overlying it and in the lower position the plurality of rollers does not engage the case overlying it, said rollers having forward ends and rearward ends taken relative to the movement of said main conveyor;

means for moving the plurality of rollers to either the upper position or the lower position;

a spur conveyor making an angle with the main conveyor;

means for actuating the means for moving the plurality of rollers;

means for rotating the plurality of rollers;

the plurality of rollers being positioned such that when the rollers are in the upper position and are rotated, the case overlying the plurality of rollers is moved from the main conveyor onto the spur conveyor;

the plurality of rollers being skewed in the vertical plane in the upper position so that the forward ends of the rollers are higher than the rearward ends; and

a second plurality of rollers which are skewed in the horizontal plane so that the end of each roller of the second plurality of rollers in line with the forward ends of the plurality of rollers is forward of the other end thereof.

6. The invention of claim **5** wherein the second plurality of rollers is skewed in the vertical plane so that the end of each roller of the second plurality of rollers which is forward of its other end is higher than the other end thereof.

7. The invention of claim **6** wherein:

the main conveyor comprises a plurality of chains mounted in the frame and means for moving the chains longitudinally;

the plurality of rollers is positioned within the plurality of chains; and

the plurality of rollers and the second plurality of rollers are formed of material having a high coefficient of friction.

8. The invention of claim **7** wherein:

the axes of the rollers of the plurality of rollers in the upper position and of the second plurality of rollers make a vertical angle of the order of 5° with the horizontal members of the frame.

9. The invention of claim **6** wherein:

the plurality of rollers and the second plurality of rollers are formed of material having a high coefficient of friction; and

the axes of the rollers of the plurality of rollers in the upper position and of the second plurality of rollers make a vertical angle of the order of 5° with the horizontal members of the frame.

10. The invention of claim **5** wherein:

the plurality of rollers and the second plurality of rollers are formed of material having a high coefficient of friction; and

the axes of the rollers of the plurality of rollers in the upper position make a vertical angle of the order of 5° with the horizontal members of the frame.

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U.S. Cl. X.R.

198—105