Feb. 25, 1969 W. E. MYERS 3,429,063

SHEET FEEDING AND SPREADING APPARATUS

Filed Jan. 3, 1966 Sheet 1 of 6

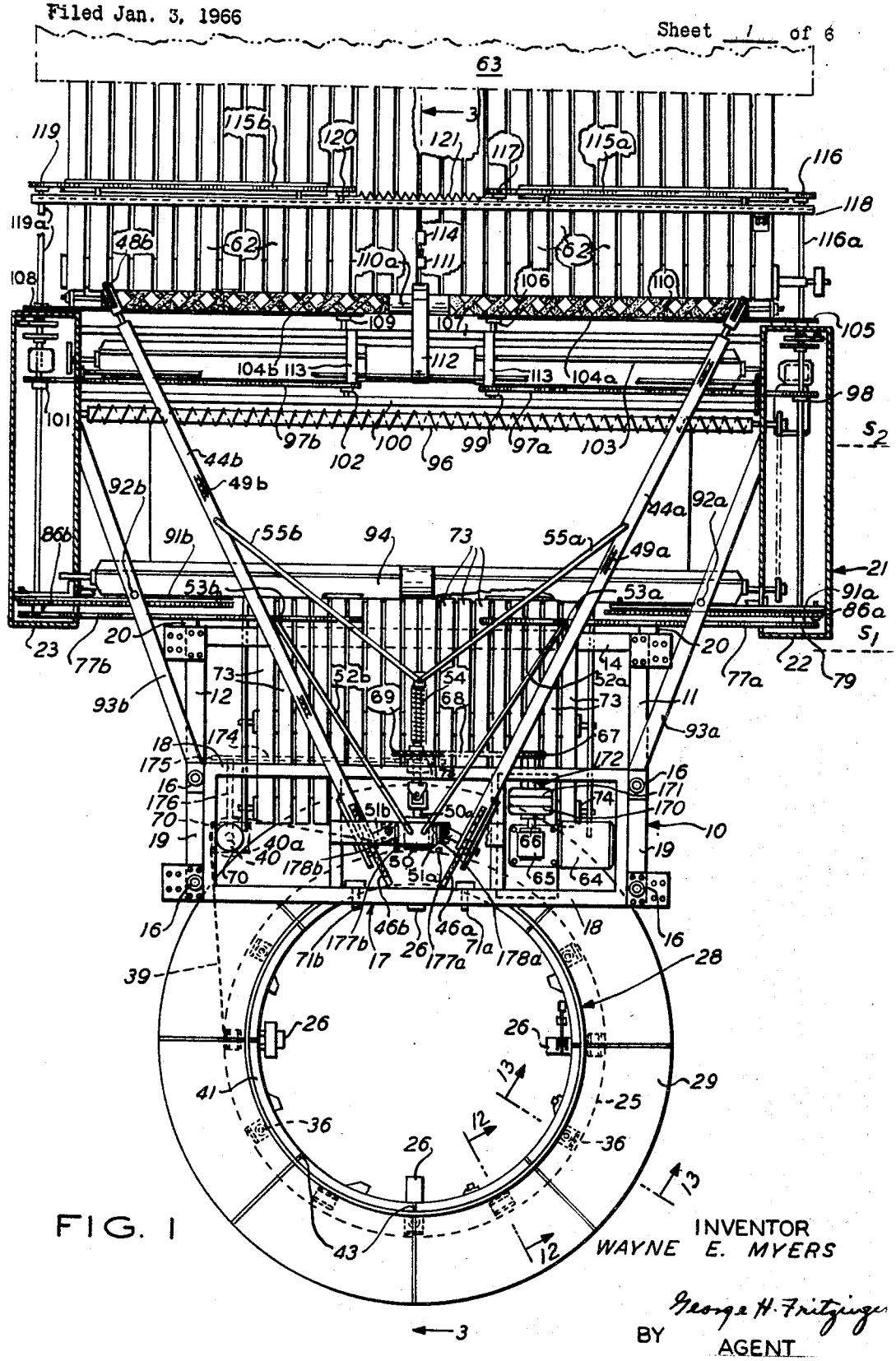


FIG. 1

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SHEET FEEDING AND SPREADING APPARATUS

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FIG. 2

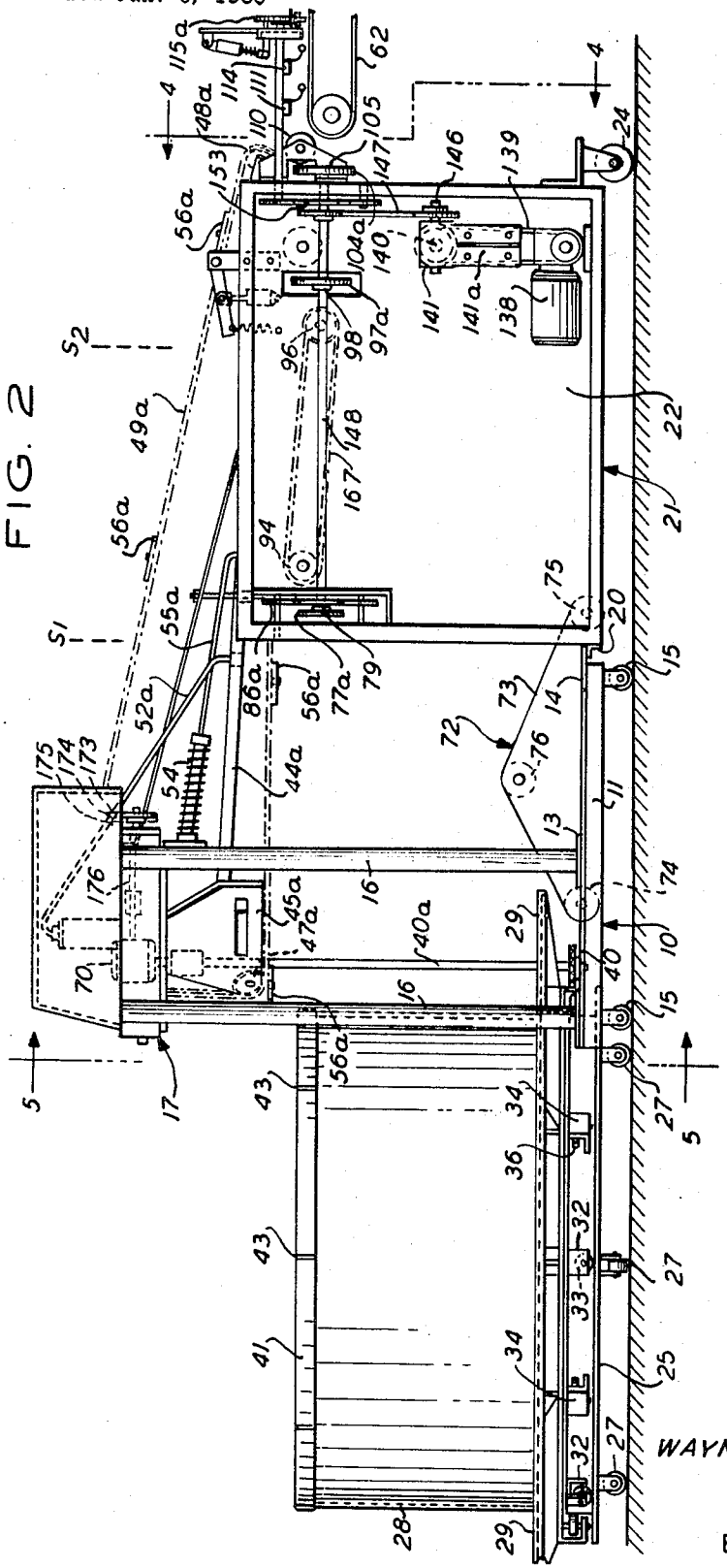
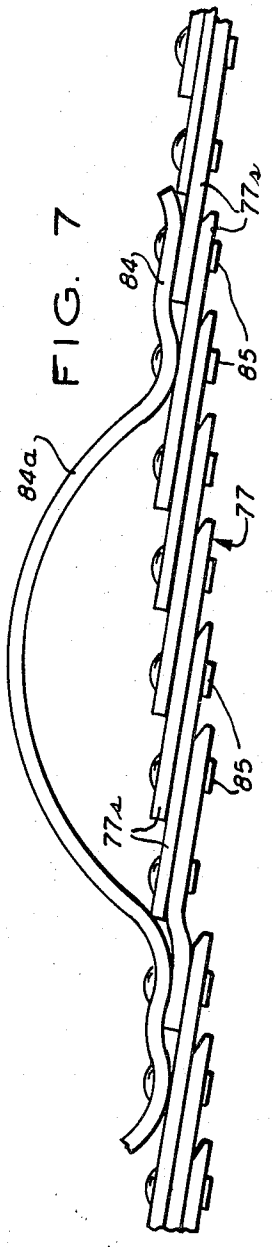


FIG. 7



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SHEET FEEDING AND SPREADING APPARATUS

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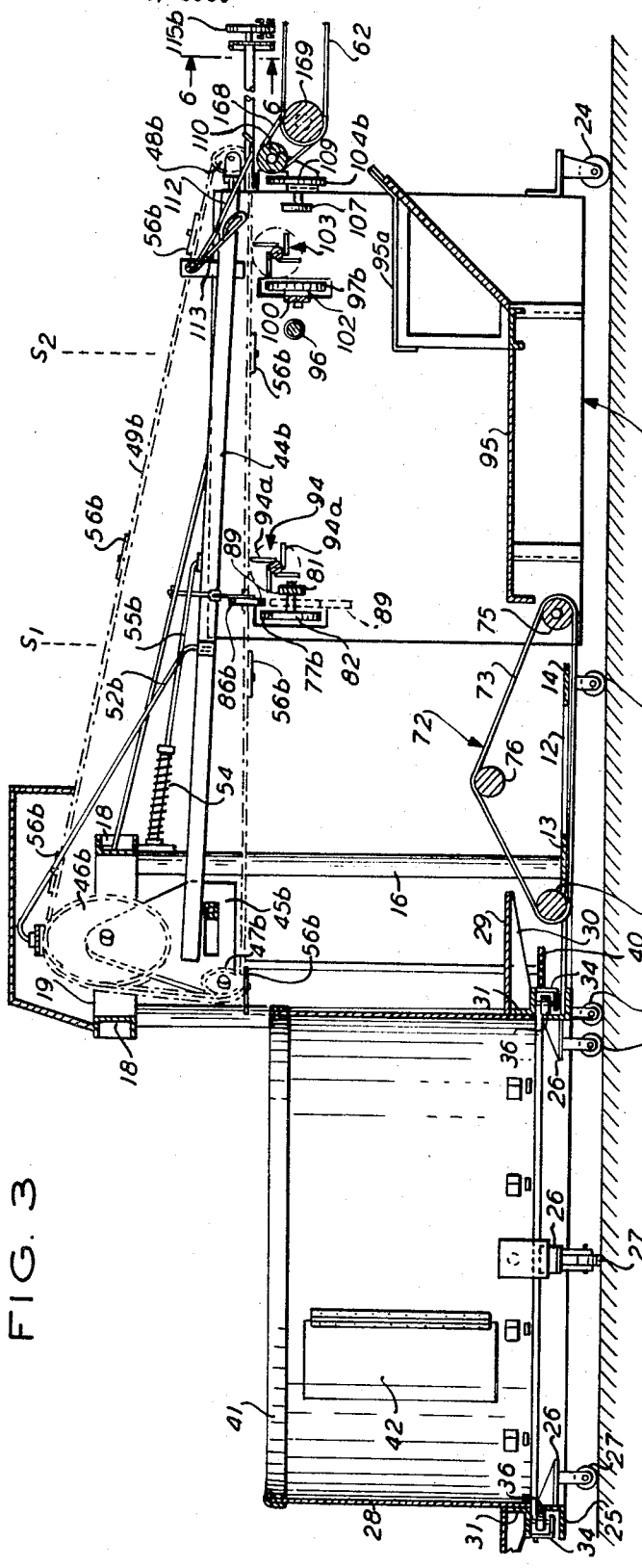


FIG. 3

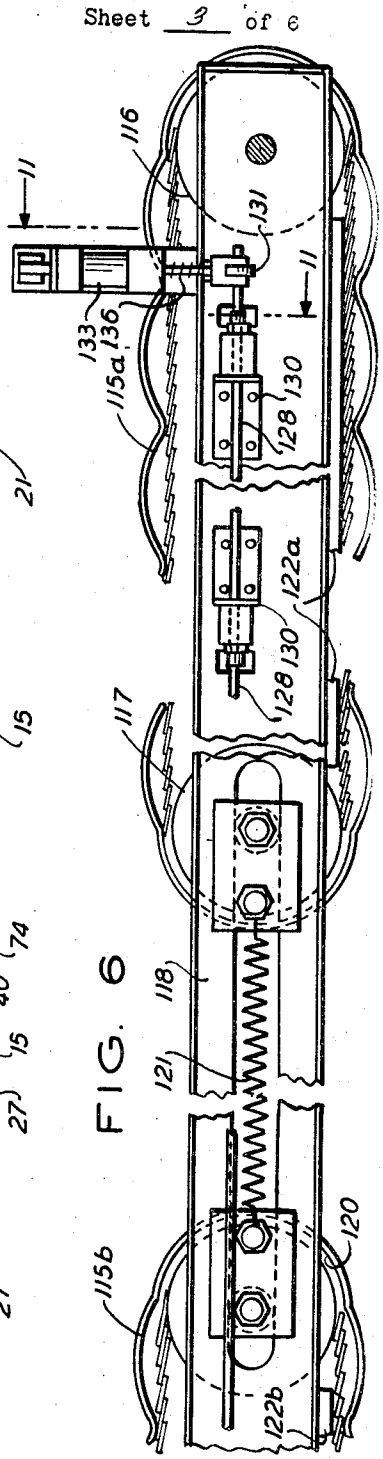


FIG. 6

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SHEET FEEDING AND SPREADING APPARATUS

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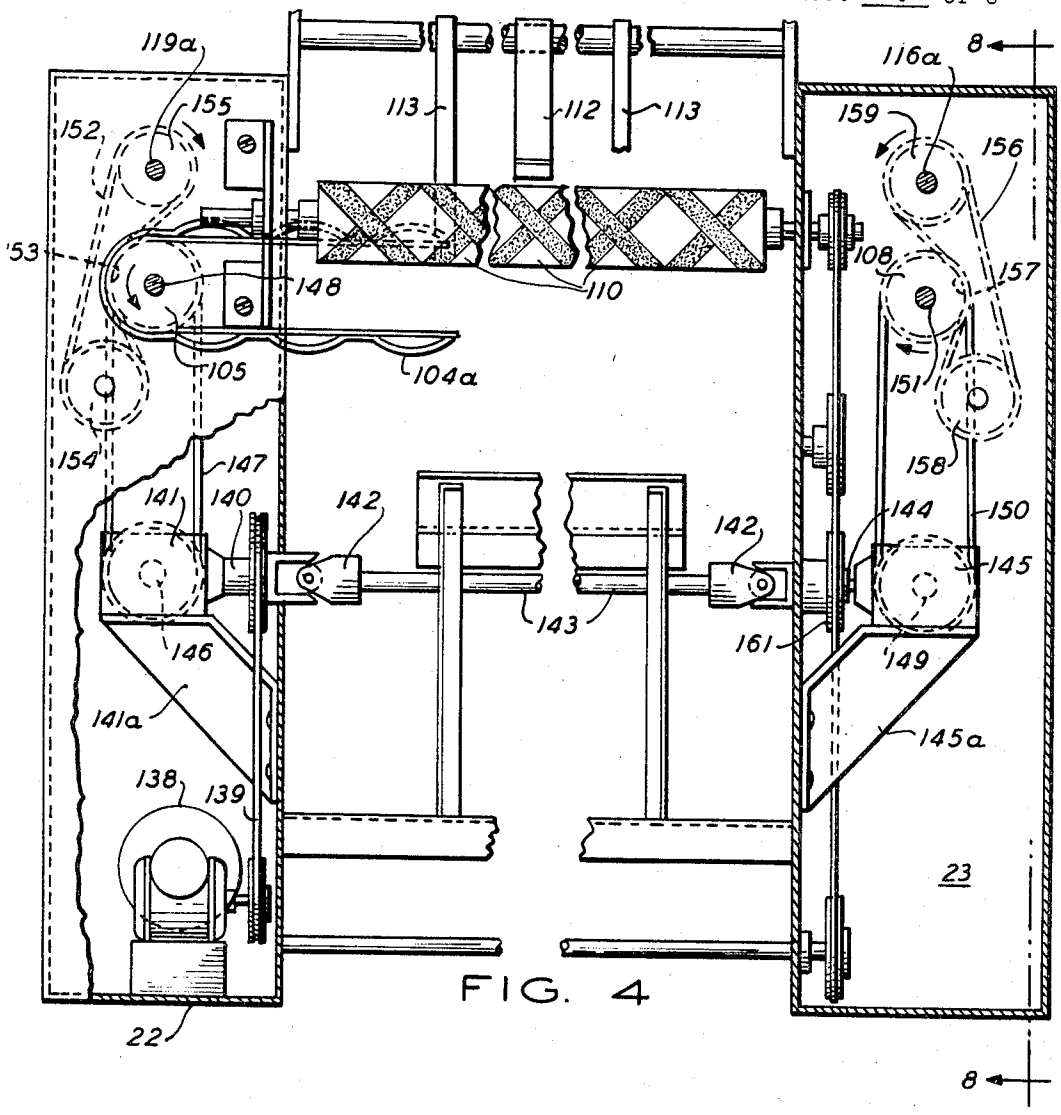


FIG. 4

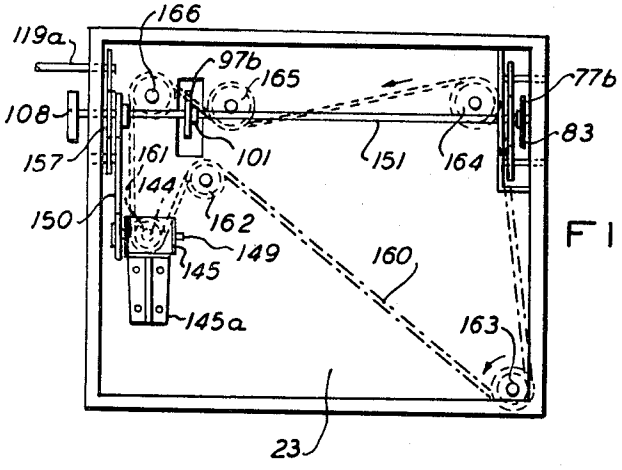


FIG. 8

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SHEET FEEDING AND SPREADING APPARATUS

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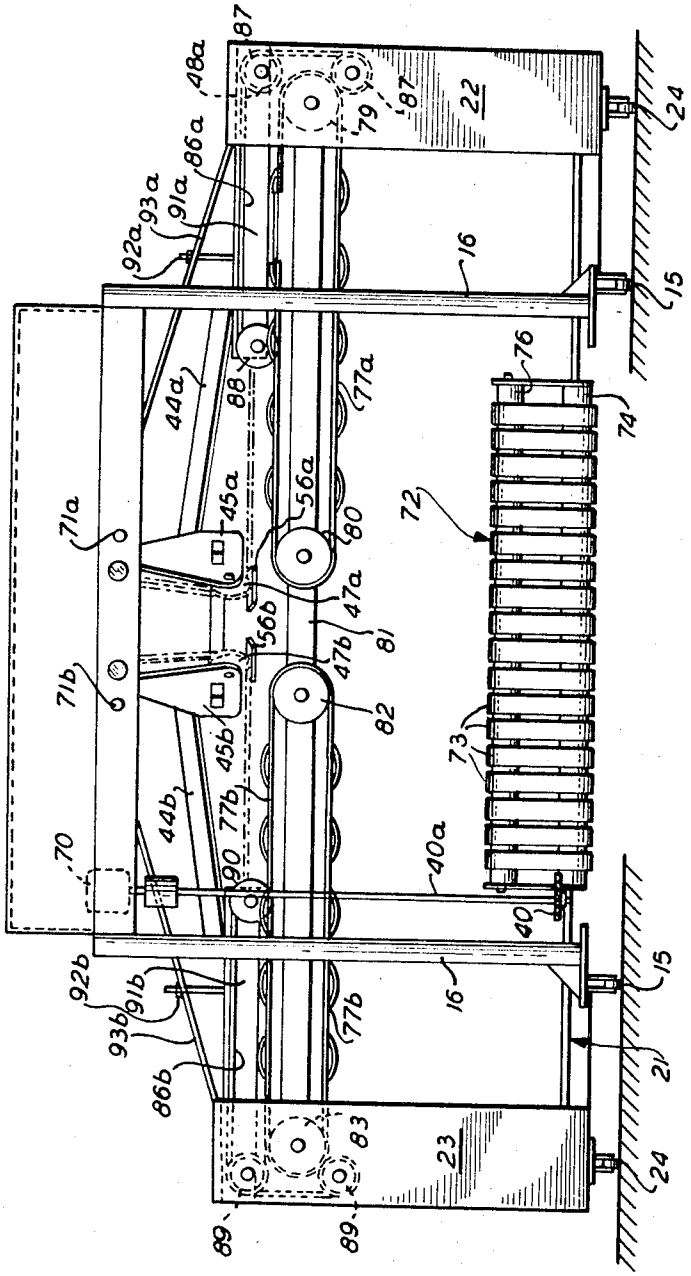


FIG. 5

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Feb. 25, 1969 W. E. MYERS 3,429,063

SHEET FEEDING AND SPREADING APPARATUS

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FIG. 9

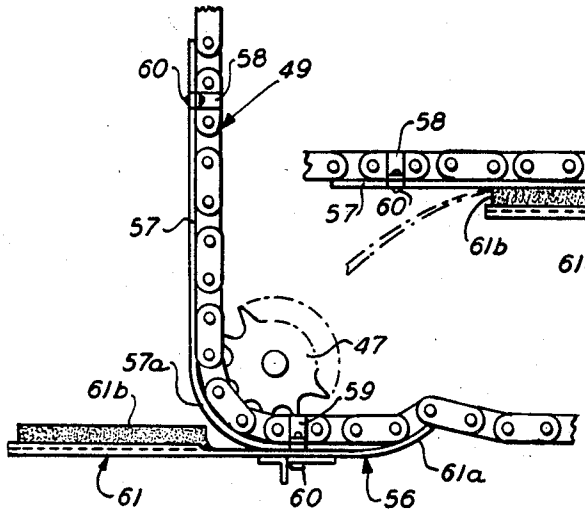


FIG. 10

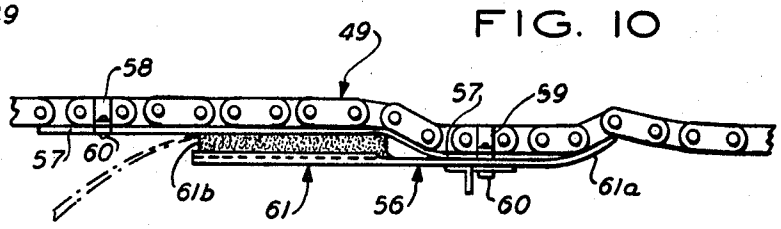
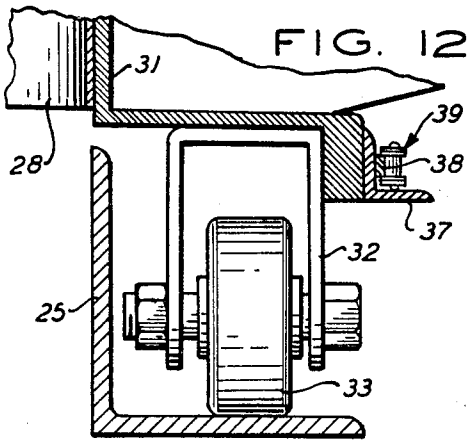


FIG. 12



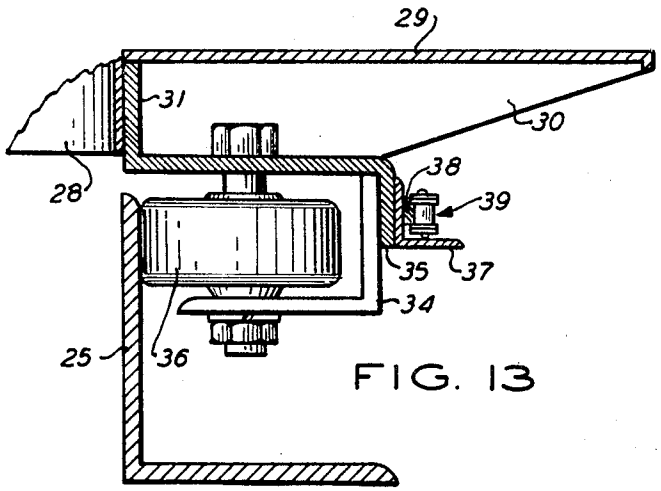


FIG. 13

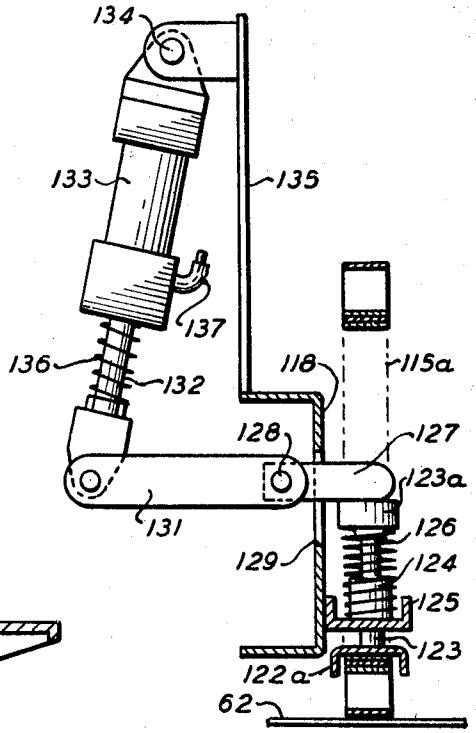


FIG. 11

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United States Patent Office 3,429,063
Patented Feb. 25, 1969

3,429,063

SHEET FEEDING AND SPREADING APPARATUS

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Filed Jan. 3, 1966, Ser. No. 528,327
U.S. Cl. 38—143 12 Claims
Int. Cl. D06f 67/04; D06c 3/00, 3/06

ABSTRACT OF THE DISCLOSURE

The present machine comprises two diverging conveyor chains adapted for gripping the corners of one edge of a sheet to carry the sheet through the machine in a suspended condition and simultaneously to tauten the leading edge. The suspended portion is so carried through first and second spreading stations spaced from each other lengthwise of the machine. Each spreading station includes a pair of spreading belts running sidewise in opposite directions from the center of the machine and having ripples for imparting a wavy motion to the sheet to spread the sheet sidewise and to de-wrinkle the same. Following each pair of spreading belts is a flipper roller having flaps to help in drawing the sheet across the spreading belts. Also, a roller having spiral ridges respectively running clockwise and counterclockwise from the center thereof is provided ahead of the second spreading belt to help in lifting the suspended portion of the sheet and in spreading the same.

This invention relates to an apparaus for spreading and simultaneously feeding flat work laundry pieces to a delivery zone where the laundry pieces are to undergo further processing. By way of preferred example, the apparatus is especially adapted for spreading and simultaneously feeding washed and extracted sheets to an ironer.

The invention comprises improvements in the "Automatic Sheet Feeding Device" disclosed in the Grantham Patent No. 3,174,238, dated Mar. 23, 1965.

A general object of the invention is to provide improvements in the spreading and feeding apparatus of the character described which enables an operator to insert successive sheets therein at a faster rate and which enables the apparatus to perform a more efficient spreading and dewrinkling operation on the suspended portions of the sheets.

Another object and feature of the invention resides in the provision of an upright cylindrical rotary conveyor which is indexed in synchronism with a step advance of the spreading apparatus for carrying successive sheets draped over the top edge of the conveyor into position to be picked up and inserted into the spreading apparatus by an operator sitting or standing within the rotary conveyor.

Another object is to provide a sheet spreading and feeding apparatus wherein each sheet is suspended from a pair of diverging conveyor chains which bring the leading edge into a taut condition at the delivery end of the spreading apparatus and wherein the suspended portion of each sheet is drawn across a pair of transverse spreading belts moving in opposite directions from a longitudinal center line between the conveyor chains.

Another object is to provide such spreading belts with an attached undulating or wavy strip for rippling the sheet to remove kinks and wrinkles therefrom as the suspended portion of each sheet is drawn thereacross.

Another object is to provide overhead belts in association with the outer portions of each rippling belt which depress the sheet onto the rippling belts to render the latter more effective in their spreading operation.

Another object is to provide a plurality of spreading stations each including a pair of rippling belts across which the suspended portions of each sheet are drawn as the sheet is carried from the receiving end to the delivery end of the spreader-feeder apparatus.

Another object is to provide transverse flipper rollers just past the rippling belts which are provided with rubber blades driven at sufficient speed to draw the suspended portion of each sheet across the rippling belts and cause the sheet to be suspended in a hanging down condition before it reaches a next successive spreading station.

Another object is to provide a control switch operated by passage of the leading edge of the machine onto the ironer feed ribbons which lowers a clamp onto the drag roller and a plurality of clamps onto the central portion of a flipper roller there behind to cause the front portion of the sheet to run slower than the rear portion thereof whereby the sheet is tucked down into a hanging down condition before it reaches a pair of ripple belts preceding the ironer feed ribbons.

Another object is to provide a transverse drag roller just preceding the ironer feed ribbons to place the sheet under longitudinal tension as it is led onto the feed ribbons.

These and other objects and features of the invention will be apparent from the following description and the appended claims.

In the description of my invention, reference is had to the accompanying drawings, of which:

FIGURE 1 is a plan view of a sheet spreader and feeder apparatus constructed in accordance with the present invention, showing the operator's station at one end and the ironer feed ribbons at the other end of the apparatus;

FIGURE 2 is a side elevational view of this sheet spreader and feeder apparatus;

FIGURE 3 is a left hand sectional view taken on a longitudinal center line 3—3 of FIGURE 1;

FIGURE 4 is a fractional rear elevational view on the line 4—4 of FIGURE 2;

FIGURE 5 is a front fractional elevational view taken substantially on the line 5—5 of FIGURE 2;

FIGURE 6 is a fractional sectional view to larger scale as seen from the line 6—6 of FIGURE 3;

FIGURE 7 is an enlarged view showing a portion of one of the ripple-type spreading belts;

FIGURE 8 is a left hand sectional view on the line 8—8 of FIGURE 4;

FIGURE 9 is a detailed view, showing a portion of the conveyor chain stopped at the loading station, with the sheet gripping clamp in open position;

FIGURE 10 is a side elevational view of the conveyor chain and clamp, with the clamp in closed position, gripping the leading edge of a sheet;

FIGURE 11 is a fractional section on the line 11—11 of FIGURE 6, showing the air pressure means for lifting and lowering the spreading belt relative to the ironer feed ribbons;

FIGURE 12 is a section to larger scale taken on the line 12—12 of FIGURE 1, illustrating the roller support means for the operator's rotary conveyor; and

FIGURE 13 is a section to a larger scale taken on the line 13—13 of FIGURE 1, illustrating the means for confining the rotary conveyor to rotation about a central axis.

The present spreader-feeder apparatus has a skeleton base frame **10** comprising side members **11** and **12** secured intermediately by cross member **13** and at the back by cross member **14**. This base frame is supported at its four corners on casters **15**. Secured to the fore part of the base frame **10** are four upright posts **16** bridged by a rectangular frame **17** at the top made of front and back channel bars **18** and side channel bars **19** welded together

at the ends. The base frame **10** is secured at the rear side by brackets **20** to a wide rectangular frame **21**. The frame **21** has closed upright rectangular housings **22** and **23** at the sides in which are housed the drive mechanism components of the apparatus. The frame **21** is supported at the rear end by casters **24**.

At the front of the base frame **10** there is a circular frame comprising an annular angle iron **25** having a series of equally spaced brackets **26** secured to the inner wall thereof (FIGURE 3). These brackets are supported by respective casters **27**. The annular angle iron **25** forms a circular track on which is mounted a rotary cylindrical conveyor **28**. This cylindrical conveyor is surrounded at the base by a circular platform **29** which is mounted on a series of radial arms **30** welded to an annular angle iron **31** which in turn is bolted to the exterior wall of the conveyor. Secured to the underside of the annular angle iron **31** are respective inverted U brackets **32** (FIGURE 12) carrying cross shafts for respective caster rollers **33** which ride on the outwardly extending horizontal member of the annular angle iron **25** to support the rotary conveyor vertically. Secured to the annular angle iron **31** are respective L-shaped brackets **34** which are welded to both the lugs **35** and annular angle iron **31** as shown in FIGURE 13. The lower horizontal member of each bracket **34** and the bottom member of the annular angle iron **31** carry a vertical shaft on which is journaled a caster roller **36** which rides against the outer wall of the upright member of the annular angle iron **25** to keep the rotary conveyor centered so that it will turn in effect about a central vertical axis.

Secured to the outer wall of each lug **35** is a small L-shaped annular angle iron **37** (FIGURES 12 and 13) which carries a series of outwardly extending teeth **38**. The teeth **38** are engaged by a chain **39** which surrounds the rotary conveyor except where the chain runs off tangentially to a drive sprocket **40** as shown in FIGURE 1. The sprocket **40** is journaled to the central base frame **10**. In order that the chain **39** may be retained in a taut condition the annular angle iron **25** is suitably rigidly connected to the base frame **10** by suitable means not shown. The lower arm of each bracket **37** serves to support the chain **39** vertically so it does not run off of the teeth **38** from gravitational force.

A ferrule **41** caps the upper edge of the rotary conveyor **28** to provide a well rounded surface across which sheets to be spread and ironed may be draped at successive intervals with the outer lower portions resting on the annular platform **29**. Suitable marks **43** on the ferrule **41** at 45° intervals designate the successive areas within which the successive sheets are to be draped. A door **42** (FIGURE 3) is openable to enable an operator to enter the rotary conveyor **28**. The operator within the conveyor **28** picks up the successive sheets from the top edge **41** and attaches them to the spreader as the conveyor is indexed in synchronism with the step advance of the spreader, as will appear.

The spreader and feeder mechanism comprises two conveyor arms **44***a* and **44***b* which are pivotally supported at the receiving end of the spreader apparatus and which extend in diverging relation to each other through the spreader apparatus to the delivery end thereof. The arms **44***a* and **44***b* have identical vertical V-shaped frame plates **45***a* and **45***b* secured thereto at the receiving end of the apparatus. Journaled to the upper portions of these plates are relatively large sprockets **46***a* and **46***b* and to the lower portions relatively small sprockets **47***a* and **47***b*. Journaled to the far ends of the conveyor arms **44***a* and **44***b* are small sprockets **48***a* and **48***b*. Endless conveyor chains **49***a* and **49***b* are trained around the three sprockets on each conveyor arm with the bottom run of each chain being positioned below and extending substantially parallel along the length of each conveyor arm. A drive transmission **50** is mounted on the frame **17** between the conveyor arms at the receiving end of the apparatus. This drive transmission has opposed drive ends connected through universal joints **51***a* and **51***b* to the respective sprockets **45***a* and **45***b*. These universal joints not only supply driving power to the conveyor chains **49***a* and **49***b* but also support the conveyor arms **44***a* and **44***b* for swinging movement. Braces **52***a* and **52***b* are pivotally connected to the central frame structure **17** about in line vertically with the universal joints **51***a* and **51***b* and are extended obliquely downwardly along the conveyor arms to make pivotal connection to the arms at **53***a* and **53***b*. These braces hold the conveyor arms in horizontal positions and allow the arms to swing towards and away from each other. Additionally, there is a spring pressed plunger **54** between the two conveyor arms which are secured at one end to the frame structure **17** and which is connected at its rear end through links **55***a* and **55***b* to central portions of the conveyor arms to spread the conveyor arms apart under spring pressure.

Secured at equal intervals to the respective conveyor chains **49***a* and **49***b* are clamps **56***a* and **56***b*. Each clamp shown in FIGURES 9 and 10 comprises a flexible strip **57** which may be of leather or plastic secured to spaced bracket-type links **58** and **59** by means of rivets **60**. Each flexible strips portion between the successive bracket links **58** and **59** has a bowed portion **57***a* so that the chain can follow around the respective sprockets. Secured to the fiexible strip at the link **59** is a rigid metal strip **61** having at one side of its connection point a tongue **61***a* which is curved inwardly towards the chain and having on the other side of its connection point a straight gripping pad **61***b*. In each indexed position of the conveyor chains one of the clamps **56***a* and **56***b* is in a loading position directly below the sprocket **47**. The cooperating strip portion **57***a* is then extending around the sprocket **47** away from the cooperating clamp member **61***b* to place the clamp in an open position (FIGURES 3 and 9). The operator at the front of the machine grasps the opposite corners of a sheet draped over the edge **41** of the rotary conveyor and thrusts them into the angle between the strip **57***a* and clamp member **61***b* of the respective clamps while the conveyor chains **49***a* and **49***b* are stopped. When the conveyor chains are next advanced from the positions shown in FIGURE 3, the clamps **56***a* and **56***b* below the sprockets **47** are closed by the chain moving into a straight run and, further, the clamps are closed under pressure by the straight run of the chains bearing against the curved tongues **61***a*. When the clamps holding the sheet reach the sprockets **48***a* and **48***b* at the far end of the conveyor arms **44***a* and **44***b* the clamps are automatically opened to release the sheet by the movement of the strips **57** around the sprockets **48**.

There are six clamps **56***a* and six clamps **56***b* on the respective conveyor chains **49***a* and **49***b*. Because each chain, say the chain **49***a* is trained around the relatively large sprocket **46***a* in its return run from the sprocket **48***a* to the sprocket **47***a* the third clamp in advance of the clamp below the sprocket **47***a* at the receiving or loading station is on the return run of the chain past the sprocket **48***a*. This is done so that when the chains are stopped in their indexed positions to permit the operator to attach another sheet at the loading station, the sheet at the delivery end of the spreader will already have been released onto a set of ironer conveyor ribbons **62** leading to an ironer **63** as shown by broken lines in FIGURE 1. The conveyor chains **49***a* and **49***b* and the rotary cylindrical conveyor **28** are driven by a motor **64** mounted in the right side portion of the upper frame **17** (FIGURE 1). This motor has a speed reduction gear box **65** with a rearwardly extending shaft **66** supporting electric clutch drive section **170** and driven section **171** that is secured to shaft **172** journaled in a bearing in the rear frame **18** (FIGURE 1). The shaft **172** has a sprocket **67** pinned thereon which is coupled by a chain **68** to a sprocket **69** pinned to a shaft **50***a* leading into the drive transmission **50**. Secured to the shaft **50***a* is a drive sprocket **173**

coupled via a chain **174** and driven sprocket **175** to a shaft **176** journaled in a bearing in the rear frame **18**. The shaft **176** is coupled via a bevel gear transmission **70** mounted on the frame **17** to a vertical shaft **40***a* of the drive sprocket **40** for the rotary conveyor **28**.

Every time the operator has taken a sheet from the rotary conveyor **28** and attached the two leading corners to the conveyor chains **49***a* and **49***b*, he presses a pair of control buttons **71***a* and **71***b* (FIGURE 1) which causes the electric clutch to be engaged for a short interval through a pair of electric switches **177***a* and **177***b* operated by cams **178***a* and **178***b*. The electric clutch engages the drive for the conveyor chains **49***a* and **49***b* and rotary conveyor **28** to advance the conveyor chains by 42 inches—the distance between successive clamps **56***a* or **56***b*—and to index ahead the rotary conveyor by ⅛ revolution. Since the third clamp **56***a* or **56***b* in advance of the loading station has already released the sheet and started back on the return run, there are two stations of the spreader between the loading station and the delivery end which are herein referred to as the spreading stations S_1 and S_2 (FIGURES 1 and 3).

As a sheet is carried from the loading station through the first interval to the first spreading station S_1 the lower hanging portion of the sheet is carried on a conveyor **72** located near the floor between the rotary conveyor **28** and a point just past the first spreading station. This conveyor comprises a group of 18 conveyor tapes **73** (FIGURE 1) trained around front and back rollers **74** and **75** and across a centrally located roller **76** positioned at a raised level to cause the bottom hanging portion of the sheet to be carried over a hump. When a sheet is first attached to the conveyor chains **49***a* and **49***b* it is in a bunched condition with the two top corners separated only by the distance between the two clamps **56***a* and **56***b* at the loading station (FIGURE 1). After one interval of advance to the first spreading station S_1 the two upper corners will have been spread by about half the width of the sheet. As shown in FIGURE 1 the floor conveyor **72** is even wider than the width to which the sheet is spread at this first spreading station.

After the operator has attached the leading corners of another sheet to the clamps **56***a* and **56***b* at the loading station he presses again the control buttons **71***a* and **71***b* to turn the rotary conveyor **28** through another ⅛ revolution and to advance the clamps **56***a* and **56***b* by another 42 inches to bring the first sheet to a second spreading station S_2 and to bring the sheet just attached to the first spreading station S_1 (FIGURE 3). As a sheet is advanced from the station S_1 to the station S_2 its leading edge is further spread by about the full width of the sheet and the suspended portion is drawn across the upper runs of a pair of right and left spreading belts **77***a* and **77***b* running sidewise in opposite directions from the central portion of the machine to the opposite sides thereof. The belt **77***a* is trained around a drive pulley **79** in the housing **22** and around a guide pulley **80** near the longitudinal center of the machine journaled on a crossbar **81** (FIGURES 3 and 5) which bridges the two housings **22** and **23**. The belt **77***b* is trained around a guide pulley **82** also near the center of the apparatus journaled also on the crossbar **81** and around a drive pulley **83** in the housing **23**. The spreading belts are rotated continuously while the apparatus is in use.

Each spreading belt **77***a* and **77***b* is of a unique construction shown in FIGURE 7 having a continuous flexible strip **84** as of fabric or plastic riveted at equal intervals along the length of the belt with the portions of the strip **84** between successive rivet points bowed outwardly to form successive ripples **84***a*. The ripples impart a wavy movement to a sheet as the sheet is drawn across the belt. The belt proper may satisfactorily be of a construction comprising a series of overlaid strips **77***s* as of fabric secured together by successive rivets **85**.

Along the outer portions of the spreading belts **77***a* and **77***b* are overhead belts **86***a* and **86***b* (FIGURES 1 and 3) which are preferably of a rubber-fabric composition provided with an outer tread. The right overhead belt **86***a* is trained around a pair of vertically spaced guide pulleys **87** to cause the belt to have a wrap-around driving engagement with a pulley on the shaft of the drive pulley **79** (FIGURE 5). At its inner end the belt **86***a* is trained around an intermediate guide pulley **88** about midway between the right side and the center of the spreading apparatus. Similarly, the left overhead belt **86***b* is trained around a pair of vertically spaced guide pulleys **89** to cause the belt to have a wrap-around driving engagement with a pulley on the shaft of the drive pulley **83** (FIGURE 5). At its inner end the belt **86***b* is trained around an intermediate guide pulley **90** midway between the left side and the center of the spreading apparatus. The two overhead belts are supported so that their lower runs are at about an elevation equal to a medial line through the ripples **84***a* on the upper run of the adjacent spreading belts **77***a* and **77***b*. Thus, a "bite" is provided between the upper run of each spreading belt and the lower run of the respective overhead belt by reason of the overhead belts running continuously with the bottom runs moving in opposite directions from the intermediate portion of the apparatus to the opposite sides thereof. The overhead belts therefore enable the spreading belts to grip the sides of the suspended portion of a sheet and draw the sheet apart more effectively as it is carried forwardly by the overhead conveyor chains across the spreading belts. In order that the "bite" between the overhead belts and the adjacent spreading belts is unobstructed the intermediate guide pulleys **88** and **90** are journaled on the inner end portions of horizontal cantilever arms **91***a* and **91***b* extending along the overhead belts midway between the top and bottom runs thereof from the frame structure at the sides of the spreading apparatus. The cantilever arms are however supported vertically by vertical tie bars **92***a* and **92***b* which are anchored at their upper ends to oblique side braces **93***a* and **93***b* interconnected between the side portions of the upper frame **17** and the frames of the side housings **22** and **23** (FIGURES 1 and 5).

Just past the spreading belts **77***a* and **77***b* is a transverse flipper roller **94** which extends throughout the full width of the apparatus (FIGURES 1 and 3). This flipper roller is journaled in bearings in the frame structure **21** and is rotated in an advanced direction—clockwise as seen from FIGURE 3—at a peripheral speed in excess of the speed of the conveyor chains **49***a* and **49***b*. The flipper roller comprises a central shaft having four flaps **94***a* of a flexible sheet material such as of fabric or rubber running most of the length of the roller. The flipper roller extends slightly above the level of the spreading belts **77***a* and **77***b* so that the flaps **94***a* will come into brushing engagement with the underside of a sheet soon after the sheet is drawn onto the spreading belts **77***a* and **77***b* by the conveyor chains **49***a* and **49***b* and cause the remaining suspended portion of the sheet to be moved across the spreading belts and flipper roller onto a tray **95** near the floor preceding the second spreading station S_2. At the end of the second step advance the sheet will be hanging down from the clamps **56***a* and **56***b* with its leading edge in a nearly taut condition and with the suspended portion of the sheet just in front of the second spreading station S_2. After the operator attaches another sheet to the clamps at the loading station he will press the controls **71***a* and **71***b* to cause the sheets to be advanced by another interval which will now cause the first of the sheets to be carried through the second spreading station S_2 onto the ironer feed ribbons **62**. The spreading station S_2 has in the sequence here named a transverse spiral roller **96** journaled at its ends in the side walls of the frame **21** and having spiral ridges leading clockwise and counterclockwise from the center to the ends of the roller as shown in FIGURE 1, a pair of spreading belts **97***a* and **97***b* without however any cooperating overhead belts, a flipper roller **103** jour-

naled also at its ends in the side walls of the frame **21**, a pair of spreading belts **104***a* and **104***b* and a transverse drag roller **110** journaled at its ends in the side walls of the frame **21** and located directly below the far end sprockets **48***a* and **48***b* where the sheet clamps **56***a* and **56***b* are opened to release the sheet from the conveyor chains **49***a* and **49***b*. The first spreading belt **97***a* is trained around a drive pulley **98** in the housing **22** and a centrally located guide pulley **99** journaled on a transverse frame bar **100** and the spreading belt **97***b* aligned with the belt **97***a* is trained around a drive pulley **101** in the housing **23** and a centrally located guide pulley **102** journaled also on the frame bar **100**. The spreading belt **104***a* is trained around a drive pulley **105** at the back of the housing **22** and a centrally located guide pulley **106** journaled to a transverse bar **107** and the second spreading belt **104***b* is trained around a drive pulley **108** at the back of the housing **23** and a centrally located guide pulley **109** also journaled to the frame bar **107**.

The flipper roller **103** is driven at a peripheral speed greater than the speed of travel of the conveyor chains **49***a* and **49***b* and the drag roll **110** so that it will draw the lower hanging portion of the sheet quickly over the second spreading belts **97***a* and **97***b* and tuck the sheet down into the space before the third spreading belts **104***a* and **104***b*. This also enables the trailing portion of one sheet to be drawn away from the leading edge of the next sheet behind it. Further, when the sheet is thus tucked down in the manner described it will be drawn by the force of its own weight across the third pair of spreading belts **104***a* and **104***b* to provide a better spreading action.

The spread between the conveyor arms **44***a* and **44***b* at the delivery end of the spreading apparatus is greater than the width of each sheet to cause the leading edge of a sheet to be drawn taut and the conveyor arms to be drawn together slightly against the action of the plunger **54** before a sheet is released. As the leading edge of a sheet is released by the movement of the clamps **56** around the sprockets **48**, it places the front portion of the sheet over the drag roller **110** and onto the ironer feed ribbons **62**. The ironer feed ribbons are driven at a faster speed than the peripheral speed of the drag roller so that the portion of the sheet being led onto the ironer feed ribbons is kept under a constant longitudinal tension to remove wrinkles from the sheet. As the leading edge of the sheet is moved onto the ironer feed ribbons it operates a wire-finger switch **111** (FIGURES 1 and 2) to lower a forward clamp **112** onto a smooth central portion **110***a* of the drag roller **110** and it lowers several clamps **113** onto a central portion **103***a* of the flipper roller **103**. These clamps assure that the portion of the sheet engaging the drag roller will run slower than the rear portion of the sheet being drawn across the spreading belts **97** whereby to assure that the sheet will be tucked down onto the table **95***a* before it is drawn across the spreading belts **104**.

As the leading edge of a sheet is carried further along the ironer feed ribbon **62** it operates another wire-finger switch **114** to lower the bottom runs of two horizontal spreading belts **115***a* and **115***b* onto the ironer feed ribbon **62**. The right spreading belt **115***a* is trained around a drive pulley **116** and an intermediate guide pulley **117** (FIGURE 6) both journaled on a transverse channel bar **118** extending across the width of the ironer feed ribbons. The left spreading belt **115***b* is likewise trained around a left drive pulley **119** and an intermediate guide pulley **120** also both journaled on the channel bar **118**. The journals for the intermediate pulleys **117** and **120** are slidably mounted and a tension spring **121** is connected between these mountings to keep the spreading belts under constant tension. The drive rollers **116** and **119** are rotated from respective shafts **116***a* and **119***a* extending from the housings **22** and **23**. The direction of drive of these pulleys is such that the lower runs of the spreading belts move in opposite directions from the central portion of the apparatus respectively to the opposite sides thereof.

The bottom runs of the spreading belts **115***a* and **115***b* are normally at a short distance above the ironer feed ribbon **62** but are shiftable downwardly by channel-shaped pressure plates **122***a* and **122***b* so that the ripples of the bottom runs of the belts are brought into brushing contact with the feeder ribbons (FIGURES 6 and 11). Each pressure plate is secured to a pair of vertical guide rods **123** which extend slidably through respective bearings **124** mounted on brackets **125** welded to the back side of the channel bar **118**. Interposed between the brackets **125** and head portions **123***a* of the respective guide rods **123** are compression springs **126** which normally hold the pressure plates **122** in raised positions against the bottom side of the bracket **125** and out of contact with the bottom runs of the spreading belts. Engageable with the head portions **123***a* are rocker arms **127** which are secured to a rocker shaft **128** within the channel bar **118**, the arms extending through clearance openings **129** in the channel bar. The rocker shaft extends lengthwise of the channel bar **118** and is journaled in bearings **130** bracketed to the channel bar. Pinned to the right end of the rocker shaft is an actuating arm **131**, and pivotally connected to the outer end of this actuating arm is a plunger **132** of an air cylinder **133**. The air cylinder is pivotally supported at **134** to an upright bracket **135** on the channel bar **118**. The plunger **132** is normally held in downmost position wherein the arms **127** are free of the guide rods **123** by a compression spring **136**. When air is admitted to the bottom end of the air cylinder through a nipple **137** the plunger **132** is driven upwardly to move the pressure plates **122** downwardly whereby to shift the bottom runs of the spreader belts into contact with the ironer feed ribbons. Such downward shifting of the bottom runs is accompanied by a slight shifting apart of the intermediate pulleys **117** and **120** against the tensioning of the spring **121**.

The floor conveyor **72** and the spreading belts and rollers of the feeder-spreader apparatus are all driven by a motor **138** in the right drive housing **22** (FIGURES 2 and 4). The motor is coupled by a belt **139** to a shaft **140** of a right angle gear box **141** mounted on a bracket **141***a*. The shaft **140** is also coupled through universal joints **142** and an intermediate cross shaft **143** to a shaft **144** of another right angle gear box **145** mounted on a bracket **145***a* in the drive housing **23** (FIGUR 8).

In the right drive housing **22** a right angle shaft **146** of the gear box **141** is coupled by a chain **147** to a common shaft **148** for the drive pulley **79** of the spreading belt **77***a*, the drive pulley **98** for the spreading belt **97***a* and the drive pulley **105** for the spreading belt **104***a*. Similarly, in the left drive housing **23** a right angle shaft **149** of the gear box **145** is coupled by a chain **150** to a common shaft **151** for the drive pulley **83** for the spreading belt **77***b*, the drive pulley **101** for the spreading bet **97***b* and the drive pulley **108** for the spreading belt **104***b*.

Further, in the right drive housing **22** a chain **152** is trained around the outer side of a sprocket **153** (FIGURES 2 and 4) on the shaft **148** and thence around a lower guide sprocket **154** and an upper drive sprocket **155** on the shaft **119***a* to drive the spreading belt **115***a*. Likewise, in the left drive housing **23** a chain **156** (FIGURE 4) is trained around the outer side of a sprocket **157** (FIGURE 8) on the common shaft **151** and thence around a lower guide sprocket **158** and an upper drive sprocket **159** on the shaft **116***a* to drive the spreading belt **115***b*.

Further, in the left drive housing **23** (FIGURE 8) a chain **160** is trained around a drive sprocket **161** on the shaft **144** and thence around an idler sprocket **162**, a drive pulley **163** for the floor conveyor **72**, a drive sprocket **164** for the first flipper roller **94**, a drive sprocket **165** and a drive sprocket **166** for the second flipper roller **103**. In the right drive housing **22** (FIGUR 2) the shaft of the first flipper roller **94** is coupled by a belt **167** to the shaft of the spiral roller **96** to drive the latter. As shown in FIGURE 3, the drag roller **110** is driven at a lesser speed than the ironer feed ribbon **62** by a chain **168** from the front roller **169** for the feed ribbons.

The embodiment of my invention herein particularly shown and described is intended to be illustrative and not necessarily limitative of my invention since the same is subject to changes and modifications without departure from the scope of my invention, which I endeavor to express according to the following claims.

I claim:

1. In apparatus for spreading and feeding laundry sheets, said apparatus having a receiving end and a delivery end: the combination of two endless conveyor belts extending from the receiving end to said delivery end, each of said conveyor belts having clamp means equally spaced therealong each adapted for gripping one of the opposite corner portions of the leading edge of a sheet to carry the sheet in a suspended condition through the spreading apparatus, drive means for advancing said conveyor belts by steps, and an upright circular conveyor at the receiving end of said spreading apparatus journaled for rotation about a central vertical axis and having a top circular edge across which successive sheets are draped to be picked up and fed into said spreading apparatus, said circular conveyor being sufficiently large to accommodate an operator therein for transferring the successive sheets from the circular conveyor to said conveyor belts.

2. The apparatus set forth in claim 1 including means coupling said circular conveyor to said drive means for indexing the circular conveyor in synchronism with the intermittent step advance of said conveyor belts.

3. The spreading apparatus set forth in claim 1 wherein said circular conveyor is provided with an exterior circular platform in surrounding relation thereto for carrying the end portions of the sheets draped across said top circular edge of the conveyor, and marking means on the upper circular edge of said circular conveyor at intervals equal to the indexing intervals of the circular conveyor for indicating the spaces within which successive sheets are to be draped on the conveyor.

4. The spreading apparatus set forth in claim 1 including a floor conveyor extending from said circular conveyor inwardly of said feeding apparatus in the direction of feed of said conveyor belts through a distance of an index interval of said conveyor belts for carrying the lower hanging portions of the sheets suspended from said conveyor belts as the sheets are advanced through the first index interval from the receiving end of the spreading apparatus.

5. An apparatus for spreading and simultaneously feeding sheets to a processing means, comprising two conveyor belts operated in synchronism and extending from the receiving end to the delivery end of the apparatus, said belts having clamp means equally spaced therealong for receiving the opposite corner portions of the leading edge of respective sheets to carry the sheets in a suspended condition to the delivery end of the apparatus: the combination of means for intermittently advancing said conveyor belts by the distance between successive clamp means to advance the respective sheets to successive stations in the transit from the receiving end to the delivery end of the spreading and feeding apparatus, and a pair of spreading belts having the upper runs thereof moving respectively from the central portion to the opposite sides of said apparatus in transverse relation to the direction of feed of the conveyor belts, said spreading belts having a rippled outer surface of a flexible material for spreading and smoothing the suspended portions of the respective sheets by frictional contact therewith as the sheets are moved thereacross.

6. The apparatus set forth in claim 5 including a roller extending transversely of the apparatus and positioned at the far side of said spreading belts, said roller having yieldable flipper members therealong and being rotated in a forward direction to cause the flipper members to engage the hanging portions of the respective sheets as the same are carried past said spreading belts whereby to draw the hanging portions of the sheets past the spreading belts and enhance the spreading and smoothing action of the latter.

7. The apparatus set forth in claim 5 including a pair of overhead belts extending respectively along the outer end portions of said spreading belts and having the lower runs thereof below the rippled surface on the upper runs of the spreading belts and moving respectively in directions from the center to the outer sides of said apparatus, said conveyor belts being closely spaced apart at the receiving end of the apparatus causing the respective sheets to be initially bunched between said pair of overhead belts whereby after an initial spreading of the suspended portion of a sheet by said spreading belts the side portions of the sheet are engaged between the spreading belts and the respective overhead belts to enhance the spreading action of the spreading belts during the continuing transit of the sheet through said apparatus.

8. The apparatus set forth in claim 5 wherein said spreading belts are provided with a fabric strip lengthwise thereof and riveted thereto at equal intervals with the intervening portions of the fabric strip between successive rivets being bowed outwardly from the belt and forming a means for rippling the sheets as they are drawn across the spreading belts.

9. An apparatus for spreading and feeding laundry sheets to an ironer having motor driven ironer feed ribbons at its input end, comprising two conveyors extending from the receiving end to the delivery end just prior to said ironer feed ribbons, each conveyor having a plurality of clamp means equally spaced by a distance less than the length of a sheet to be ironed, said clamp means being adapted for releasably gripping the respective corner portions of the leading edge of a sheet and holding the sheet in a suspended condition until the leading edge of the sheet is brought to said ironer feed ribbons, means for advancing said conveyors by steps through the distance between successive clamp means on the respective conveyors whereby to carry a sheet to successive stations, a drag roller at the delivery end of said conveyors across which a sheet is fed to said ironer feed ribbons, means for rotating said drag roller in an advance direction but at a substantially slower peripheral speed than the speed of said ironer feed ribbons, a clamp member for engaging said drag roller, and means for lowering said clamp member onto said drag roller as each sheet is fed onto said ironer feed ribbons comprising a control switch operated by the leading edge of a sheet in its initial movement on the ironer feed ribbons.

10. The apparatus set forth in claim 9 including in the sequence here named a transverse spiral roller having thereon a wide open spiral ridge leading from the center outwardly to the opposite ends of the roller for spreading a sheet as it is drawn thereacross, a pair of spreading belts located just past said spiral roller and running from the central portion to the opposite sides of the apparatus, a flipper roller just past said spreading belts and running at a faster peripheral speed than the speed of said conveyors for drawing the hanging portion of a sheet past said spiral roller and spreading belts and tucking the hanging portion downwardly ahead of the flipper roller, and another pair of spreading belts just behind said drag roller across which the tucked down portion of a sheet is drawn and smoothed before it is moved onto said drag roller.

11. The spreader and feeder apparatus set forth in claim 10 including clamp members for engaging said last-mentioned flipper roller, and means controlled also by said control switch for lowering said clamp members onto said flipper roller as each sheet is fed onto said ironer feed ribbons.

12. The spreader and feeder apparatus set forth in claim 11 including a second control switch located past said first control switch and operated by the leading portion of a sheet carried by said ironer feed ribbons, a pair of spreading belts spaced above said ironer feed ribbons and running in opposite directions from the center to

the opposite sides of the machine, and means controlled by said second control switch for lowering said last-mentioned spreading belts onto the top side of a sheet carried by said ironer feed ribbons for smoothing the sheet from the center to the opposite side edges thereof before it enters into said ironer, said spreading belts having a rippled surface for brushing contact with the sheet carried by said ironer feed ribbons.

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