

May 8, 1934.

A. O. HURXTHAL

1,958,341

ROLLER CONVEYER

Filed April 22, 1931

5 Sheets-Sheet 1

Fig. 1.

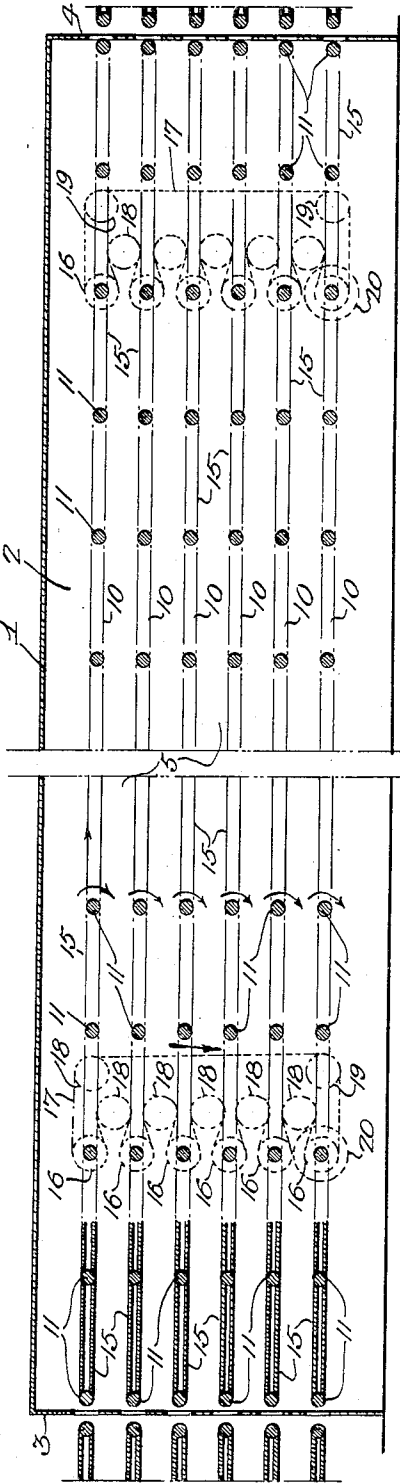


Fig. 2.

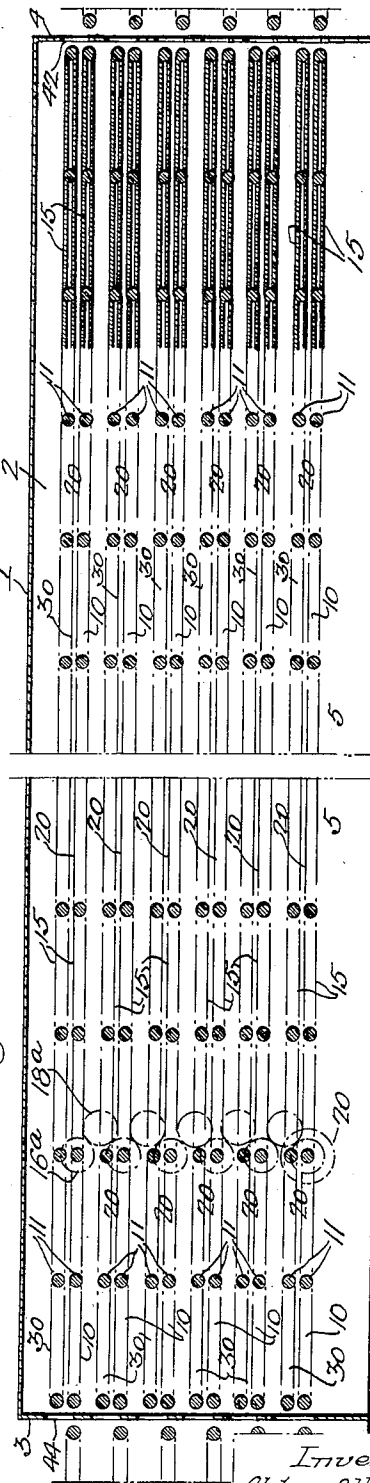
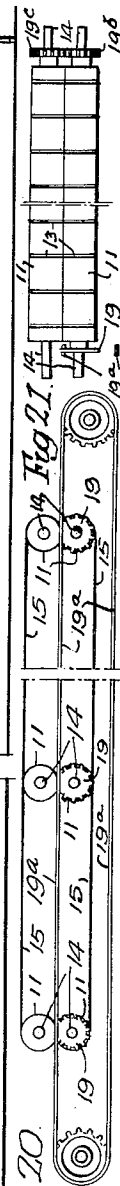


Fig. 20.



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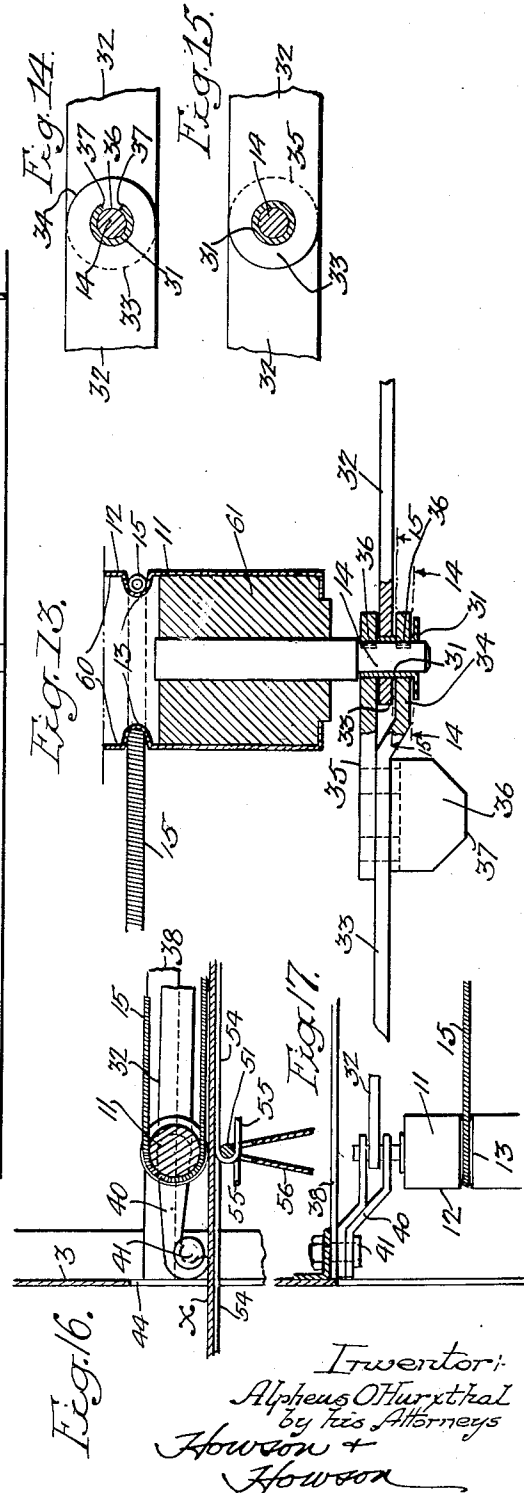
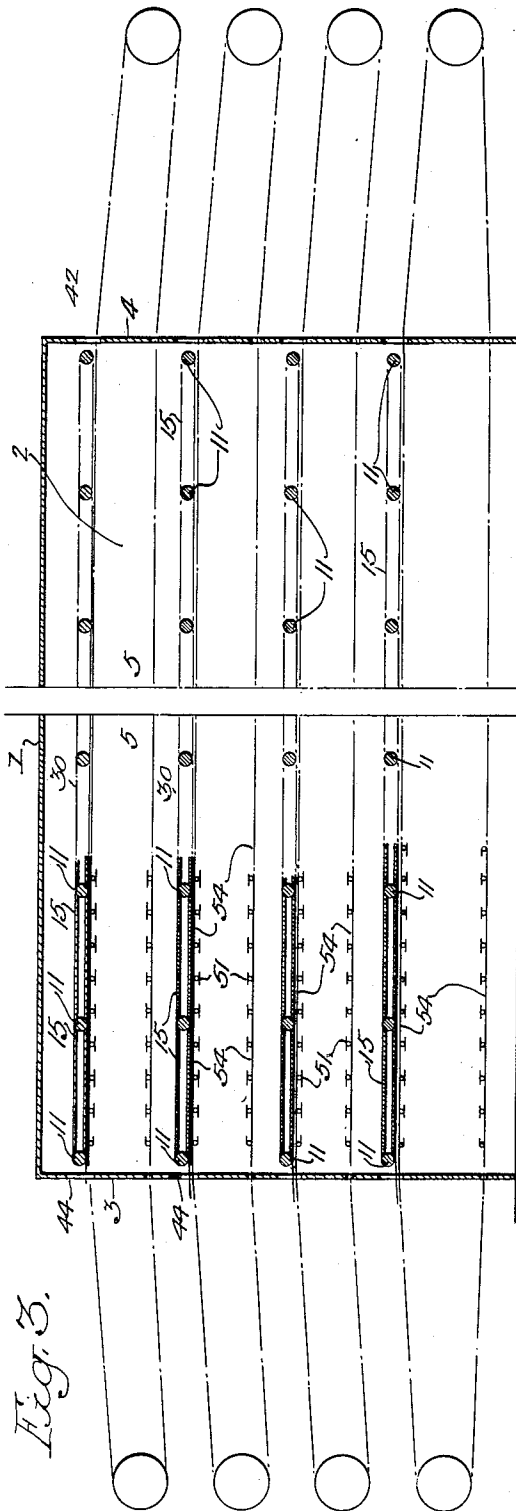
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5 Sheets-Sheet 2



May 8, 1934.

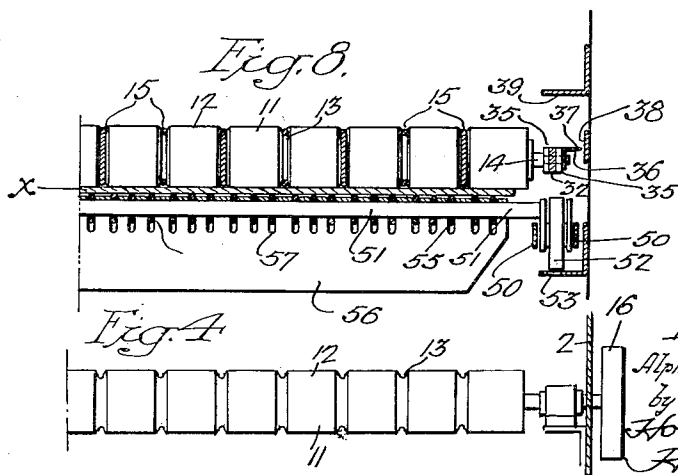
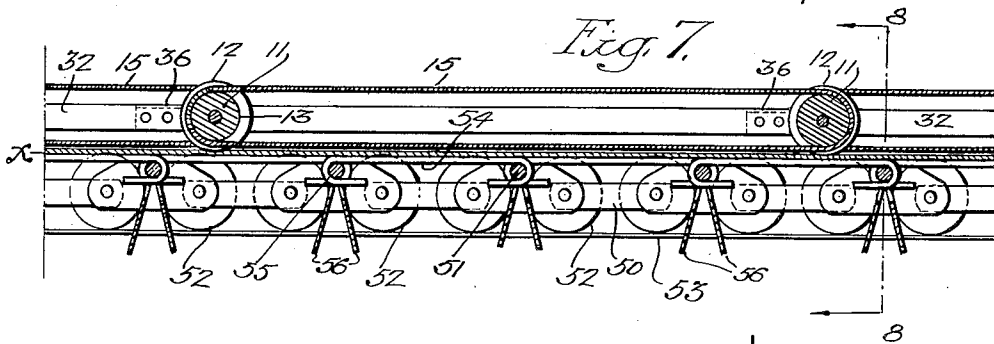
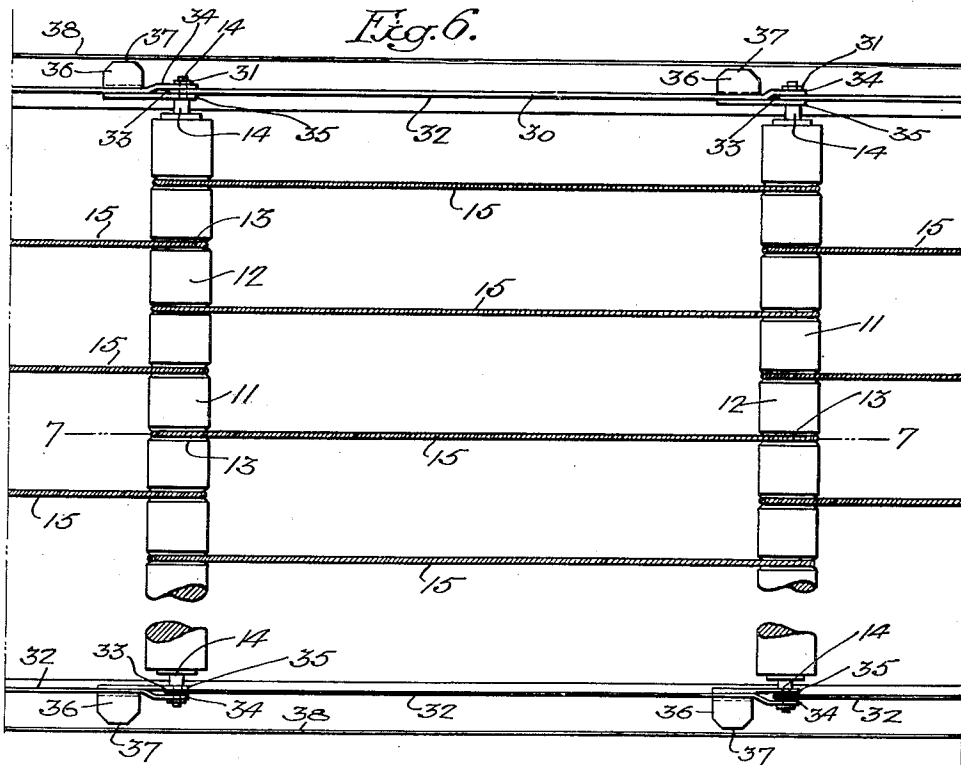
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ROLLER CONVEYER

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5 Sheets-Sheet 3



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1,958,341

ROLLER CONVEYER

Filed April 22, 1931

5 Sheets-Sheet 4

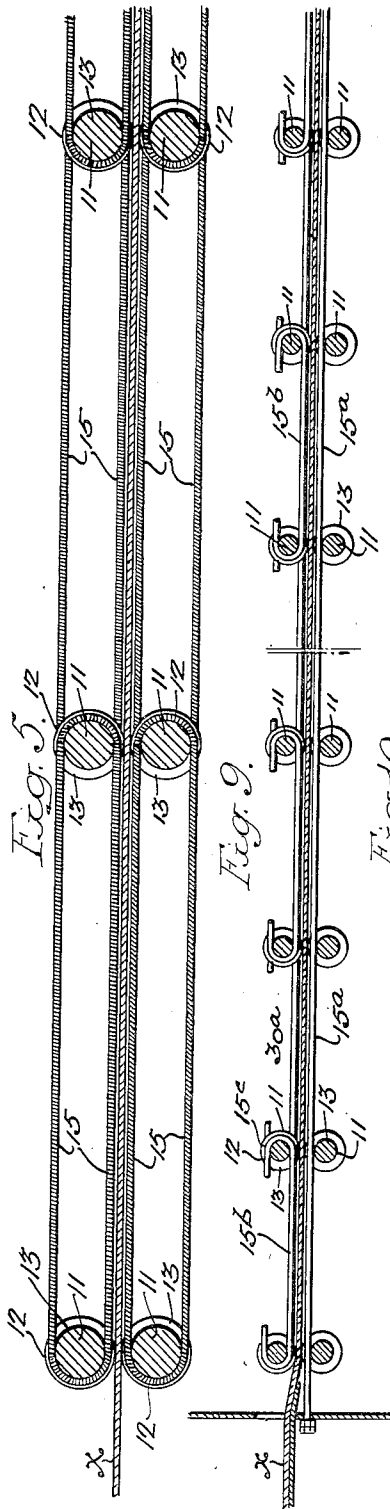


Fig. 10.

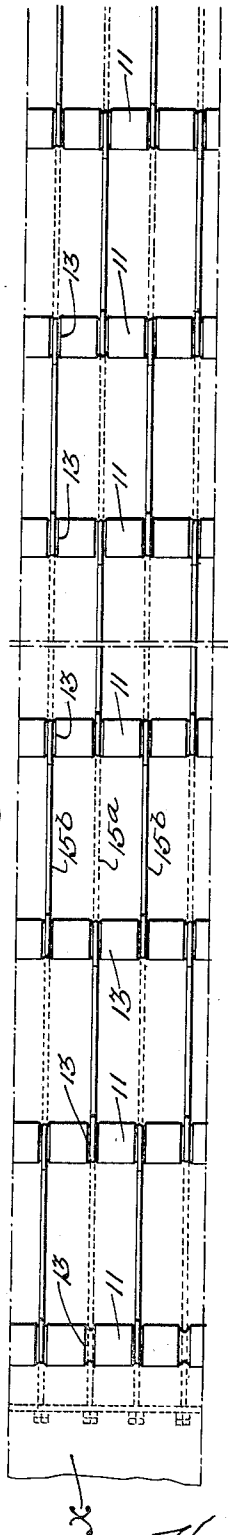


Fig. 11.

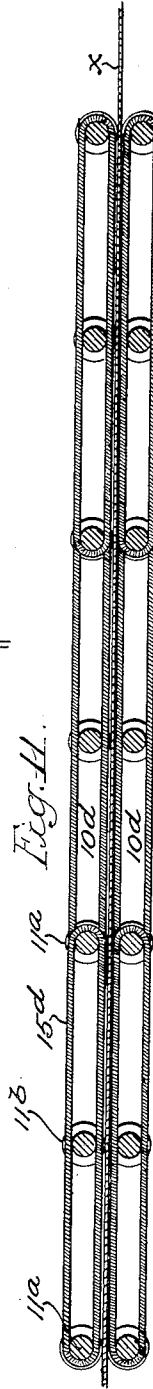
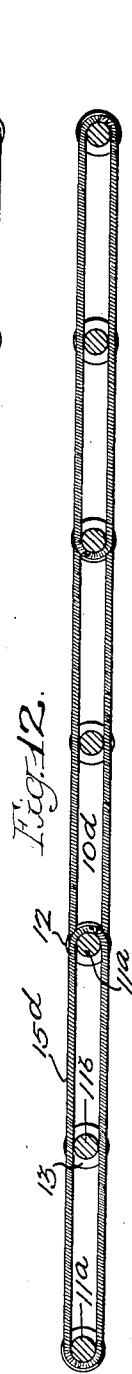


Fig. 12.



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ROLLER CONVEYER

Filed April 22, 1931

5 Sheets-Sheet 5

Fig. 18.

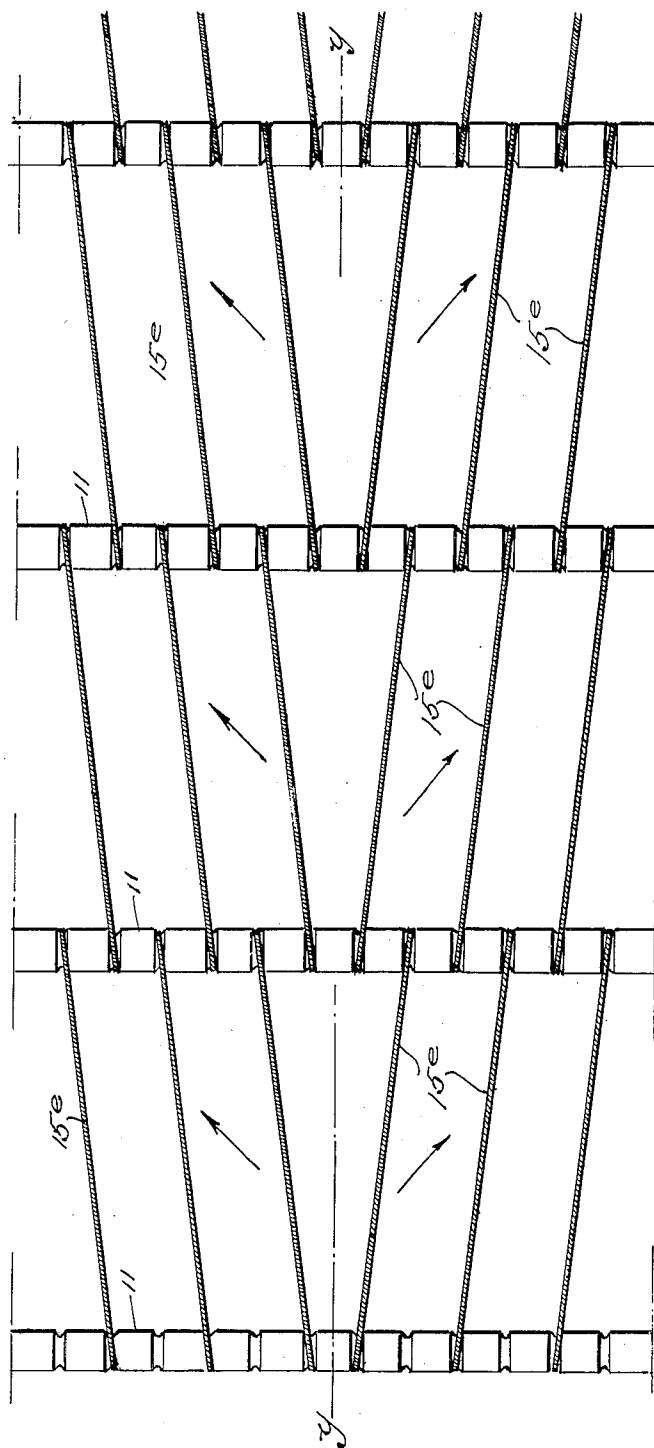
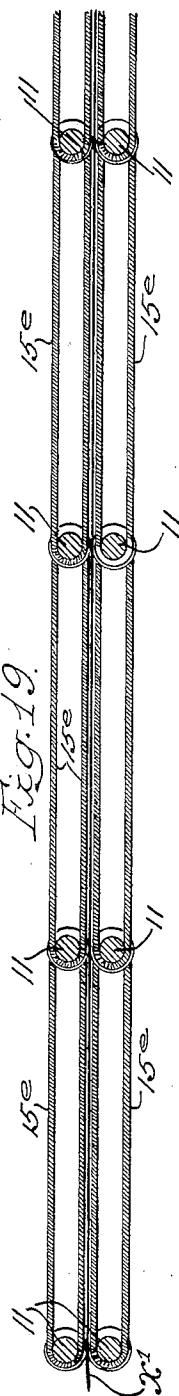


Fig. 19.



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UNITED STATES PATENT OFFICE

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ROLLER CONVEYER

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Application April 22, 1931, Serial No. 532,093

8 Claims. (Cl. 198—165)

This invention relates to conveyers, and particularly to a new, useful and novel combination of elements that is especially adapted for use in advancing sheet or web materials such as veneer, wall board, or cloth, etc. through the drying chamber of a suitable conditioning apparatus.

In driers for sheet material, such as veneer, two distinct types of conveying apparatus have been commonly employed, one of which comprises a conveying unit consisting of two endless belts operating one directly on top of the other, with the sheet material disposed between the adjacently disposed runs of the two belts.

In a unit of this kind the bottom belt functions as a carrier unit, for advancing the material through the drier, while the top belt serves as a pressure unit for holding the material down on the bottom belt, for the purpose of reducing the warping of the sheets to a minimum during the drying operation and thereby causing the sheets to be dried in a substantially flat condition.

The second of these well-known types of conveying apparatus comprises a conveying unit which consists of two superposed series of rollers operating with the rolls of the top series arranged respectively above and substantially in vertical alignment with the rolls of the bottom series, the top rolls functioning as the pressure unit to hold the sheets down flat on the lower rolls which function as the carrying unit, whereby the sheets will be held between the two series of rolls and advanced by the rolls as the rolls rotate in unison.

The driers in which these conveying units are employed are usually adapted for drying a number of runs of material at one time, by arranging several complete conveying units in horizontal superposed relation to each other.

The belt type of conveying unit is generally considered to be the more ideal for conveying and drying of sheet materials, in that the sheets are positively held at all times between the upper run of the bottom belt and the lower run of the top belt. These endless belts usually consist of side chains suitably connected by transversely extending girts which also function to support the ends of relatively stiff rods, screens or perforated plates that extend longitudinally of the belts and substantially parallel to the side chains, for supporting and holding down the sheets inserted between the two belts.

Each of the conveying units of this particular construction requires a relatively large amount of space, vertically, as the side chains of the belts must pass around sprockets of such diameters as will permit of the rods, screens or perforated

plates, being turned end for end in passing from one horizontal level to another, as the endless belts are operated.

If it is desired to dry, for example, four or more runs of material at one time, with all of the runs moving in the same direction, which requires the use of a separate conveying unit for each run, the drier, of necessity, attains such a height that the sheets cannot be conveniently fed to the uppermost units or conveniently taken from such upper units, due to the height of the upper conveying units from the floor on which the drier is mounted.

The roller type of conveying unit obviously may be made of a lesser vertical overall dimension than the belt type of conveying unit, consequently the roller type of conveying unit is more adapted for use in multi-run driers, as a relatively large number of the roller type conveying units may be employed, one above the other, without increasing the height of the drier to the extent that the upper units cannot be conveniently fed with the sheets to be dried.

The roller type of conveying unit, however, has certain inherent and undesirable qualities, one of which resides in the fact that the sheets in passing from one vertically aligned pair of rollers to the next successive pair, longitudinally of the conveying unit, are apt to curl to such an extent, up or down from the normal horizontal plane of travel of the sheets, as to prevent the leading edge of the sheet from coming into the bite of the said succeeding pair of rolls, consequently the sheet will foul the upper or lower rolls of the conveying unit, as the case may be, and become so jammed in the apparatus as to necessitate the shutting down of the drier until the jam can be cleared.

Clearing of the apparatus under such conditions is extremely difficult, due to the inaccessibility of the interior of the drier, as is caused by the close positioning of the superposed conveying units, the heat within the drying chamber adding materially to the difficulty of clearing the apparatus when such fouling of the rolls takes place.

In some instances the pairs of vertically aligned rolls have been placed relatively close together in order to reduce the possibilities of the sheets fouling in the successive rolls. Such close positioning of the rolls materially adds to the expense of building and maintaining the drier and adds to the inaccessibility should fouling of the rolls occur, and furthermore the close position-

ing of the pairs of rollers does not entirely eliminate the fouling of the rolls.

Attempts have been made to combine certain features of these two well-known types of conveying units with a view of producing a drier having such a height, for a given number of runs, that the feeding of the upper units may be conveniently carried on. Such units have been made by combining a conveying belt of the endless type, for supporting the sheet material, and a series of rolls disposed above the carrying belt, for holding the sheet material down thereon.

While this construction permits the building of the drier having a height relatively less than the height of a drier using endless belt units exclusively but greater than one using roller units exclusively, and while this combination eliminates the possibilities of fouling of the rolls by downward bending of the sheets, such a conveying unit, however, is still open to the possibilities of fouling by an upward bending of the sheets, as the sheets are carried along from one roller to the next successive roller longitudinally of the drier.

The primary object of the present invention is to construct a unit comprising a series of rolls spaced at a greater distance apart than has been possible or practical heretofore and to combine with these relatively widely spaced rollers means for guiding the sheets from one roll to the next successive roll, the guides being arranged in such a manner with respect to the rolls as to prevent fouling of the rolls, thereby eliminating the possibilities of the apparatus becoming jammed in the manner above noted.

A unit made in accordance with the principles of this invention is adapted for use as a carrying unit, as a pressure unit, or for use in superposed pairs to form a complete conveying unit including a carrying unit and a pressure unit, as will be hereinafter fully disclosed.

Other combinations, modifications, advantages, and the detailed construction of the device forming the subject of the present invention will be fully disclosed hereinafter, reference being had to the accompanying drawings, of which:

Fig. 1 is a diagrammatic sectional elevation illustrating the invention adapted for use as a material-carrying unit, in a multi-run drier, without the use of means for holding the material down on the carrying unit;

Fig. 2 is a view similar to Fig. 1, but showing a plurality of conveying units disposed in superposed relation and wherein each conveying unit comprises a pair of superposed series of rollers, one series of rollers functioning as a carrying unit and the other series of rollers functioning as the pressure unit, and wherein sheet-guiding means is provided between the rollers of each of the superposed series of rollers;

Fig. 3 is a view similar to Fig. 1, but showing the carrying unit in the form of an endless belt and the pressure unit as a series of rollers with sheet-guiding means extending from roller to roller;

Fig. 4 is a detail illustrating one means for driving the rollers of the units shown in Fig. 1;

Fig. 5 is a fragmentary longitudinal sectional elevation of one of the conveying units illustrated in Fig. 2 and drawn to an enlarged scale;

Fig. 6 is a fragmentary plan view of one of the conveying units shown in Fig. 3;

Fig. 7 is a longitudinal sectional elevation taken on the line 7—7, Fig. 6;

Fig. 8 is a transverse sectional elevation taken on the line 8—8, Fig. 7;

Fig. 9 is a longitudinal sectional elevation through a conveying unit constituting a modification of the invention;

Fig. 10 is a fragmentary plan view of the apparatus shown in Fig. 9;

Fig. 11 is a view similar to Fig. 5, but showing a unit having an alternative arrangement of rollers and guides;

Fig. 12 is a view similar to Fig. 11, but showing the combination of guides and rollers being used as a carrying unit without a pressure unit;

Fig. 13 is a fragmentary plan view partly in section and illustrating one means for supporting the rollers when the apparatus is employed as a pressure unit;

Fig. 14 is a sectional elevation taken on the line 14—14, Fig. 13;

Fig. 15 is a sectional elevation taken on the line 15—15, Fig. 13;

Figs. 16 and 17 are respectively a sectional elevation and plan of one form of means for anchoring the pressure unit shown in Figs. 2 and 3 against longitudinal movement by the underlying carrying unit;

Fig. 18 is a fragmentary plan view of another modified arrangement of rollers and guides;

Fig. 19 is a side elevation of the apparatus shown in Fig. 18; and

Figs. 20 and 21 illustrate a method of driving the individual rollers of a unit made in accordance with the principles of the present invention.

Fig. 1 of the drawings diagrammatically illustrates a drier comprising a top 1, side walls 2 and end walls 3 and 4 respectively, which provide an inclosure in the form of a drying chamber 5. Within the drying chamber 5 is a plurality of units 10 which are respectively made in accordance with the principles of the present invention. The units 10 are disposed in horizontal planes respectively, in superposed, spaced, and substantially parallel relation with respect to each other.

Each of the units 10 comprises a series of rollers 11 disposed in relatively wide laterally spaced relation with respect to each other, longitudinally of the drying chamber 5. Each of the rollers 11 is of the general character shown in Figs. 6 and 13, wherein the peripheral surface 12 of each roller has a series of circumferential grooves 13 formed therein, the grooves of each roller being in spaced relation with respect to each other across the peripheral face of the roller. The rollers are so arranged that the grooves 13 of the successive rollers 11 are in substantial alignment with each other longitudinally of the series of rollers.

Seated in the grooves 13 of the rollers 11 and extending between each laterally spaced pair of said rollers is a series of sheet-guiding elements 15 which, in the preferred forms of the invention, are composed of endless belts formed of circular spirally coiled springs, the convolutions of which normally lie in close abutting relation to each other.

The rollers 11 are provided at their opposite ends with axially aligned trunnions 14, 14, which are adapted to be rotatably mounted in suitably spaced bearings, whereby the rollers are maintained in spaced relation to each other.

The spring belts 15 are of such a diameter that, when the belts are seated in the bases of the grooves 13 of the rollers 11 the outer faces of the spring belts 15 lie flush with or a slight dis-

tance below the peripheral surfaces 12, 12 of the rollers 11, 11 respectively.

The resilient nature of the spring belts 15 obviates the necessity of providing any slack adjusters for the individual belts, as the belts, when in position on the spaced rollers, are stretched to some extent and are, therefore, maintained in a taut state, between the rollers around which they pass, by their own inherent tendency to contract to their normal state.

In Fig. 1 of the drawings, the units 10, which comprise the above noted combination of rollers 11 and guides 15, are employed as material-carrying units without the use of any means for holding the material down. In this application of the units 10 the trunnions 14 of the rollers 11 may be mounted in suitable bearings formed in or carried by the side walls 2 or other framework of the drier and the rollers of the several units may be rotated in unison by any suitable means desired; for example, the trunnions of one or more of the rollers of each unit 10 may be extended beyond the side walls 2 of the drying chamber and provided with a suitable pulley or sprocket wheel 16, around which may pass a suitable belt or sprocket chain 17, which, intermediate the superposed units 10, may pass around suitable idlers 18 and around other suitably placed idlers 19 whereby the driving element 17, moving in the direction of the arrow in Fig. 1, will rotate the rollers of all the superposed units 10 in the same direction and at the same rate of speed.

The laterally spaced rollers 11 of each unit 10, due to the plurality of resilient guide belts 15 passing around the rollers, in the manner illustrated in Fig. 6, will cause all the rollers of each unit to be driven in a like manner, in the same direction and at the same rate of speed, whereby any sheets or other material placed on top of the rollers 11 of any of the units 10 will be advanced through the drying chamber; for example, from the left to the right, as viewed in Fig. 1, with the belts 15 functioning to guide the material from the crest of one roll 11 to the crest of the next successive roll 11.

As shown in Figs. 1 and 2, longitudinally spaced vertically aligned rows of the rollers 11 are driven in unison by the driving elements 17, 17 respectively, as in Fig. 1, or by gear trains including gears 16a, 18a, as shown in Fig. 2, and the several rolls of each unit are driven in unison through the belts 15, 15, but obviously each roll of each unit, or any desired number of the rolls of each unit may be provided with suitable driving means in addition to the belts 15, 15, for rotating the rolls of each unit in unison. For example, each lower roll 11 may be provided with a sprocket 19, see Figs. 20 and 21, and the various sprockets may be operatively connected by a common drive chain 19a, which when the roll 11, driven by the element 17, is rotated all the other rolls of the carrying unit will be correspondingly rotated. Each lower roll 11 may be provided with a gear 19b adapted to mesh with a corresponding gear 19c on the vertically aligned upper roll 11, whereby the upper rolls will be driven in unison with the lower rolls.

Power may be applied to the driving element 17 through the medium of a pulley, sprocket or gear wheel 20 mounted on one of the roller trunnions 14 and connected to any suitable source of power, not shown, or the driving wheels 16 may be separately driven for the purpose of driving the rollers 11 of the respective series of rollers at different speeds, to advance the runs

of material carried by the respective series of rollers, at different lineal speeds.

In Fig. 2, a plurality of conveying units 20 are shown in superposed relation to each other. Each of these units 20 comprises one of the units 10 which functions as a material-carrying unit in the same manner as the carrying units 10 shown in Fig. 1. Superposed upon each of the carrying units 10 is a corresponding unit functioning as a hold-down unit as indicated at 30. Each of the hold-down units 30 is identified in structure with the carrying units 10 with which they are associated, with the exception of the mountings for the trunnions 14, 14 of the rollers 11.

In instances where combinations of rollers 11 and intermediate sheet-guiding means 15, which forms the subject of this invention, are used as hold-down units as indicated at 30, 30 in Figs. 2 and 3, for example, the trunnions 14 of the rollers 11 are mounted in the manner illustrated in Fig. 6, wherein these trunnions 14 of the rolls 11 are rotatably mounted in bushings 31 which, in addition to providing suitable bearings for the trunnions, function as pintles for, and at the junction of, side links 32, 32, which function to maintain the rollers 11, 11 in spaced relation with respect to each other, against the tension of the coiled spring belts 15, 15 extending between and around the spaced rollers 11.

The body portions of the links 32, as shown in Figs. 6 and 13, are substantially aligned with respect to each other and one end of each link 32 is provided with an offset portion 34 in which one end of the pintle bushing 31 is mounted. Adjacent to, and spaced laterally from, the offset 34, each of the links 32 is provided with an extension bracket 35 in which the opposite end of the pintle bushing 31 is mounted. The opposite straight end 33 of each link 32 is rotatably mounted on the pintle bushing 31 of the next link, and lies between the laterally spaced parts 34 and 35 thereof.

The trunnions 14 of the rollers 11 are permitted free rotation within the pintle bushings 31 and the straight ends of the links 32 are permitted free pivotal movement around the outside of the pintle bushings 31, which are held rigidly in the bifurcated end of the next adjacently disposed link.

Rotation of the pintle bushing 31 with respect to the bifurcated end of each of the links 32 is prevented by segmental lugs 36 formed in the ends of the offset 34 and extension 35 of the link, which enter segmental cavities 37 formed in the bushing 31, as clearly shown in Fig. 14. This construction relieves the trunnions 14 of the side thrust produced by the links 32 in maintaining the rollers in spaced relation under the tension of the spring belts 15, 15, and also provides for removal of the trunnions from the bushings without disassembling the links 32, 32.

The hold-down units 30 are adapted to rest of their own weight on the underlying carrying units respectively or on sheets of material being carried by said carrying units, the pivotal connections between the links 32, 32 permitting each hold-down unit 30 to accommodate itself to any variations in the plane of the carrying unit, at all times, so that the sheet material will be held down at all points by the hold-down unit 30.

The construction of the hold-down unit 30 permits of its easy removal from the drying chamber at any time should such removal be desired or become necessary. To provide for

such removal the entire hold-down unit 30 is adapted to be anchored at its end lying adjacent the feed end of the drying chamber in which the unit is located, the whole of the hold-down unit riding loosely on the carrying unit and being held against transverse displacement with respect to the carrying unit by means of lugs 36, which are secured to and located adjacent the bifurcated ends of the links 32, in the present instance, with the outer edges 37 of the lugs lying adjacent longitudinally extending guide rails 38, as clearly shown in Figs. 6 and 8.

Excessive vertical movement of the hold-down unit 30 is prevented by means of angle or other limiting bars 39 which extend longitudinally of the chamber 1, said limiting bars being spaced above and in substantially parallel relation to the guide bars or rails 38, as shown in Fig. 8.

Any suitable means may be provided for anchoring the one end of the carrying unit 30 in the drying chamber; for example, the spacing members at the opposite sides of the unit may be provided, at the anchoring end of the unit with suitable hooks or eyes, such as illustrated at 40, in Figs. 16 and 17, for engagement with a transversely extending anchor bar, or studs 41, disposed adjacent the end wall 3 of the drying chamber and extending inwardly of the chamber 1 from the oppositely disposed sides of the chamber 1, respectively.

In order to remove the hold-down unit 30 from the drying chamber the anchoring means at the feed end of the chamber is released and the unit 30 is permitted to rest on, and to be conveyed through the drying chamber by, the underlying carrying unit, whereby the hold-down unit will be passed out of the drying chamber through the opening 42 formed in the end wall 4 at the discharge end of the chamber 5, through which the material normally is carried and discharged by the carrying unit.

In order to reinsert the conveying unit 30, one end of the hold-down unit 30 is placed on the carrying unit at the feed end of the chamber 5 and permitted to pass through the feed opening 44 formed in the end wall 3 of the chamber, through which the material is normally fed to the drying chamber. The hold-down unit 30 is then fed into and is carried through the chamber 5, by the underlying carrying unit, until the opposite end of the hold-down unit lies within the chamber 5, whereupon the hooks or other anchoring means 40 are attached to the stationary anchoring elements 41, thereby preventing further longitudinal movement of the hold-down unit 30 through the drying chamber.

The rolls 11 of the hold-down unit 30, at such time, are in the correct position to co-operate with the underlying carrying unit to assist in advancing the sheet material through the drying chamber and to hold the said material down firmly on the underlying carrying unit.

Figs. 3, 6, 7 and 8 illustrate the hold-down unit 30 in combination with the usual form of endless belt-carrying unit employed commonly for advancing the material through the drying chamber. This form of carrying unit comprises the usual side chains 50 connected by the transversely extending girts 51 and provided with rollers 52 adapted to ride on rails 53 secured to the side walls and extending longitudinally of the drying chamber 1.

Extending longitudinally of the belt between the relatively spaced girts 51, is a series of later-

ally spaced and relatively stiff rods 54 having hooked ends 55 which engage the girts 51, 51, the lateral spacing of the supporting rods 54 on the girts 51 being maintained by the usual girt aprons 56 having openings 57 through which the hooked ends 55 of the rods extend when hooked onto the girts 51, as clearly shown in Fig. 8.

Figs. 9 and 10 illustrate a modification of the invention wherein a series of rolls 11 are maintained in laterally spaced relation to each other to function as a carrying unit and wherein the belts 15 are replaced by longitudinally extending rods 15a, which respectively rest in substantially aligned grooves 13 of the spaced rolls 11, the rods 15a functioning as guides for the material x as it advances from the crest of one roll 11 to the crest of the next relatively spaced roll 11, the rods 15a being anchored to the end wall 3 of the drying chamber 5 in any suitable manner, such, for example, as illustrated in Fig. 9.

The guide means of the superposed hold-down unit 30a, in this instance, comprise short rods 15b having hooked ends 15c which embrace and ride freely in the bases of the grooves 13 of the rollers 11 of the hold-down unit 30a, in the manner illustrated in Fig. 9, the rods 15b in this case preventing upward curling of the forward ends of the sheets x as they are advanced by rotation of the rollers 11 and the rods 15a of the underlying carrying unit preventing downward curling of the forward edges of the sheets as they are advanced through the drying chamber.

Fig. 12 illustrates a unit 10d comprising a combination wherein guide belts 15d are stretched between and around two widely spaced rollers 11a, 11a of a series of rollers, with a third roll 11b of the series lying intermediate the two rolls around which the ends of the belts 15d pass, the intermediate roll 11b being freely rotatable with the belts 15d merely resting in the grooves 13 of the roll 11b, as shown.

Fig. 11 shows two of the units 10d disposed in superposed relation to each other with the lowermost unit functioning as the carrying unit and the upper unit functioning as the hold-down unit. In this instance, as in Fig. 12, the coiled spring belts 15d pass around one roller, rest in the grooves of the next successive roll, and pass around a third successively disposed roll. Thus, it will be seen that in place of the belts 15d passing around successively arranged pairs of rollers 11a these belts may be of such length as to include any desired number of the rollers, while resting in the grooves of intermediately placed rollers.

In Figs. 18 and 19, a modification is shown wherein the belts 15e pass around and rest, for example, in one roller groove 13 disposed in one vertical plane extending longitudinally of the drying chamber while the opposite end of such belt passes around and rests in a groove 13, in the next successive roller, that is disposed in a vertical plane laterally spaced with respect to the plane in which the first said end of the belt is located.

Thus, the belts 15a, in place of traveling in a plane parallel to the center line of the drying chamber, move in planes disposed at angles with respect to the longitudinal center line y, y of the drying chamber, as shown in Fig. 18, the belts 15e at one side of the center line y, y traveling forward and toward one of the side walls of the drying chamber while the belts 15e at the opposite side of the center line y, y travel forward

and toward the opposite wall of the drying chamber.

This arrangement is particularly adapted for use in the drying of more or less flimsy material, such as lighter weight papers, or cloths, or other webs, the material x^1 , as shown in Fig. 19, being gripped between the belts 15e of the lower carrying unit and the correspondingly arranged belts 15e of the upper hold-down unit. As the rolls 11 rotate to advance the material longitudinally through the drying chamber the belts 15e, 15e moving forward at opposite angles with respect to the center line y, y of the drying chamber tend to spread the material transversely, to work out any wrinkles that may be in the material, whereby the material will be delivered from the drying chamber in a flat smooth state, devoid of wrinkles.

As shown in Fig. 13, the rolls 11 may be made hollow to reduce their weight, by the use of a tube 60, and rigidly securing in its opposite heads 61, 61 in which the trunnions 14, 14 are respectively secured.

In the construction, as above noted, power may be applied to any desired number of the rollers 11 and the coiled spring belts 15 in passing around the driven rolls and around the successively spaced rolls, will function to drive these rolls to which power is not otherwise applied.

The inherently resilient nature of the belts obviates the necessity for providing any slack adjusting means for the belts, such as would be necessary if other non-resilient belts were employed.

The temper of the spring belts is such that the belts will readily withstand the heat within the drying chamber, without losing their inherent resiliency, they are therefore, not affected by the heat within the drying chamber and consequently will maintain a taut state, and will adjust themselves to any variations in the spacing of the rollers 11, such as may be caused by expansion and contraction of the side links 32 or other means provided for maintaining the rollers 11 in spaced relation to each other.

From the above, it will be obvious that the combination of laterally spaced grooved rollers with resilient belts seated in the grooves and acting as guides for the material in its passage from roll to roll is adaptable for wide and varied usages and that the invention is particularly adapted to veneer and similar driers employing the roller type conveyer units, whereby a large number of runs of material may be passed through the drier in one direction, at one time, at the same or relatively different lineal speeds, without the drier attaining an inconvenient height for handling the uppermost runs of material and at the same time eliminating the possibilities of the material fouling the rolls or otherwise causing any interruption of the continuous drying process.

I claim:

1. In a conveying unit, the combination of a carrying unit, a hold-down unit resting on said carrying unit, and readily releasable anchoring means at one end of said hold-down unit for securing said hold-down unit against longitudinal movement by said carrying unit and for permitting said hold-down unit to be bodily advanced by said carrying unit upon release of said anchoring means.

2. In a conveying unit, the combination of a series of laterally spaced rollers, trunnions extending outwardly from the opposite ends of

the rollers respectively, side links extending rigidly between the rollers along the opposite sides of the series, and pivotal elements for said links comprising bushings mounted in the ends of adjoining links upon which at least one of said links swings, said bushings affording bearings for rotatably mounting the roller trunnions.

3. In a conveying unit, the combination of a series of laterally spaced rollers, trunnions extending outwardly from the opposite ends of the rollers respectively, side links extending rigidly between the rollers along the opposite sides of the series, pivotal elements for said links comprising bushings mounted in the ends of adjoining links upon which at least one of said links swings, said bushings affording bearings for rotatably mounting the roller trunnions, and means for securing each bushing in one of the links pivotally connected thereby against relative rotation between the bushing and said link.

4. In a conveying unit, the combination of a carrying unit and a free riding hold-down unit superposed from said carrying unit, said hold-down unit comprising a plurality of laterally spaced rollers, resilient belts passing around relatively spaced pairs of said rollers, rigid links extending longitudinally along the side edges of the hold-down unit and pivotally connecting successive rollers of the series for maintaining said lateral spacing of the rollers against inherent contractive tendencies of the belts and providing for longitudinal flexibility in said hold-down unit, means for anchoring one end of said hold-down unit against longitudinal movement by said carrying unit, and means for maintaining said hold-down unit against transverse displacement with respect to said carrying unit.

5. The combination, in a drier for sheet materials, of a plurality of superposed conveying units each of which comprises a carrying unit and a hold-down unit bodily resting thereon, each hold-down unit comprising a series of laterally spaced circumferentially grooved rollers and a series of endless coiled spring belts seated in the grooves and bridging the spaces between the rollers of the respective series.

6. The combination, in a drier for sheet materials, of a plurality of superposed conveying units each of which comprises a carrying unit adapted to advance material through the drier from end to end thereof and a co-operating hold-down unit adapted to rest bodily and ride freely on said carrying unit for holding the material down as the material is advanced through the drier by the carrying unit, and means for releasably anchoring the hold-down unit in the drier against bodily movement through the drier by the carrying unit, whereby the hold-down unit of any of said superposed conveying units may be withdrawn and carried out of the drier from between the adjacently disposed conveying units by its co-operating material-carrying unit upon release of said anchoring means.

7. In a conveying unit, the combination of a series of rollers disposed in spaced parallel relation longitudinally of the unit, each roller having a series of circumferential grooves spaced transversely of the unit, and endless belts seated at their opposite ends respectively in relatively transversely spaced grooves of succeeding rollers, with the belts adjacent one side of the unit extending at an angle toward said side and the belts adjacent the opposite side of the unit extending at an angle toward said opposite side of the unit to spread material carried by the

conveyer simultaneously with the advancing of said material thereby.

8. In a conveying unit, the combination of a carrying unit and a superposed hold-down unit
 5 arranged for the reception of material therebetween, said carrying and hold-down units each comprising a series of rollers disposed in spaced parallel relation longitudinally of the unit, each
 10 roller having a series of circumferential grooves spaced transversely of the unit, and endless belts

seated at their opposite ends respectively in relatively transversely spaced grooves of succeeding rollers, with the belts adjacent one side of the unit extending at an angle toward said side and
 80 the belts adjacent the opposite side of the unit extending at an angle toward said opposite side of the unit, whereby the interposed material will be longitudinally advanced and transversely spread at the same time.

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