June 11, 1963 J. J. McLAUGHLIN 3,093,236

DEFLECTOR MECHANISM

Filed Dec. 21, 1959 2 Sheets-Sheet 1

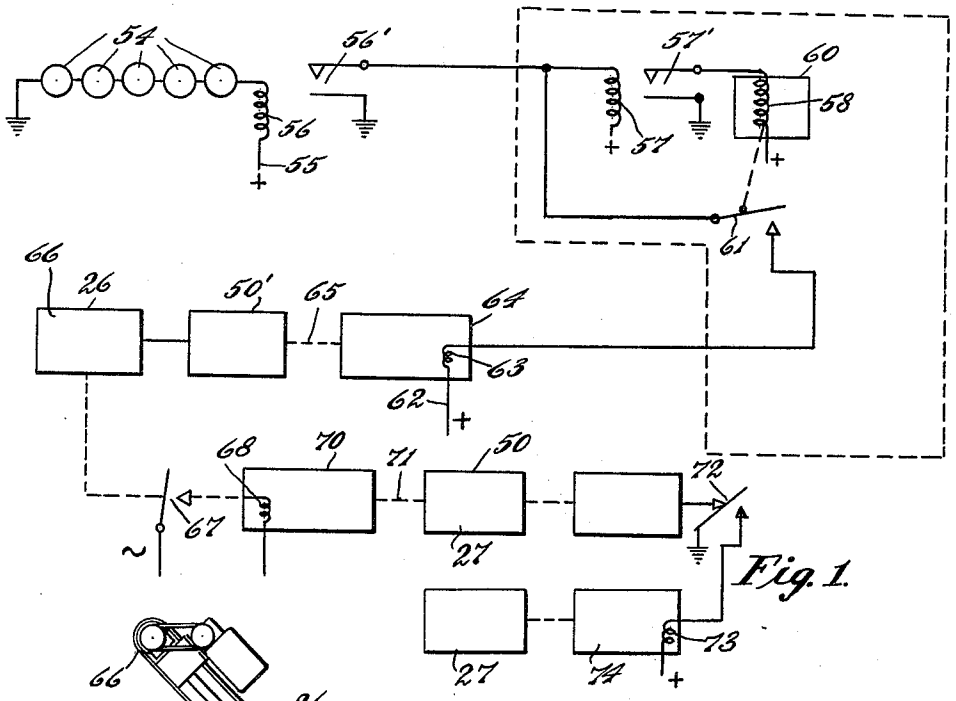


Fig. 1.

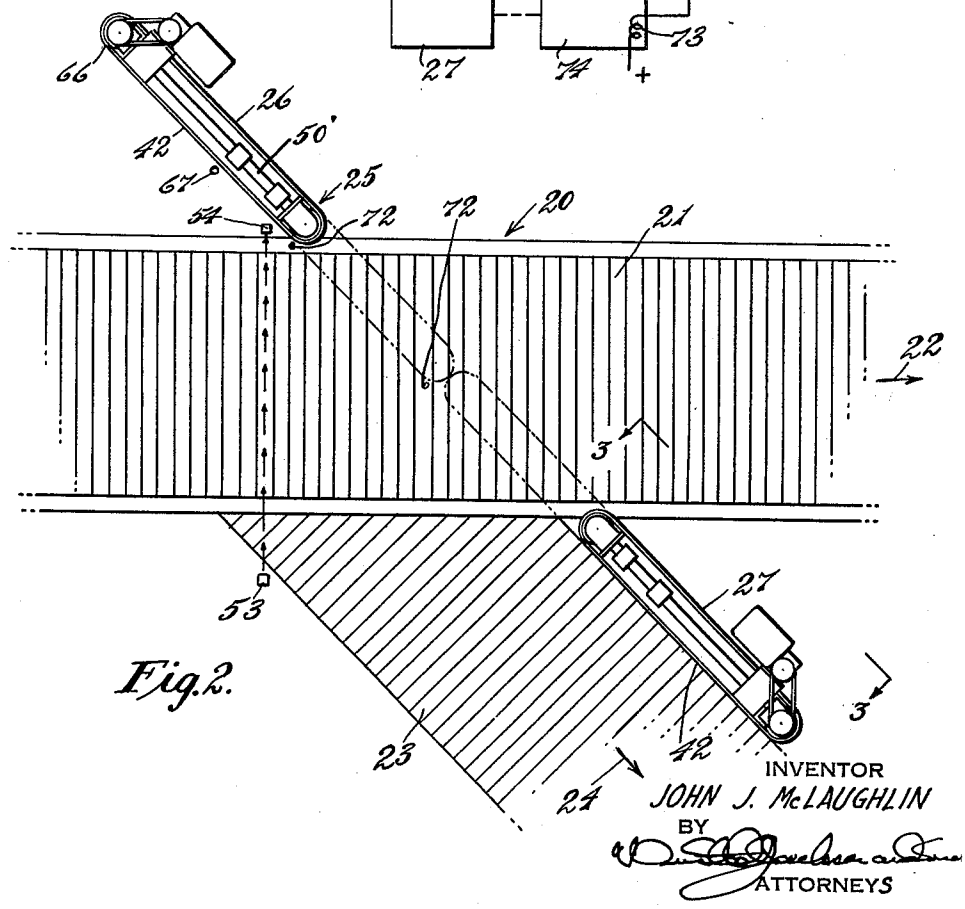


Fig. 2.

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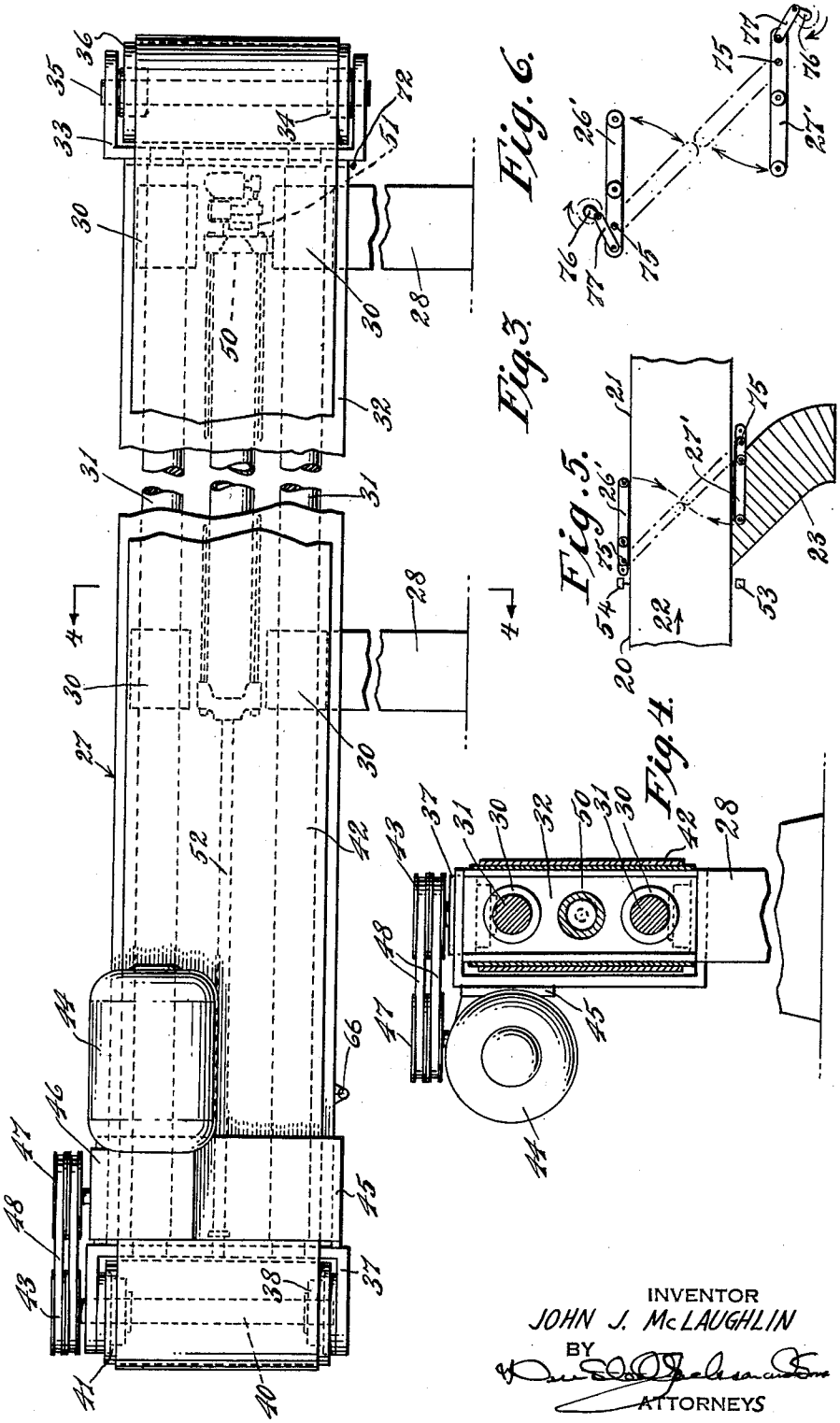


Fig. 6.

Fig. 3.

Fig. 5.

Fig. 4.

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DEFLECTOR MECHANISM

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The present invention relates to deflector mechanism which is particularly useful in connection with conveyors.

A purpose of the invention is to operate a deffector mechanism which can more reliably divert an object from one conveyor path to another and is less likely to wrongly deflect an object not requiring deflection notwithstanding that objects may be traveling in close sequence on the conveyor.

A further purpose is to increase the speed at which a deflector can become effective on a conveyor and also decrease the speed with which a deflector can be withdrawn from a conveyor.

A further purpose is to permit withdrawal of portions of a deflector at different times, suitably allowing a portion of the deflector which is first encountered by an object on the conveyor to be first withdrawn so that it will be less likely to strike a following or preceding object.

A further purpose is to extend a deflector diagonally across a conveyor from opposite sides, and to advance and withdraw the deflector partially from one side and partially from the other side.

A further purpose is to advance and withdraw a deflector in response to the presence of an object on the conveyor desirably assisted by a selector control which will predetermine whether or not the deflector will operate.

A further purpose is to mount deflector bodies on sliding guides, to position pulleys on vertical axes on forward and rearward ends of the deflector bodies, and to drive belts extending around the pulleys in the same direction on a cooperating pair of deflector bodies, the belts traveling in the direction of deflection during advance and retraction of the deflector operations.

Further purposes appear in the specification and in the claims.

In the drawings I have chosen to illustrate one only of the numerous embodiments in which the invention may appear, selecting the forms shown from the standpoints of convenience in illustration, satisfactory operation, and clear demonstration of the principles involved.

FIGURE 1 is an electrical and fluid diagram useful in explaining the operation of the deflector system.

FIGURE 2 is a diagrammatic top plan view of a deflector installation according to the invention applied to a conveyor.

FIGURE 3 is an enlarged fragmentary side elevation of one of the deflector halves according to the invention from the position of the line 3—3 in FIGURE 2.

FIGURE 4 is a fragmentary section on the line 4—4 of FIGURE 3.

FIGURE 5 is a diagrammatic top plan view of a swinging form of deflector according to the invention.

FIGURE 6 is an elevation of the crank mechanism for operating the conveyor halves of FIGURE 5.

Describing in illustration and not in limitation and referring to the drawings:

In the prior art, it is common to convey distributed objects of the character of packages, boxes, cartons, and other containers and the like by means of conveyors, such as generally horizontal belt and live roller conveyors, from which alternate distribution paths are provided.

In conveyors of this character it is quite possible that articles may travel in close sequence or in a regular sequence, some of the articles being closely spaced, and in such cases it is very difficult to apply a deflector to the conveyor to divert one object into an alternate conveyor path without the danger of either striking and improperly deflecting another object or striking and damaging another object.

The present invention provides a deflector which is much less likely to improperly divert objects, and is much less likely also to improperly strike or damage articles.

The deflector of the present invention is able to advance to deflecting position in much less time than the deflectors of the prior art, and is able to withdraw more quickly, and also to withdraw the deflector halves at different times.

Thus there is much more positive assurance that desired objects will be deflected and undesired objects will not be deflected and also less likelihood of damaging fragile wrappings and cartons which may be traveling on the conveyor.

The invention is applicable without special control and under individual manual operation, but in the preferred embodiment the deflector mechanism of the invention operates in response to the presence of an object, and also suitably in response to selection of a particular object among a sequence of objects travelling on a conveyor.

Considering first the mechanism of the conveyor and deflector I illustrate a suitable conveyor **20** best seen in FIGURE 2 which has a main generally horizontal conveyor path **21** traveling in the direction of the arrow **22**, and provided with an auxiliary or diverging path **23** suitably positioned slightly below the conveyor **21** and traveling in the direction of the arrow **24**.

A deflector **25** according to the invention is positioned diagonally on the side of the line of prolongation of the diverting path **23** which is remote from the approach of the articles, so that the deflecting component will carry the articles on to the auxiliary conveyor **23**. The deflector **25** consists of two deflector halves **26** and **27**, which are disposed in line with one another, such line extending diagonally across the main conveyor path. The deflector halves have retracted positions in which they are at the side of but not above the conveyor **21** and they have advanced position shown by the dot and dash lines in FIGURE 2 in which they extend across and substantially meet suitably near the middle of the main conveyor **21**, forming a sufficiently complete obstruction across the main conveyor path to divert all articles traveling on the conveyor.

As best seen in FIGURES 3 and 4 each of the conveyor halves is mounted on stationary vertical supports **28** which position sliding guides **30**, which guides support and control the sliding motion of support rods **31** of the deflector frame **32**.

The deflector frame at one end carries a yoke **33** which mounts bearings **34** in which is journalled a suitable vertical shaft **35** on which a belt pulley **36** is keyed. At the opposite end of the deflector frame a yoke **37** mounts bearings **38** in which is journalled a suitable vertical shaft **40** on which a belt pulley **41** is keyed. A belt **42** is threaded around the pulleys and surrounds the outside of the deflector frame extending substantially the height of the frame and sufficiently close to the top of the conveyor **21** in extended position so that no article can pass along the conveyor without encountering the deflector belt.

Shaft **40** at its upper end carries pulleys **43** which are driven by a motor **44** mounted by a bracket **45** at the back of the frame remote from the operative face, said bracket spaning the belt **42**. The motor drives a speed reducer **46** which drives pulleys **47** which interconnect with the pulleys **43** by belts **48**.

The deflector halves are moved between their retracted and advanced positions by a suitably air-actuated double-acting cylinder **50** mounted at one end **51** from the support **28** and having a piston and rod combination **52** which connects at the other end with the yoke **37**. Air, under pressure, selectively delivered to the appropriate end of the double acting cylinder **50** will move the piston and rod assembly **52** which, acting through yoke **37**, will project or retract the deflector frame along a path defined by guides **30** mounted on supports **28**.

Positioned suitably ahead of the deflector is a photo-electric illumination device **53** which provides a series of illumination paths which transmit beams of light at a series of suitable elevations across the conveyor **21** to photo-cells **54** which are desirably connected electrically in series and which are energized from a suitable positive source of electric current at **55** through relay electro-magnet **56** to ground.

Relay **56** has a normally open contact **56'**, which is energized in case any one of the photo-cells **54** becomes deenergized due to interruption of the light beam by an article travelling on the conveyor. The normally open contact **56'** of the relay is connected electrically in series across to ground from a power source through the electro-magnet of relay **57**, said relay controlling normally open contacts **57'**. Normally open contacts **57'** close every time an article is encountered on the conveyor and transmit an electrical pulse through electromagnet **58** of memory or counter unit **60** of any well-known type suitably conected from a source of current to ground through contacts **57'**. At a time determined by the memory or counter unit **60**, normally open contacts **61** are closed establishing that it is desired to divert a particular article by the diverter. Contacts **61** are in series from a source of current applied at **62** through solenoid **63** of solenoid valve **64** and through contacts **56'** to ground. When solenoid valve **64** opens it admits hydraulic fluid, suitably air, under pressure through pipe **65** to the end of the air cylinder **50'** of deflector half **26** so as to advance the deflector half across the conveyor. As deflector half **26** advances, deflector abutment **66** on the deflector half encounters normally open micro-switch **67** which is connected through a suitable source of electric current and through solenoid **68** of solenoid valve **70**, which opens to introduce hydraulic fluid, suitably air, through pipe **71** to air cylinder **50** of deflector half **27** and thus move deflector **27** forward.

At the same time that the deflector halves are moving forward and while they are forward the belts of the operative side of the deflectors are both moving in the same direction to carry the article on the conveyor **21** laterally, so that very soon after deflector half **26** has moved across its half of the conveyor, it will have diverted the article until it is chiefly or entirely engaging deflector half **27**. At this stage therefore deflector half **26** can to advantage retract so that it will not actually be in position across the conveyor to divert a succeding article.

To accomplish this, micro-switch **72** is provided on deflector half **27** so that it will normally open when the trailing edge of the article passes the photo cell, and after contact with the package terminates will close and energize solenoid **73** connected through a source of electric current and operating solenoid valve mechanism **74** which disconnects the air pressure from the forward-operating end of the cylinder **50** and connects air pressure to the retracting end of the cylinder so as to retract diverter **27** and preferably at the same speed at which the belt is travelling longitudinally and the package is moving diagonally.

While the form of FIGURES 1 to 4 is preferred in which the conveyor halves project out in prolongation of their length to the position which they are to achieve on the conveyor, it will be evident that in some cases it will be preferable to use a swinging mechanism as shown in FIGURES 5 and 6. In this form the conveyor half **26'** swings across the conveyor in a direction opposed to the motion of the conveyor **21** in order to achieve its operating position, while the conveyor half **27'** swings across the conveyor in a direction with the conveyor motion in order to achieve its operating position.

Both conveyor halves are mounted on pivot shafts **75**, and the shafts swing back and forth under the action of cranks **76** and connecting rods **77** of any suitable well known character.

When the deflector halves have performed their function, they retract to the solid line position shown in FIGURE 5.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a deflector adapted for use with a conveyor, a first set of guides mounted on one side of the conveyor, a second set of guides mounted on the opposite side of the conveyor, the two sets of guides being in line and disposed diagonally of the conveyor, a deflector body mounted on each of the sets of guides having a retracted position outside the limits of the conveyor and an extended position above the conveyor, pulleys at opposite ends of the deflector bodies on vertical axes, belts around the pulleys, means for driving both belts with the stretch of belt on the side of the deflectors toward an object approaching on the conveyor travelling in the same direction, and means for advancing and retracing the deflectors.

2. In a deflector adapted for use with a conveyor, a pair of deflector halves each of which is pivoted on a generally vertical axis on an opposite side of the conveyor, each of the deflector halves having a retracted position at the side of a conveyor and a forward position at which it extends diagonally across the conveyor in prolongation of the other deflector half, and means for swinging the deflector halves between their two limiting positions.

3. A deflector of claim 2, in combination with pulleys at opposite ends of the deflector halves on vertical axes, belts extending around the pulleys and means for driving the belts.

4. In a deflector mechanism for use with a conveyor, a pair of deflector halves on opposite sides of the conveyor, directed diagonally across the conveyor in prolongation of one another, each of the deflector halves having a forward position in which it extends partially across the conveyor and a retracted position which is clear of the conveyor, means for retracting the deflector halves, said means beginning movement of the half which is more forwardly located on the conveyor prior to the deflector half which is more rearwardly located on the conveyor, the two deflector halves in their extended positions cooperating to obstruct the path across the conveyor and in their retracted positions cooperating to remain clear of the conveyor, and means for moving the deflector halves between their retracted positions and their extended positions.

5. In a deflector adapted for use with a conveyor, a first set of guides mounted on one side of the conveyor, a second set of guides mounted on the opposite side of the conveyor, the two sets of guides being in line and disposed diagonally of the conveyor, a deflector body mounted on each of the sets of guides having a retracted position outside the limits of the conveyor and an extended position above the conveyor, pulleys at opposite ends of the deflector bodies on vertical axes, belts around the pulleys, means for driving both belts with the stretch of

belt on the side of the deflectors toward an object approaching on the conveyor travelling in the same direction, and means for advancing the deflectors and for retracting the deflectors in which the deflector which is first engaged by the work on the conveyor is moved initially prior to the deflector which is later engaged by the work on the conveyor.

6. In a deflector adapted for use with a conveyor, a first set of guides mounted on one side of the conveyor, a second set of guides mounted on the opposite side of the conveyor, the two sets of guides being in line and disposed diagonally of the conveyor, a deflector body mounted on each of the sets of guides having a retracted position outside the limits of the conveyor and an extended position above the conveyor, pulleys at opposite ends of the deflector bodies on vertical axes, belts around the pulleys, means for driving both belts with the stretch of belt on the side of the deflectors toward an object approaching on the conveyor travelling in the same direction, and means for advancing the deflectors and for retracting the deflectors which is responsive to the travel of work on the conveyor.

7. In a deflector adapted for use with a conveyor, a first set of guides mounted on one side of the conveyor, a second set of guides mounted on the opposite side of the conveyor, the two sets of guides being in line and disposed diagonally of the conveyor, a deflector body mounted on each of the sets of guides having a retracted position outside the limits of the conveyor and an extended position above the conveyor, pulleys at opposite ends of the deflector bodies on vertical axes, belts around the pulleys, means for driving both belts with the stretch of belt on the side of the deflectors toward an object approaching on the conveyor traveling in the same direction, means for retracting the deflectors, and means for advancing the deflectors responsive to the presence of selected articles on the conveyor.

8. In a deflector mechanism for use with a conveyor, a pair of deflector halves on opposite sides of the conveyor and directed diagonally across the conveyor in prolongation of one another, each of the deflector halves having a forward position in which it extends partially across the conveyor and a retracted position in which it is clear of the conveyor, the two deflector halves in their extended positions cooperating to obstruct a path across the conveyor and in their retracted positions cooperating to extend clear of the conveyor, and means for moving the deflector halves between their retracted and extended positions.

9. In a deflector mechanism for use with a conveyor, a pair of deflector halves on opposite sides of the conveyor, belt means mounted to travel longitudinally at one side of each deflector half, means for operating the belt means on both deflector halves in the same direction in prolongation of one another, each of the deflector halves having a forward position in which it extends partially across the conveyor and a retracted position in which it is clear of the conveyor, the two deflector halves in their extended position cooperating to obstruct a path across the conveyor and in their retracted positions cooperate to extend clear of the conveyor, and means for moving the deflector halves between their retracted and extended positions.

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