April 27, 1965 F. D. MARASSO ETAL 3,180,476

CORRECTOR FOR MISALIGNED AND OVERTURNED ROLLS

Filed Jan. 29, 1962 4 Sheets-Sheet 1

FIG. 1

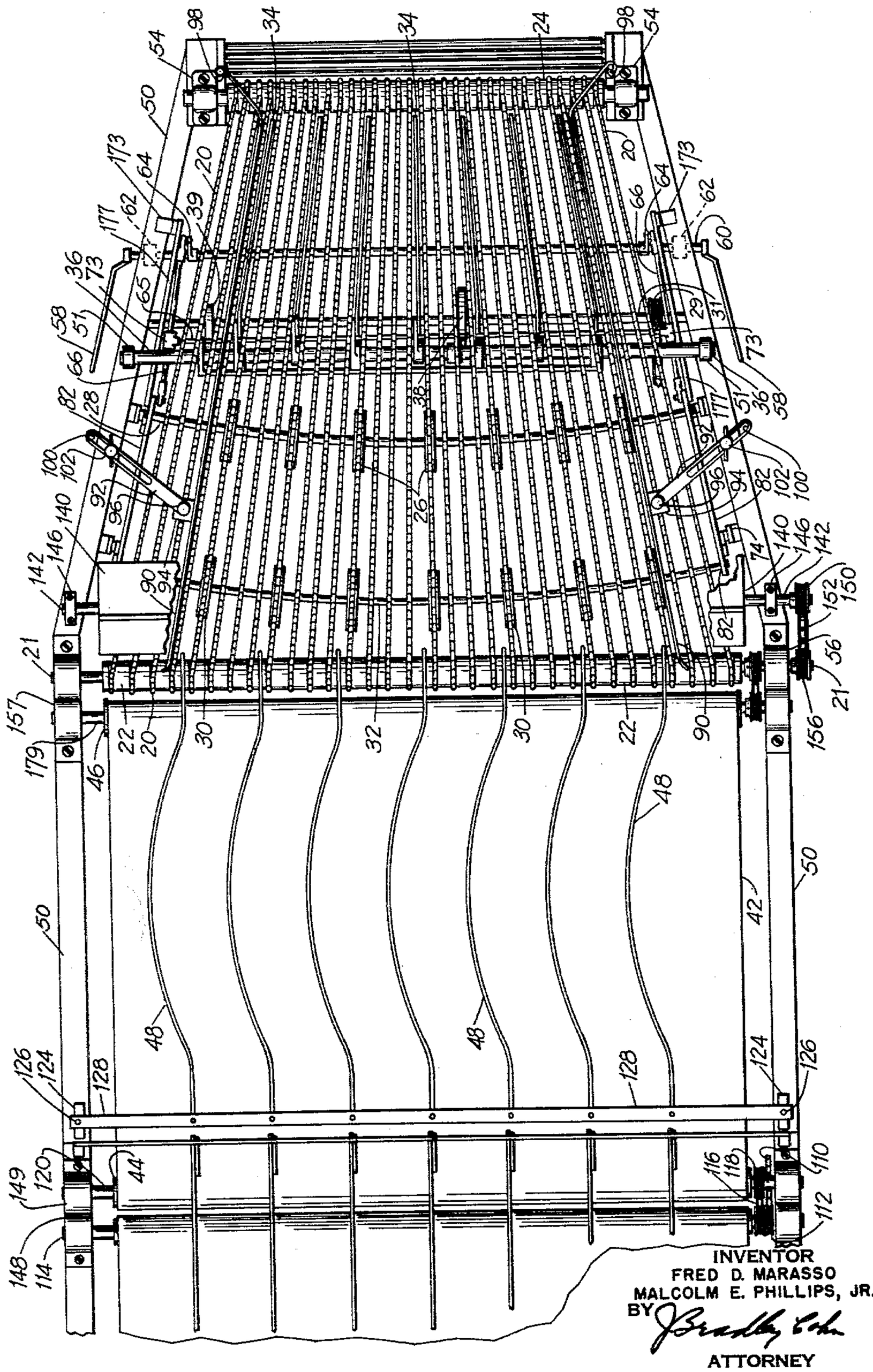

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FIG. 2

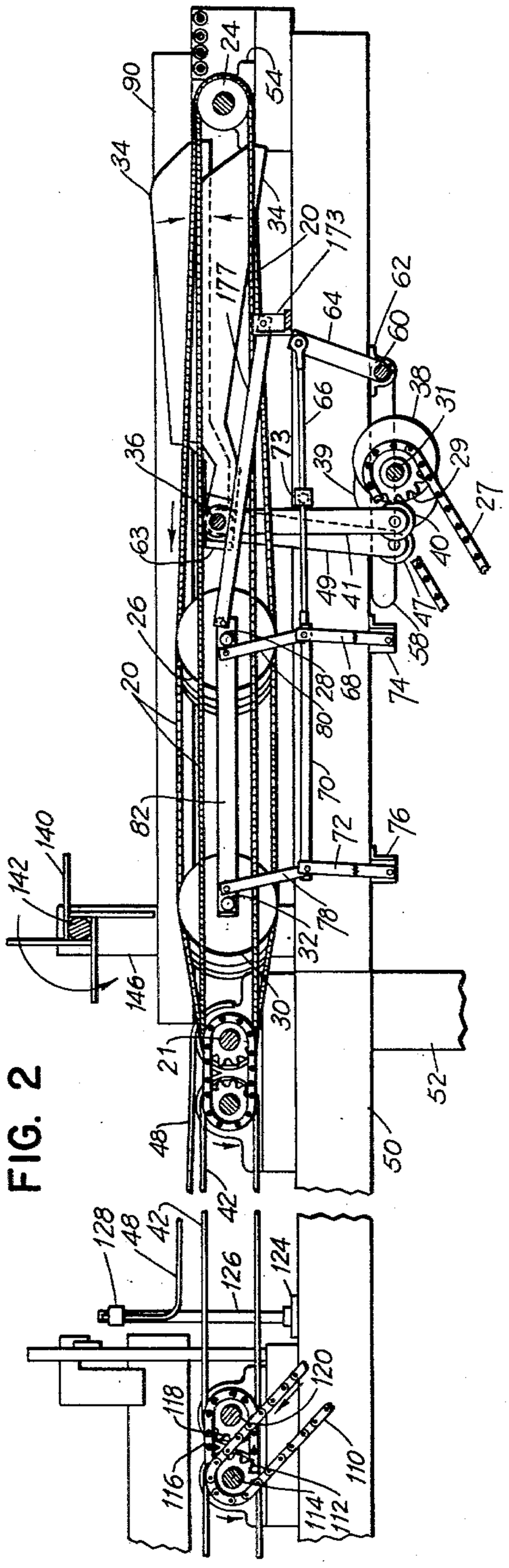
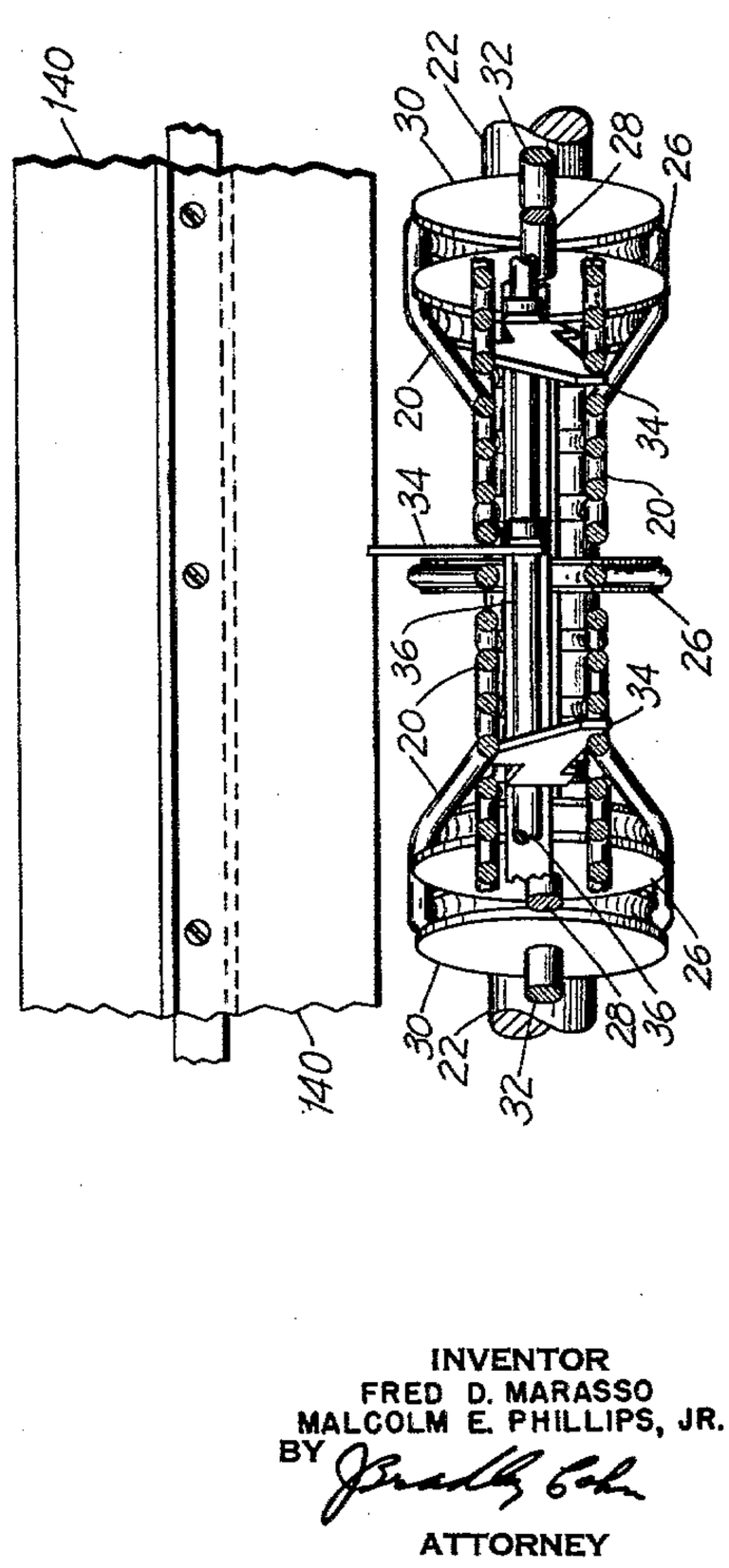


FIG. 5



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CORRECTOR FOR MISALIGNED AND OVERTURNED ROLLS

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FIG. 3

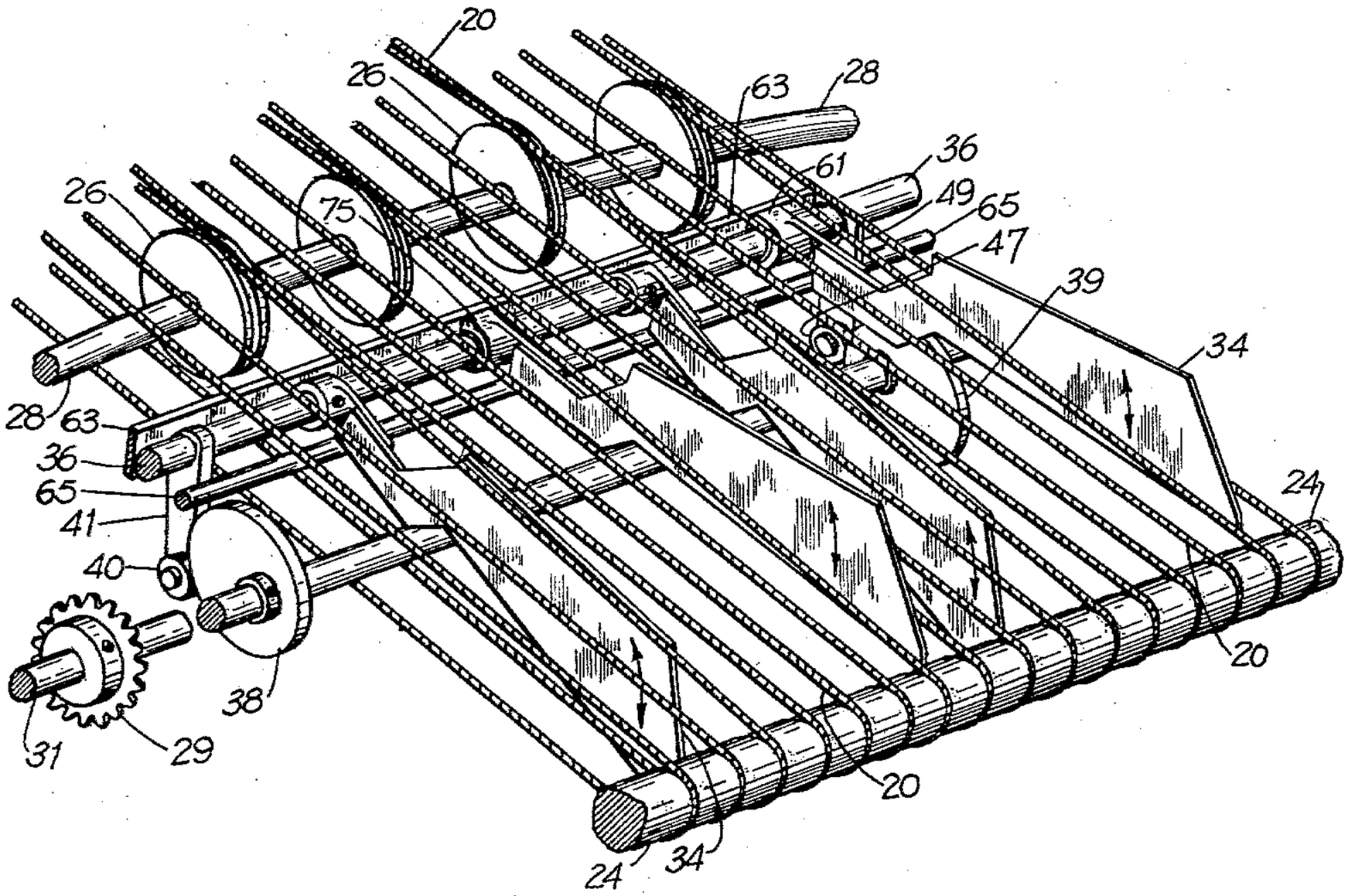
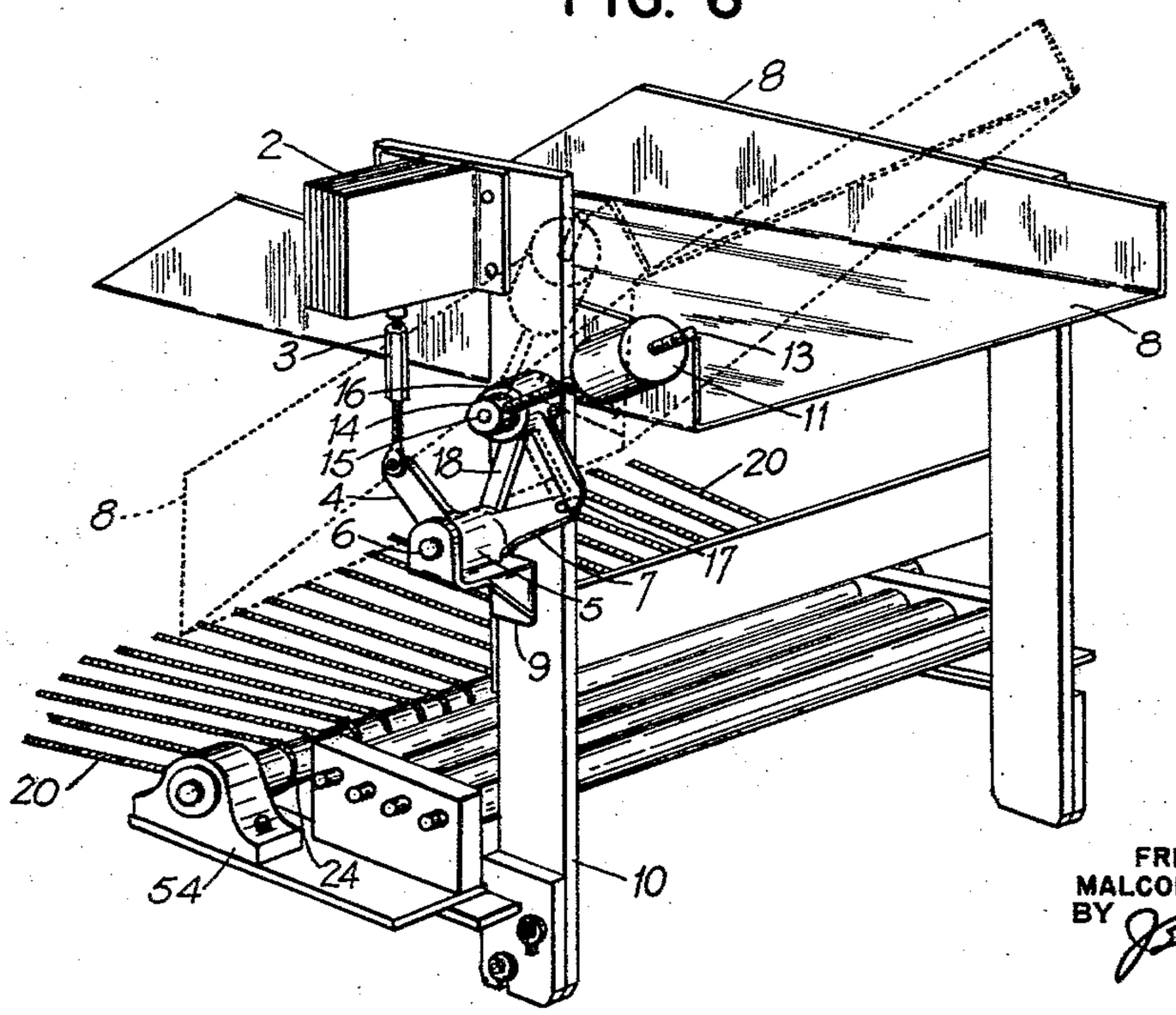


FIG. 6



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CORRECTOR FOR MISALIGNED AND OVERTURNED ROLLS

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FIG. 7

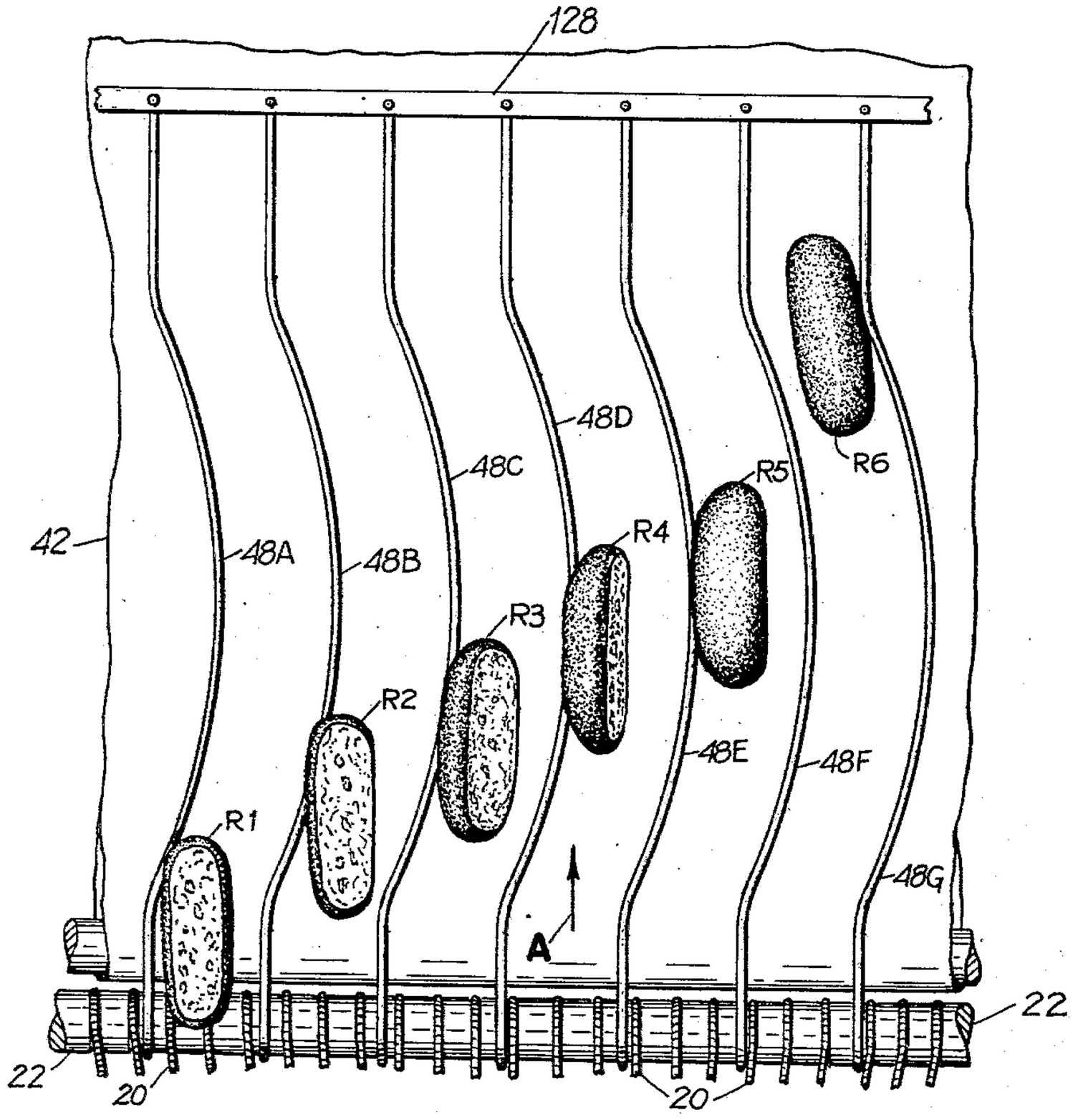
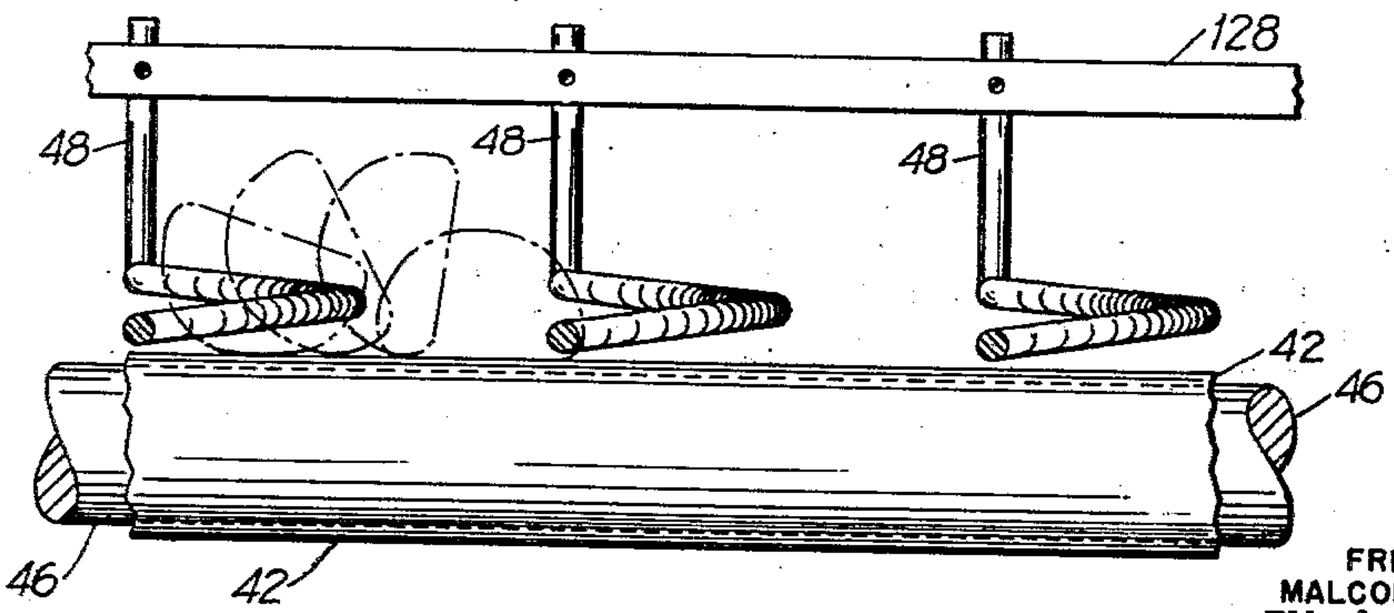


FIG. 4



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United States Patent Office

3,180,476
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3,180,476
CORRECTOR FOR MISALIGNED AND OVERTURNED ROLLS

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4 Claims. (Cl. 198—33)

This invention is a mechanism for aligning and orienting articles delivered haphazardly to its input during their progress to a station at which proper alignment and orientation are important. Such mechanisms have a wide diversity of applications. They may be employed in any of a large number of processes or procedures between a stage at which articles are misaligned and unoriented and another at which the articles are required to be in proper alignment and orientation so as to facilitate the performance of a succeeding operation. The input stage of the present mechanism may be the position at which raw materials are received at random and the present mechanism directs them to the position where the first operation in a manufacturing process is performed. The input stage may, if desired, be at a point adjacent the output of a first machine in which one manufacturing operation is performed, as a result of which articles are received therefrom in chance arrangement and from which position the articles are required to be delivered to the input of a second machine, at which point the articles are required to be received in a particular spatial relationship to the second machine for the proper performance of the second machine's function. The present mechanism may function advantageously also intermediate a final stage of manufacture of an article and its packaging. While the mechanism of the present invention may be accommodated to handling articles of many different shapes and sizes, and while in its present embodiment it is arranged to handle articles of two different discrete shapes and sizes, one size and shape at each of two different times, it will become apparent from the following description that the mechanisms and methods of the invention are applicable to a wide range of sizes and shapes of articles which are to be aligned or oriented.

An object of the invention is the alignment and orientation of articles.

A further object of the invention is the provision of a mechanism adaptable to receive articles in random alignment and orientation at its input and to align and orient them in a predetermined position at its output.

A feature of the invention is an arrangement for overturning an article which is wrong side up so that it becomes right side up.

Another feature of the invention is a mechanism for selectively righting randomly overturned articles moving along a conveyor. The mechanism comprises a stationary rod arranged generally longitudinally, bent transversely of the line of motion and inclined slightly upwardly from an underlying moving continuous web.

Another feature of the invention is an arrangement whereby the articles during one portion of their traverse of the conveyor mechanism are transported on moving continuous spring belts which are arranged so that, at one time, the tops of all of the belts are in a single level, generally horizontal plane on which the articles are conveyed, and so that, at another time, predetermined ones of the belts may be elevated, to form the sides of moving channels, between which the conveyed articles are confined, while being conveyed jointly by the elevated spring belts, and by other unelevated spring belts which then form the bottom of the moving channel.

Another feature of the invention is a group of paddles which are swung upwardly between the moving spring

belts, in a limited arc and then elevated so as to align articles, such as buns, which may be disposed with their longitudinal dimensions transverse the channel, so as to orient them with their longitudinal dimensions in the line of motion of the channel.

The objects and advantages of the invention as well as the features of construction, combination and arrangement of the parts thereof will be more fully understood from the following description of a preferred embodiment taken in conjunction with the accompanying drawings in which:

FIG. 1 is a plan view of the conveyor and aligner showing in its right-hand portion the spring belt infeed and aligner and in its left-hand portion the mechanism which turns rolls which are upside down right side up;

FIG. 2 is a side elevation of the machine partly in section;

FIG. 3 is a perspective view of a portion of the spring belt infeed and aligner;

FIG. 4 is a partial end elevation showing the turnover rods;

FIG. 5 is a partial end elevation, partly in section, of the infeed spring aligning belts;

FIG. 6 is a perspective of the automatic accumulator, or hopper, which may be disposed to the right of the spring belt infeed as the infeed appears in FIGS. 1 and 2; and

FIG. 7 is a partial plan view used in explaining the article overturning mechanism.

Leaving the hopper out of consideration for the present and referring to FIG. 1 and FIG. 2, it is explained that the mechanism may be divided into two main sections and before proceeding with a detailed description thereof, it will be described generally, as an aid in following the detailed description hereinafter.

The right-hand section, as seen in FIGS. 1 and 2, includes an important feature of the invention. It comprises that portion of the conveyor in which the spring belts 20 and cooperating paddles are employed to align transversely displaced rolls. As shown at the right in FIG. 1, 32 spring belts 20 are employed in the present embodiment. Obviously, more or less may be employed and they may be spaced wider or narrower, as necessary to convey the articles which are transported, to prevent the articles from dropping between the belts. As shown in the plan view also, the right-hand end of the spring belt portion of the conveyor is narrow relative to its left-hand end, so that it may coact properly with the continuous web and rod portion of the conveyor which selectively rights the randomly overturned buns. Each of the spring belts is looped over two pulleys, a longer driving spring belt pulley 22 and a shorter driven spring belt pulley 24. The spring belts, as mentioned, are arranged so that, at one time their top surfaces are all in the same horizontal plane. At another time, certain of them, which are directed over spring wheels, such as 26 on shaft 28 and 30 on shaft 32, may be elevated, thereby forming, with the unelevated spring belts, channels in which the articles such as baked items are constrained. A plurality of paddles such as 34 are mounted on a shaft 36. As is best shown in the perspective view of the spring belt portion of the infeed, FIG. 3, the paddles on shaft 36 are actuated through two eccentrics 38 and 39 and two followers 40 and 47 which oscillate alternate sets of paddles 34 one hundred and eighty degrees out of phase, so that the sets alternately project upwardly between spring belts and then are retracted. This will be more fully explained hereinafter. As a result of this motion, rolls, or other articles, which have their longitudinal dimension transverse the line of motion of the springs are brought into proper alignment.

The left-hand portion of FIG. 1 and FIG. 2 shows

another important feature of the invention, that is the arrangement for righting the position of rolls which are upside down. Essentially, this mechanism comprises an endless web **42** driven by a pulley **44** and supported at its opposite end by a pulley **46**. Coacting with this web are a plurality of formed rods **48**. The rods, as shown in the plan view, run generally longitudinal of the conveyor but each has a transverse bend therein. At its right-hand end, all of the rods are bent about the pulley **22** which serves as a support. Alternatively, all of the rods may be secured to a common bar, not shown, which extends between the sides of the machine and is secured thereto. In either event, the right-hand portion of the rods, adjacent the right-hand end of web **42**, closely overlies web **42**. From this position, each of the rods **48** is inclined gradually upward to a height which will vary depending on the shape and size of the article which is to be overturned. When engaged in righting overturned frankfurter rolls, for instance, as is well known, a roll which is in the normally upright position has a generally flat surface in contact with the web substantially throughout the entire area of the bottom surface of the roll. The top of such a roll is convex outwardly between its sides. As such an inverted roll moves along the line of motion of the web, near the right-hand end of a rod, its left-hand lower edge, as viewed in the direction of its line of motion, will be in a position slightly elevated above the web and will project over the rod so that the roll will engage with the rod. As shown in FIG. 4, and as will be explained more in detail hereinafter with relation to FIG. 7, the rods rise progressively along the line of motion of the web. As should be understood from the foregoing, the convex top of all overturned rolls near one side will engage with some one of the rods and will be progressively raised, and due to the coaction with the moving web, after the side of the roll has been elevated sufficiently, the roll will be turned right side up.

The mechanism will now be described in detail with reference to FIGS. 1 and 2. It comprises a horizontal frame **50** supported through a vertical member **52** by a base, not shown. Pulley **24** is mounted in a pair of bearing brackets such as **54**, one on each side of the machine. The driving pulley **22** is mounted on a shaft **21**, similarly secured to the frame, by a pair of bearing brackets **56**, one on each side of the frame. Each of the pulleys has an individual groove to accommodate the endless spring belts **20**. Intermediate pulleys **22** and **24** and secured near the opposed ends of a pair of bars such as **82**, one on each side of the machine, are a pair of bent shafts **28** and **32**. The bars **82** form part of a linkage to be described hereinafter. Spring wheels such as **26** and **30** are rotatably mounted on the shafts **28** and **32**. Each of shafts **28** and **32** may be actuated, from a lower position to an upper position by means of a linkage under control of a hand lever **58** which is secured to a shaft **60**. The shaft **60** extends between the opposite sides of the machine and is secured to it by means of a pair of bearing brackets **62**, one on each side of the machine. A tie rod arm **64** is fixedly secured to shaft **60** and is rotatable in a limited arc in response to the actuation of the hand lever **58**. A tie rod **66** interconnects tie rod arm **64** with the rear pivot arm **68** and a connecting rod **70** connects rear pivot arm **68** with the front pivot arm **72**. Pivot arms **68** and **72** are pivoted in brackets **74** and **76**. A front top arm **78** and rear top arm **80** are pivoted to arms **72** and **68** respectively and to the connecting rod **70**. The upper end of arms **78** and **80** are pivoted to the roller side **82**. Roller side **82** is connected near its ends to the roller shafts **28** and **32**. A pair of bars **177**, at their right-hand ends, are pivoted in a pair of brackets **173** secured to the frame on each side of the machine. At their left-hand ends the bars **177** are each pivoted to a respective roller side **82**. A corresponding linkage is mounted on the opposite side of the machine so that the

shafts **28** and **32** carrying the spring wheels may be elevated or lowered on either side of the machine.

It is pointed out particularly that with the linkage and the spring wheels controlled as described, it is possible to arrange the spring belts so that the tops of all of them at one time are in the same horizontal plane. Alternatively, it is possible to raise those of the spring belts which pass through grooves in the spring wheels so that they define the sides of channels, the bottom of the channels being defined by the spring belts which have remained in the lower positions. A pair of bosses **73**, one on each tie rod **66**, on each side of the machine are interconnected by a transverse rod **65**, see FIG. 3, which engages with the follower arms **41** and **49** to disengage followers **40** and **47** from their respective eccentrics, **38** and **39** when the linkage which controls the spring wheels such as **26** and **30** actuates them to their lower positions.

The arrangement of the oscillating paddles is as follows. A chain **27** driven by a source, not shown, engages with and rotates gear **29** which is secured to shaft **31**. The shaft is secured to the frame elements by bearing brackets, not shown. On the shaft **31** are mounted two eccentrics **38** and **39** which are displaced one from the other by 180 degrees. Each eccentric engages with an individual follower **40** and **47**. The follower **40** is secured to an arm **41** and the follower **47** to a corresponding arm **49**. Arm **41** is integral with shaft **36** which is secured to the frame **50** by a pair of bearing brackets **51**, one on each side of the machine. Arm **49** is integral with a hub **61**, rotatable on shaft **36**, and is integral with bar **63**. As seen best in FIG. 3, alternate paddles such as **34** are integrally secured to the shaft **36** and are actuated through the eccentric **38**, follower **40** and arm **41** on shaft **36** so that they are rotated up and down between an individual pair of adjacent spring belts. The eccentric **39** actuates bar **63** through follower **47**, arm **49** and hub **61**. Also secured to the bar **63** are other bearings such as **75** loosely mounted on shaft **36** secured to which bearings **75** are other paddles which are rotatably mounted on shaft **36**. With this arrangement, two sets of paddles arranged alternately transversely across the spring belt infeed will be actuated 180 degrees out of phase. While one set is in its uppermost position, the other set will be in its lowermost position and vice versa.

The spring belt infeed is provided with infeed guides **90**, one on each side of the machine. The infeed guides may be adjusted in position by means of an adjustable arm **92** which is pivotally secured at one end to the infeed guides **90**, intermediate the ends of the guide, by means of a bracket **94** secured to the guides and a pin **96**. The right-hand end of the guides **90** is bent around a vertical pin **98**. The adjustable arm **92** is provided with an elongated slot **100** through which a stud **102** projects and is screwed into frame **50**. The stud **102** may be loosened to permit adjustment of the infeed guides. A corresponding mechanism is provided on the opposite side of the spring infeed.

The mechanism is provided with a refuser **140** which is a means of rejecting such rolls as reach the left-hand end of the spring belt infeed with their longitudinal dimension transverse the line of motion. The refuser preferably comprises four vanes, each disposed at right-angles to another. The vanes may be of flexible rubber, for instance. The four vanes are secured to a central shaft **142**. The shaft is mounted on a pair of brackets such as **146** one on each side of the machine. A gear **150** is integral with an extension of shaft **142**, and the gear is connected by means of a chain **152** to a driving gear **156** mounted on an extension of shaft **21**. As shaft **142** rotates, the four vanes of the refuser **140** engage misaligned rolls and throw them back toward the right in the spring belt aligner for realignment.

A chain drive **110** connected to a power source, not shown, drives a gear **112** secured on shaft **114** rotatably mounted in a pair of bearing brackets, such as **148**, one on

each side of the machine. Gear 112 is connected through a chain drive 116 to a gear 118 secured to a shaft 120 mounted in a pair of bearing brackets 149, one on each side of the machine. Pulley 44 is integrally mounted on shaft 120 and drives the continuous web 42 which is supported at its right-hand end by pulley 46 which is integral with shaft 179, which is rotatably mounted in a pair of bearing brackets 157, one on each side of the machine.

Brackets 124 are secured to opposite sides of the frame 50. Secured in the brackets are vertical bars 126. A horizontal bar 128 interconnects the vertical bars 126. Spaced transversely at intervals across the horizontal bar 128 and secured to it are the roll turning rods 48. Each of the rods 48 is secured to the horizontal bar 128 in any convenient manner to permit adjustment of the rods 48. Refer to FIGS. 2 and 4. The left-hand ends of the roll turning bars 48, as seen in FIG. 2, project downward vertically and then are bent so that they extend longitudinally of the feeding mechanism. The space separating rod 48 from the web 42 is greater at the left-hand end of the rod, as seen in FIG. 2, than at its right-hand end in order to raise the roll gradually as it is conveyed by web 42. The coaction of the moving web and the transversely bent and gradually rising rod effectively overturn rolls which are wrong side up as they progress along the line of feed. This is illustrated in FIG. 7.

FIG. 7 is a plan view of the roll-overturning portion of the machine, illustrating six rolls, R1 through R6 in six different positions along the line of motion of the web 42 as indicated by the arrow A. It is assumed that each one of the six rolls R1 through R6 moved onto web 52 wrong side up and FIG. 7 is intended to show how the rods 48A through 48G coact with the web 42 in overturning the rolls.

As explained, and as shown in FIGS. 2 and 4, in addition to being bent transversely of the line of motion of the web 42, the rods are gradually inclined from a position closely adjacent the web in the lower portion of FIG. 7 to a more elevated position at the upper end of FIG. 7.

In FIG. 7, roll R1 is just passing onto web 42 and its rounded bottom side edge is engaging with rod 48A. Roll R2 has progressed slightly farther than roll R1 and has been turned slightly clockwise, as viewed in the direction of the arrow, as a result of the coaction of the web 42 and rod 48. Each of rolls R3 and R4 has progressed further along the line of motion on web 42 and has been rotated progressively more clockwise until roll R4 has been turned nearly edgewise. Roll R5 has moved further along the line of motion and has been flipped over into the desired upright position. Roll R6 is engaging the forward elevated portion of rod 48G which is effective to correct any slight longitudinal misalignment before the roll R6 moves off the web at the upper end of FIG. 7.

It is, of course, to be understood that any roll which is delivered by the spring belts onto web 42 while the roll is in the desired upright position will remain in this position because its bottom edges are approximately square and engagement between the lower edge of the side of the roll and any rod will be without significant effect, other than a possible slight aligning of the roll at the exit from web 42 as mentioned in the foregoing.

Refer now to FIG. 6 which shows a perspective view of the hopper which can be disposed at the right-hand end of the machine as shown in FIGS. 1 and 2. The hopper is an automatic accumulator which will ordinarily be employed with single detached baked items such as frankfurter rolls for instance. Its purpose is to accumulate rolls arriving at random times and in random orientation from a cooling conveyor. It is adjustable so that after some predetermined number have been accumulated in the pan 8, while the pan is in a horizontal position, the pan is tilted to allow the rolls to slide off pan 8 onto the spring belts 20 of the infeed mechanism. This action achieves a decided improvement in distribution of the buns and tends to compensate for undesirable favoring

of one side or the other of the infeed due to the geometry of the installation. At times, due to a malfunction, the machine must be stopped. Under these conditions, if the accumulating conveyor continues to run, the oncoming buns would fall in a heap on the infeed springs. To prevent this, the automatic accumulator has a secondary action which tilts the pan 8 in the reverse direction causing the buns to be directed into a container, not shown, and stored until they can be conveniently put into the aligning mechanism.

The operation of the hopper, FIG. 6, is as follows. When the machine is started, the solenoid 2 which is connected in parallel with the motor which drives the machine, both not shown, is energized. This elevates rod 3 which is secured to and rotates arm 4 and its connected hub 5 and pan stop 7 secured to hub 5, in a clockwise direction about stud 6 which is secured by means of a bracket 9 to the frame 10 of the hopper. The rotation is opposed by the effect of a spring, not shown, in hub 5 which tends to rotate the stop assembly in a counterclockwise direction, but the effect of the solenoid is predominant. As a result of this, the pan stop 7 is actuated into such a position as to permit the pan 8 to assume a horizontal position under the influence of a counterweight 11 mounted on a rod 13 secured to a sleeve 14 mounted on a shaft 15. Pan 8 is secured to sleeve 14. Integral with sleeve 14 is a hub 16 carrying two tines 17 and 18 which straddle the pan stop 7. When the pan 8 is empty, the counterweight 11, acting through the sleeve 14, urges pan 8 clockwise until tine 17 engages pan stop 7 when pan 8 is horizontal.

When a predetermined number of buns have been accumulated in pan 8, their weight overbalances the counterbalance, the pan tilts through an angle until tine 18 engages pan stop 7. Pan 8 turns counterclockwise permitting all of the accumulated buns to slide onto the spring belts 20. The counterbalance then restores pan 8 to the horizontal position. This action is repeated as long as the solenoid is energized. When the aligning mechanism is stopped, the solenoid 2 is de-energized and pan stop 7 is rotated counterclockwise to a new position in which the forward edge of stop 7 is spaced farther toward the left from the edge of tine 17 with which it coacts, permitting the pan assembly to rotate further in a clockwise direction before engagement therewith. After the next cycle of operation of the pan 8, instead of returning to the horizontal position, the pan will continue to rotate clockwise until tine 17 engages pan stop 7 in its new position. Oncoming buns delivered to pan 8, therefore, are directed into a container, not shown. When the mechanism is restarted, the solenoid 2 pulls pan stop 7 clockwise forcing tine 17 to rotate pan 8 into the horizontal position for the start of operation.

What is claimed is:

1. In the baking industry, a transporting mechanism for transporting baked items comprising a first group and a second group of moving spring belts all normally disposed so that their top peripheries lie in a substantially horizontal plane, to form a horizontal conveyor at a first time, a control for selectively adjusting the position of said second group of belts, and means responsive to the actuation of said control for elevating said second group of belts so as to define the side walls of channels in which said first group of belts form the bottom of said channels, and in which channels said items are constrained at a second time.

2. In the baking industry, a conveyor for randomly disposed baked items, including means for longitudinally aligning items moving along said conveyor which are disposed transversely of said conveyor, said means comprising relatively elongated substantially narrow paddles oscillated substantially vertically through said conveyor in alignment with the line of motion of said conveyor, and means in said conveyor, responsive to movement of items along said conveyor, for selectively overturning items

which are wrong side up, said latter means comprising a rod-like element disposed generally along the line of motion of said conveyor, said element having a bend therein, in a direction generally transverse said conveyor, said element also rising slightly from a position immediately adjacent the conveyor in the direction of motion of said conveyor substantially along the length of said element.

3. In the baking industry, a conveyor for baked items, said conveyor comprising a plurality of laterally spaced discrete longitudinally moving elements, a first and a second set of aligners, for aligning said items on said conveyor, each of said sets comprising a plurality of plates vertically oscillable edgewise in the spaces between said moving elements, means for operating said first set in opposite phase from said second set, said means comprising an oscillable shaft to which said first set is integrally secured, said means comprising also a group of hubs and a bar common to said group, each of said hubs integral with said bar and with an individual one of said plates of said second set, said hubs freely rotatable in a limited arc on said shaft, a first cam means for actuating said shaft and a second cam means for actuating said bar in said opposite phase from said first cam means.

4. In the baking industry, a conveyor for baked items

comprising a plurality of horizontally disposed laterally spaced discrete longitudinally moving elements, said conveyor having a first and a second set of orienting plates, for orienting said items on said moving elements, each of said plates vertically oscillable edgewise in an individual space between said moving elements, an oscillable shaft, a first cam for oscillating said shaft, an oscillable bar, a second cam for oscillating said bar substantially out of phase with said shaft, said first set of plates integral with said shaft, said second set of plates integral with said bar, each of said second set of plates also mounted to said shaft and rotatable individually in a limited arc about said shaft.

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