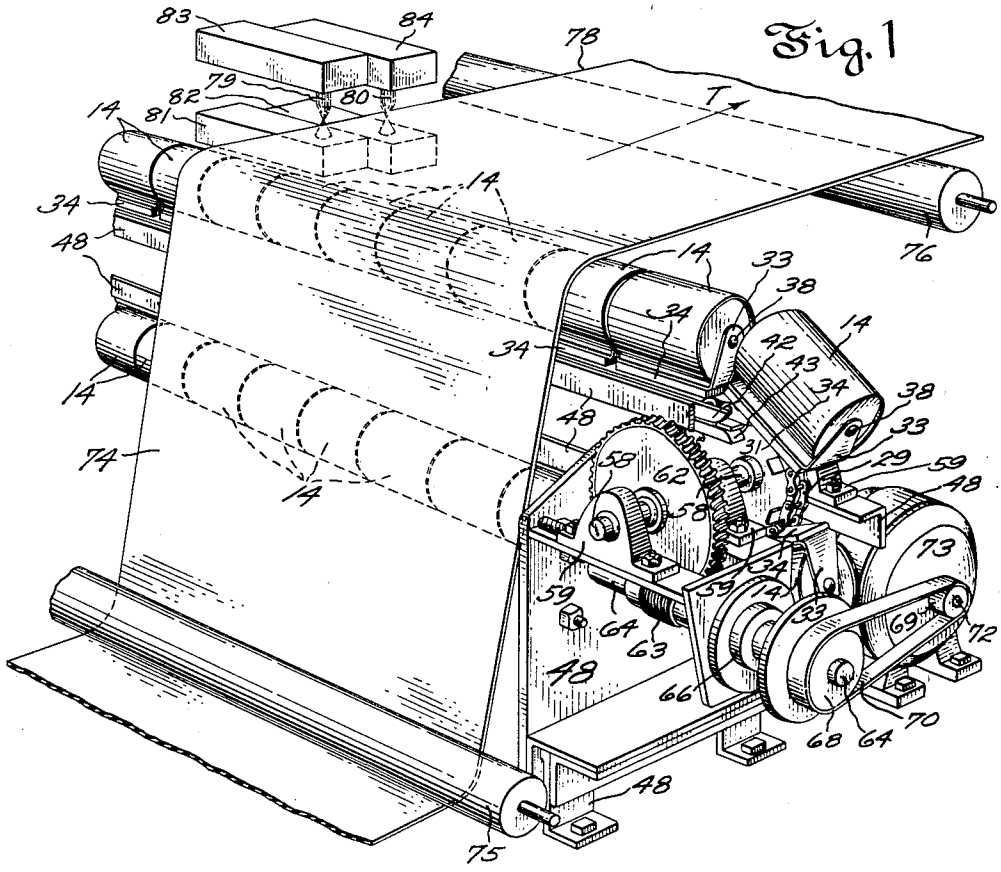
March 26, 1957 J. M. MONTEFALCO ET AL 2,786,675

SIDE POSITION REGULATING APPARATUS

Filed Sept. 3, 1953 5 Sheets-Sheet 1

Fig. 1



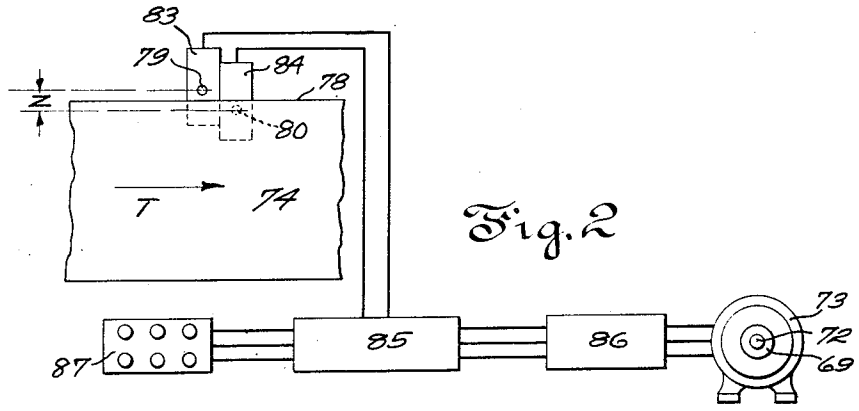


Fig. 2

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SIDE POSITION REGULATING APPARATUS

Filed Sept. 3, 1953 5 Sheets-Sheet 2

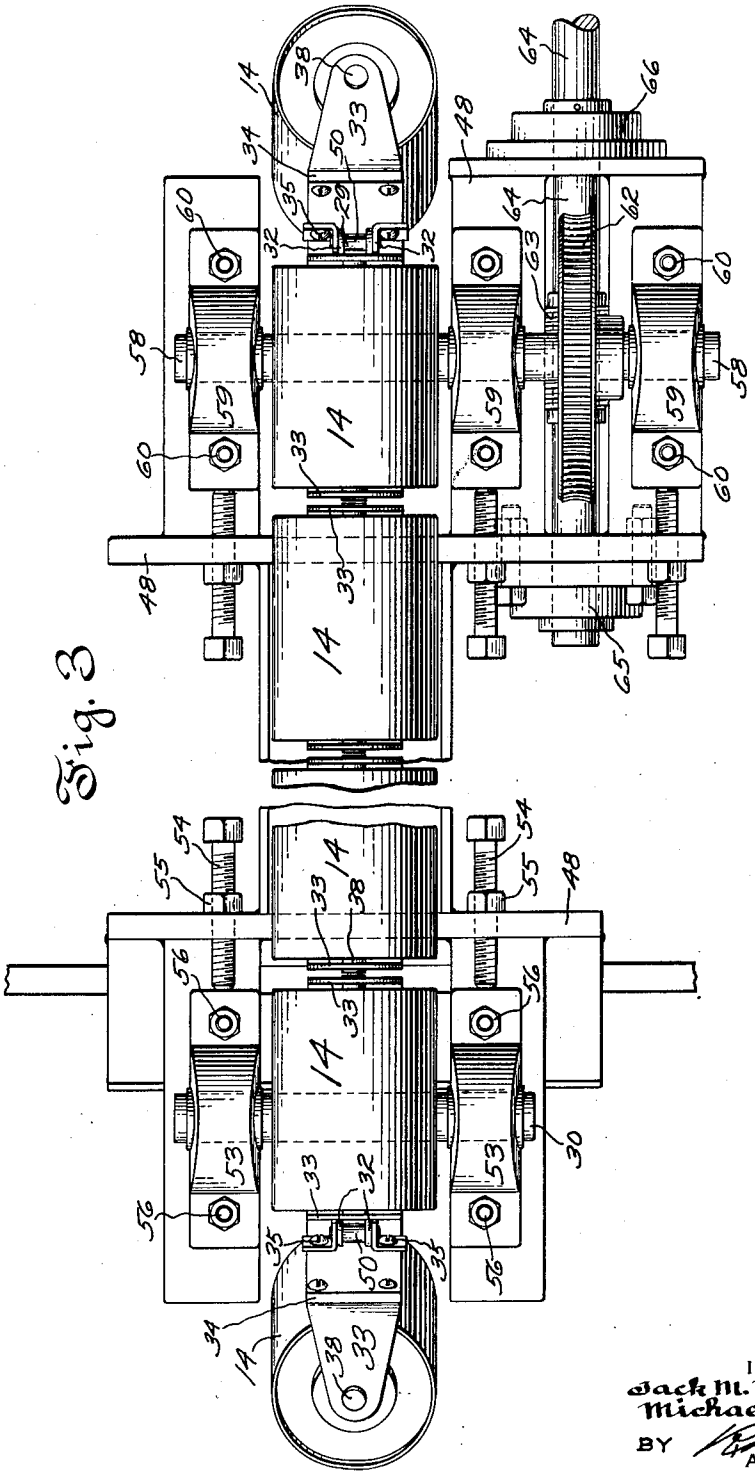


Fig. 3

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SIDE POSITION REGULATING APPARATUS

Filed Sept. 3, 1953 5 Sheets-Sheet 3

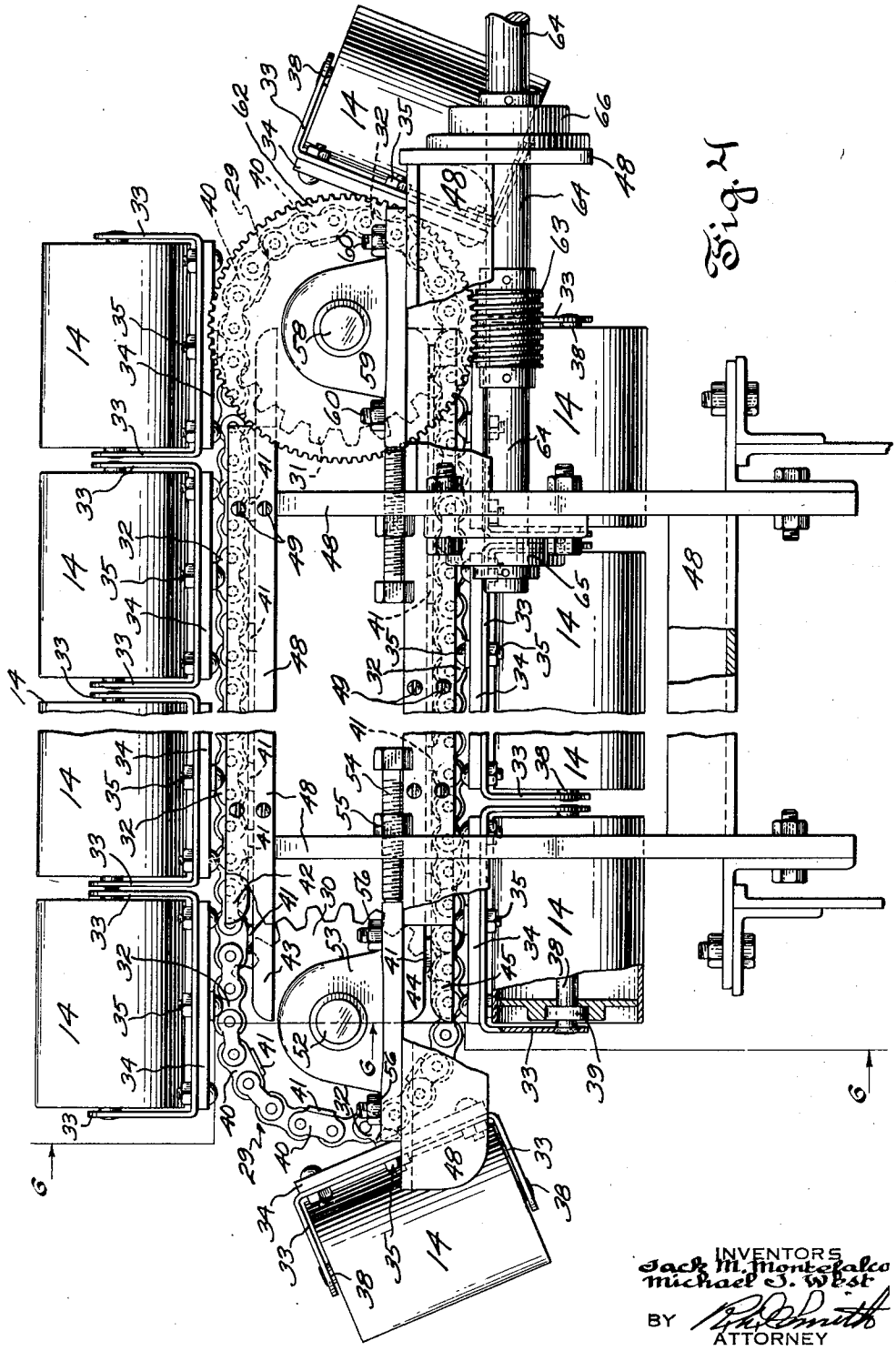


Fig. 4

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SIDE POSITION REGULATING APPARATUS

Filed Sept. 3, 1953 5 Sheets-Sheet 4

Fig. 5

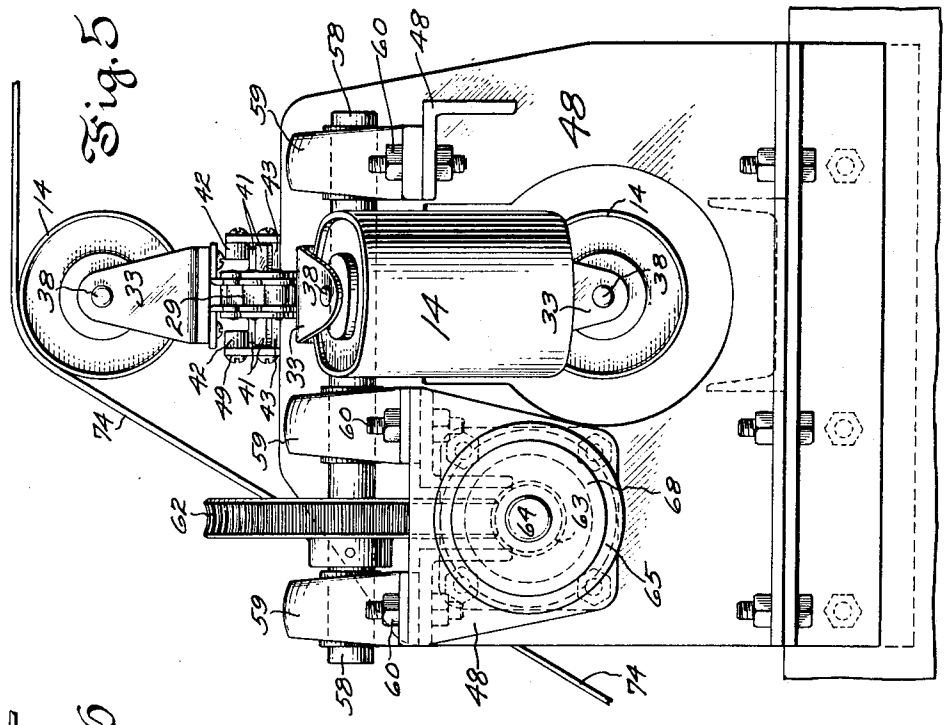
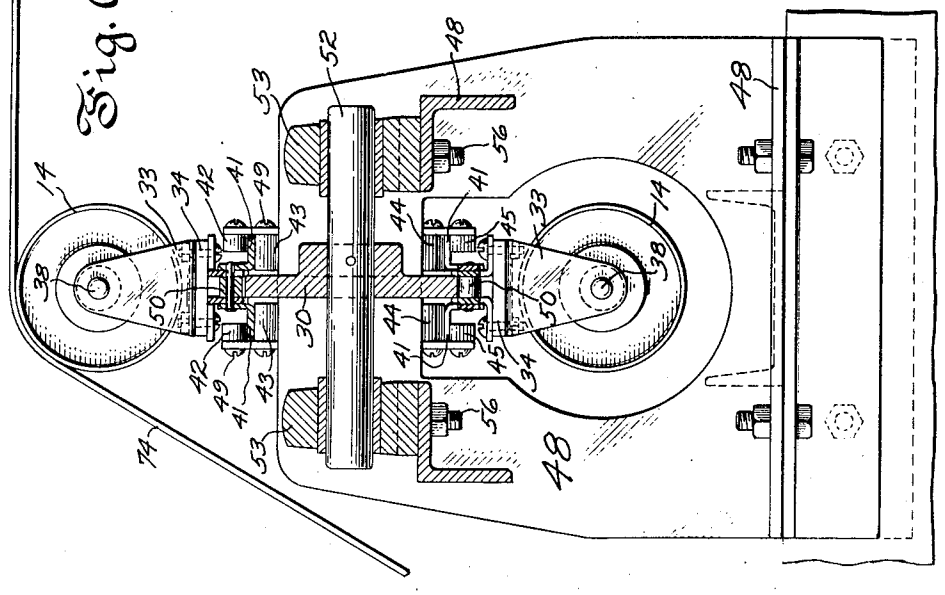


Fig. 6



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SIDE POSITION REGULATING APPARATUS

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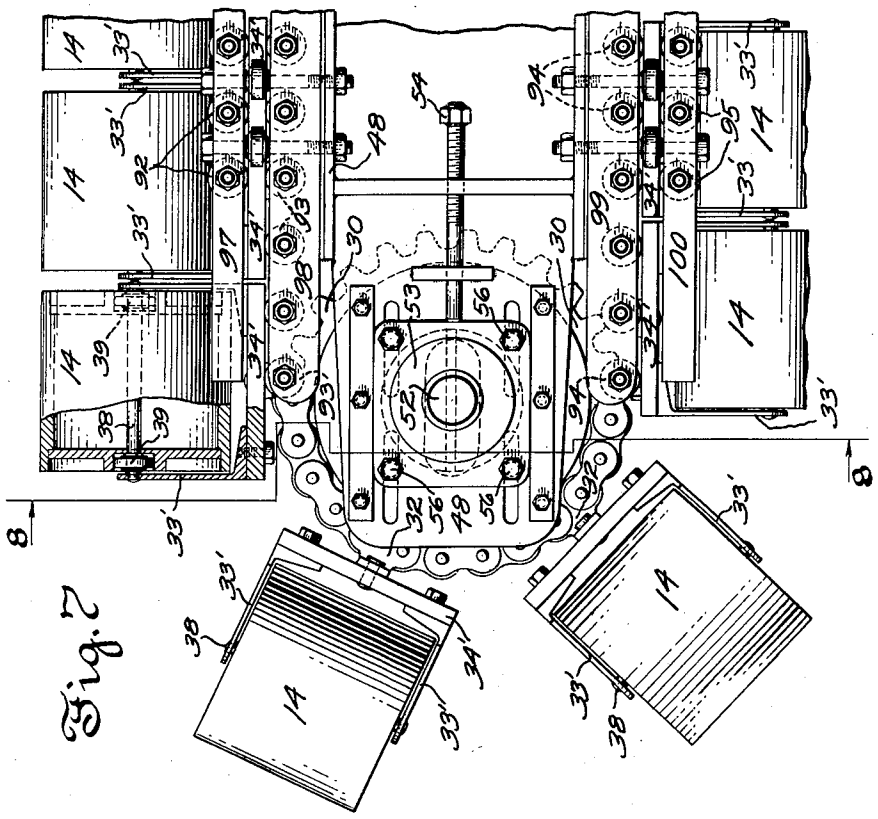


Fig. 7

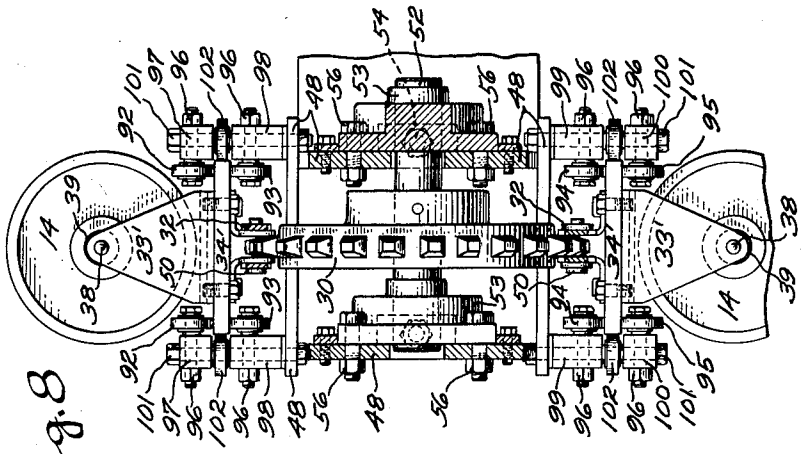


Fig. 8

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United States Patent Office 2,786,675 Patented Mar. 26, 1957

2,786,675

SIDE POSITION REGULATING APPARATUS

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Application September 3, 1953, Serial No. 378,252

11 Claims. (Cl. 271—2.6)

This invention relates to apparatus for maintaining an advancing web of sheet material in a designed path of travel. The web may comprise a traveling sheet of work material or a traveling belt conveying work material.

An object of the invention is to provide apparatus for this purpose that is capable of use for defeating an unlimited extent of accumulation of edgewise drift of the web in either lateral direction away from its designed path of travel.

Heretofore the ability of so called side position regulating apparatus to control traveling webs has been limited definitely in respect to the aggregate amount of edgewise drift of the web in one direction, or the excess of drift in either single direction, for which the apparatus can compensate. Such limitation has been due to a restricted extent of movement of the web position shifting means transversely of the path of travel of the web which heretofore has characterized such apparatus. Traveling webs which have a preponderant tendency to drift continuously or intermittently edgewise in the same lateral direction, or in either of opposite lateral directions if the drift alternates from one direction to the other, can perform an aggregate amount of drift in excess of the corrective ability of the side position regulating controls as heretofore known.

A further object of this invention is to provide apparatus capable of automatically compensating for and correcting an unlimited continuity of increments of edgewise web drift or an unlimited repetition of such increments in a constant lateral direction.

A specific object is to steer a continuous web of sponge rubber or like soft elastic material or a thin and flimsy endless conveyor belt of considerable width straight through a machine or process without stretching, wrinkling or otherwise distorting the material of the web or belt.

A related object is to steer a continuous web of soft elastic material so that it will cause the edges of the web to register in flush alignment as convolutions of a roll of the web as it is wound progressively onto a take-up spindle even if provided with no guide flanges.

Other objects of the improvements will appear in the following description of a machine embodying one of many possible forms of the present improvements, such description having reference to the accompanying drawings, wherein:

Fig. 1 is a perspective fragmentary view of web handling apparatus embodying the present invention.

Fig. 2 is a diagram of an electrical system that may be incorporated with the apparatus of Fig. 1.

Fig. 3 is a contracted plan view of an endless articulated train of side position web regulating rollers forming part of the apparatus of Fig. 1 and embodying the present improvements.

Fig. 4 is a contracted elevation of the endless roller train of Fig. 3 looking lengthwise of the traveling web.

Fig. 5 is an endwise view of the roller train looking from the right at Fig. 1.

Fig. 6 is a view taken in section on the plane 6—6—6 in Fig. 4 looking in the direction of the arrows.

Fig. 7 is a fragmentary view similar to Fig. 4 showing a modified construction of track for guiding and supporting the roller train.

Fig. 8 is a view taken in section on the planes 8—8 in Fig. 7 looking in the direction of the arrows.

The articulated train of cylindrical rollers **14** incorporates an endless link chain **29** that is trained over and impelled by sprocket wheels **30** and **31**. Each of certain links **32** of the chain bears fixedly in unison with it a carrier bar **34**. On each carrier bar there is secured by bolts **35** a forked carrier bracket **33** affording support for the axle shaft **38** of roller **14** about which shaft the roller is freely rotatable on radial ball bearings **39** lodged respectively in the end walls of the roller. Certain other links **40** carry pilot lugs **41** that enter and slide along and depart from a straight horizontal groove between an upper pair of track bars **42**, **43** and a similar straight horizontal groove between a lower pair of track bars **44**, **45**. All of the track bars are fixed on the framework **48** of the apparatus by removable bolts **49**. Thus chain **29** not only tows the rollers but serves as their sole support.

The traction rollers **50** of chain **29** engage impellably with the teeth of sprocket wheels **30**, **31** so that the upper and lower stretches of the chain which extend between the sprocket wheels are disposed to be supported by the pilot lugs **41** as they slide and are guided along the grooves between the track bars. Thus there is always maintained in the upper stretch of the chain in straight coaxial alignment a changeable series of the rollers **14** adapted to function as would a single long rigid roller. But the rollers **14** are capable of being moved endwise in unison through unlimited extents of shifting displacement in either direction around their circuitous course crosswise the designed path of travel of a belt or web **74**. The train of rollers **14** is impelled by turning the sprocket wheels **30**, **31** quite slowly either in manually selected or automatically determined rotary directions.

Sprocket wheel **30** is idle and turns on a shaft **52** that is journaled in frame bearings **53** that are held on the machine frame **48** by bolts **56** in a position that is adjustable lengthwise of the machine for loosening or tightening the chain **29** by means of the thrust screw **54** having threaded engagement with the frame and locked by a nut **55**. In a similar manner sprocket wheel **31** is fixed on a shaft **58** journaled in three frame bearings **59** secured on the machine frame by bolts **60**.

Between two of the frame bearings **59** there is fixed on shaft **58** a worm gear **62** that is in mesh with a worm **63** fixed on the power shaft **64** whose opposite ends are journaled in frame bearings **65** and **66**, respectively. In outboard relation to the frame, shaft **64** is equipped with a driven pulley **68** that is belted to the driving pulley **69** by a transmission belt **70**. Driving pulley **69** is on the shaft **72** of a reversing motor **73** that may be stationed on the same floor or platform as the machine frame **48**. Fig. 1 shows that a wide flexible web or conveyor belt **74**, which may be of soft thin easily wrinkled material and which may or need not be trained under or about a tensioning roller **75**, passes upward and over an end-to-end changeable series of the straightly aligned rollers **14**, thence onward toward the right in Fig. 1 to other web supporting rollers represented by **76**, and thence possibly to a web take-up roller (not shown) if the web constitutes material under processing treatment, or possibly to any suitable system of pulling rollers if the web constitutes an endless traveling conveyor belt. In any event the web **74** will be understood as being impelled by pulling it in the direction of arrow T in Fig. 1 against suitable

resistive force which might be merely the weight of the web but which herein is sketchily represented to include the weight of a tension roller **75**. Thus at the bight of the web, where it travels up and over the side position regulating rollers **14**, its broadside face exerts a clinging pressure against the rollers as it passes over them. To improve the tendency of the web to cling to the rollers the cylindrical faces of the latter are knurled or roughened. The wrap of the web with respect to the surfaces of rollers **14** may be 90 degrees or more or less.

In Fig. 1 the left edge **78** of the web, whose margin is assumed to be opaque or baffling to light, is shown to travel lengthwise in a path that extends between two laterally spaced and individually concentrated beams of light **79** and **80** that are projected downward toward two light sensitive phototubes **81, 82**, respectively, from light sources **83, 84**. Two photoelectric control sets comprising unitary light source **83** with phototube **81**, and unitary light source **84** with phototube **82** are separately adjustable laterally of the direction of travel of the web so that a dead or neutral zone Z between the light beams **79** and **80** in Fig. 2 is variable not only as to width but as to its location with respect to the frame of the machine from which frame the housings of the light sources and phototubes are supported. So long as the edge of the web travels in the dead or neutral zone Z no corrective web steering action of the apparatus shown in Fig. 1 will take place.

Light beam **79** is outside the edge of the web and hence normally not intercepted by the margin of the web. Light beam **80** is placed to normally be intercepted by the web margin. If the edge of the web strays laterally in an outward direction beyond this neutral zone Z so as to intercept light beam **79**, or strays in an inward direction beyond the neutral zone so as to clear the light beam **80**, control effects will be caused in an electrical system furnishing current to the reversing motor **73** through the medium of circuit switching mechanism contained in a casing **85** acting through a motor starting, stopping and reversing contactor contained in a casing **86** as well understood in the art. Push buttons for optional manual control of the same circuits are diagrammatically represented at **87**.

In operation, if the traveling web strays outwardly beyond the lateral limits predetermined by the width and location of neutral zone Z, light beam **79** will be intercepted and the motor **73** will automatically be started to run in a direction to turn sprocket wheel **31** in such direction that the series of rollers **14** in the upper stretch of the endless train of rollers shift in unison toward the right in Fig. 1. When such shifting of the rollers has caused web **74** to be carried with them a sufficient distance laterally across the path of web travel to restore the web edge to the neutral zone Z, light beam **79** will be cleared again and the motor will automatically be stopped. If the web strays inwardly instead of outwardly away from neutral zone Z, light beam **80** will become cleared and motor **73** will automatically be started to run in the opposite direction thereby to turn sprocket wheel **31** in such direction that the series of rollers **14** in the upper stretch of the train shift in unison toward the left in Fig. 1 until such shifting has restored the web edge to the neutral zone, whereupon light beam **80** again becomes intercepted and acts electrically to stop the motor.

By automatic repetition of the web steering functions described the apparatus can counteract an unlimited aggregate of unidirectional lateral drifting movement of the traveling web or conveyor belt **74** away from any predetermined path of travel because of the ability of the train of rollers to shift a limitless extent in either direction.

In Figs. 7 and 8 there is substituted for the track bars **42, 43, 44** and **45** a guiding structure defining a straight path of travel and comprising straight rows of antifrictional wheels. The row of wheels **92** takes the place of

track bar **42**. Wheels **93** are substituted for track bar **43**, wheels **94** for track bar **44** and wheels **95** for track bar **45**.

The pilot lugs **41** on the chain links are omitted and the widths of carrier bars **34** are extended laterally so that their lateral marginal portions ride between and are firmly constrained and guided by the track wheels **92** to **95**, inclusive.

The above mentioned track wheels with or without ball bearing mounting are supported respectively on horizontal stationary studs **96** that are fixedly mounted in side bars **97, 98, 99** and **100**, the latter being firmly secured on the machine frame **48** in vertically spaced relation by bolts **101** and suitable spacer collars surrounding the same.

In the space between side bars **97—98** and **99—100** there is an additional row of wheels **102** freely turnable on the bolts **101** or about their above mentioned spacer collars and presenting their peripheries to the lateral edges of the carrier bars **34** wherefore to limit edgewise deflection of the roller train in either lateral direction as its rides along and in rolling contact with the track wheels.

An endless tow belt may be substituted for chain **29** and a hand crank may be substituted for the driven pulley **68** and many other modifications are possible, wherefore the appended claims are directed to and intended to cover not only the particular constructions herein shown but all variations and substitutes for the mechanical parts and their operating arrangements that fall within a broad interpretation of the language of the claims.

We claim:

1. Apparatus for counteracting an unlimited aggregate of increments of unidirectional lateral drifting movement of a stretchable traveling web away from a predetermined path of travel, embodying in combination, a train of rollers, an endless train of carriers rotatably supporting said rollers respectively in externally peripheral relation to said endless train of carriers, means to impel said carriers in either direction around a circuitous course of shifting movement, and a straight extent of guideway forming structure extending crosswise the path of web travel operatively related to said carriers to direct the same in a path to maintain a changeable series of adjacent rollers of said train in axially end-to-end relation for simultaneous engagement with a broadside surface of the web, whereby each of the rollers in said train can repeatedly be conveyed into and out of said web engaging series in either direction of roller shifting movement.

2. Apparatus as defined in claim 1, in which the said mean to impel the said carriers includes a chain of pivotally connected links, each link being sufficiently shorter than the length of each of the said rollers so that a plurality of said links parallel and are contained within the length of a single roller, said carriers being fixed only to respective links that are separated by intervening links.

3. Apparatus as defined in claim 1, in which the said carriers comprise bearing brackets straddling the said rollers respectively, and the said impelling means comprises a chain of carrier towing links on individual links of which chain said carriers are respectively mounted.

4. Apparatus as defined in claim 3, in which at least some of the said links carry pilot lugs positioned to slide along the said guideway forming structure.

5. Apparatus as defined in claim 4, in which the said guideway forming structure comprises two parallel bars defining a passageway therebetween tracked by the said pilot lugs.

6. Apparatus as defined in claim 1, in which the said guideway structure comprises the peripheries of a row of freely rotatable wheels.

7. Apparatus as defined in claim 6, in which the said carriers bearing the said rollers in rotatable relation re-

spectively thereto ride in rolling contact with the said wheel peripheries.

8. Apparatus as defined in claim 1, in which the said guideway structure comprises vertically spaced straight rows of horizontally spaced apart freely rotatable wheels having their peripheries disposed for rolling contact with the said carriers.

9. Apparatus as defined in claim 8, in which the said carriers are equipped with laterally projecting lugs slidable along and between the said spaced rows of wheels in rolling contact with the peripheries thereof.

10. Apparatus as defined in claim 1, in which the said guideway structure comprises vertically spaced parallel straight rows of horizontally spaced apart wheels freely rotatable about parallel axes, and an additional row of horizontally spaced apart wheels freely rotatable about axes angularly related to said parallel axes, all of said

wheels having their peripheries disposed for rolling contact with the said carriers.

11. Apparatus as defined in claim 10, in which the said carriers respectively bearing said rollers in rotatable relation thereto ride along and between the said spaced rows of wheels in flanking relation to the said additional row of wheels wherefore to be constrained by the latter against excessive drift crosswise the said parallel rows of wheels.

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