

March 15, 1932.

F. D. KINNEY

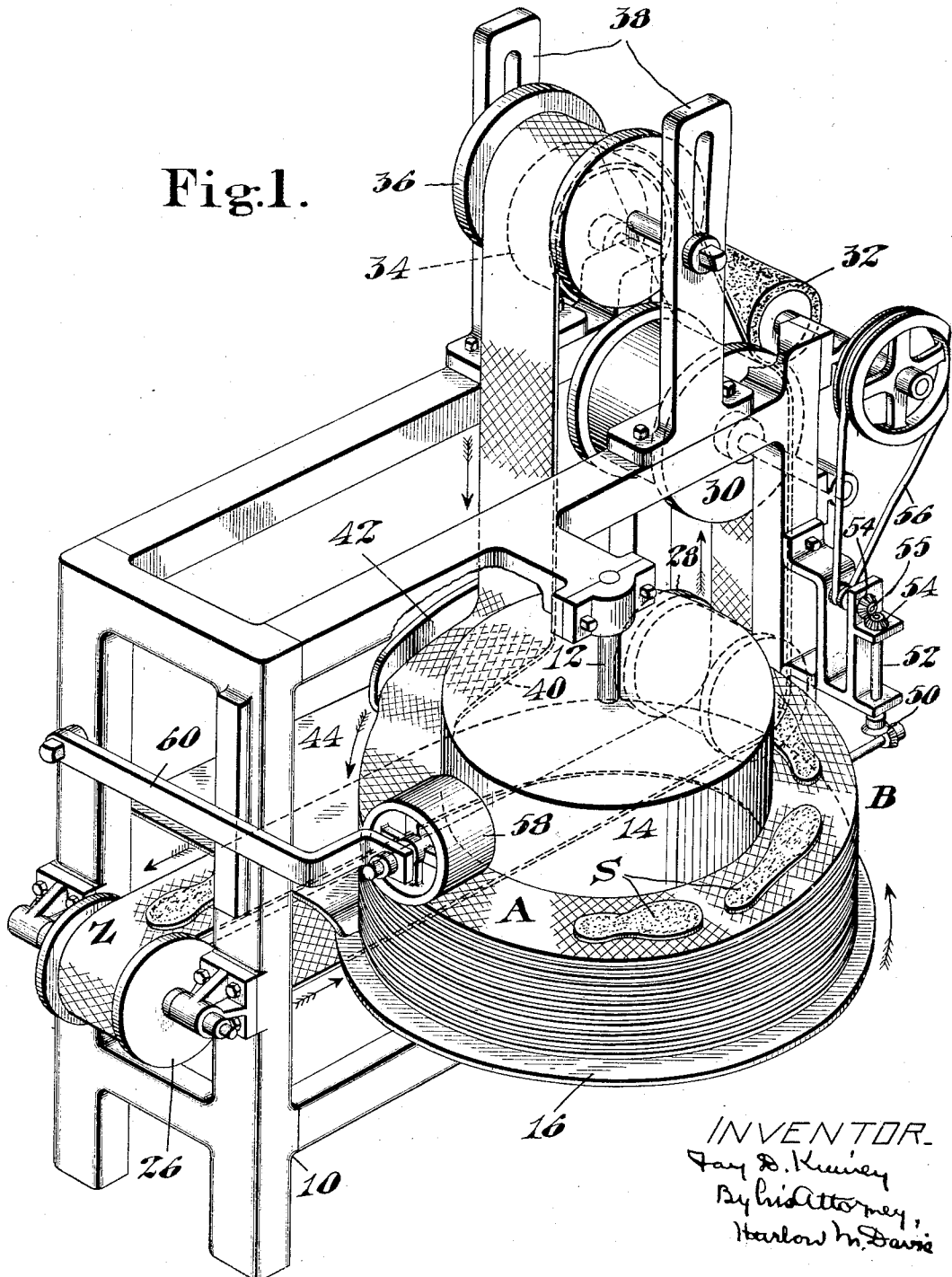
1,849,237

CONVEYER

Filed July 31, 1928

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Fig.1.



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Fig.2.

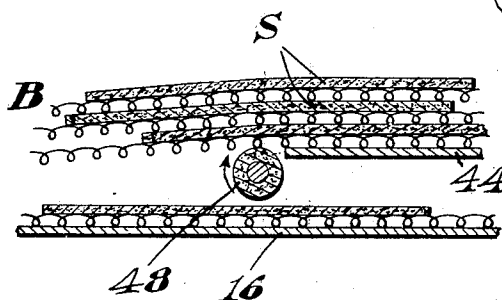
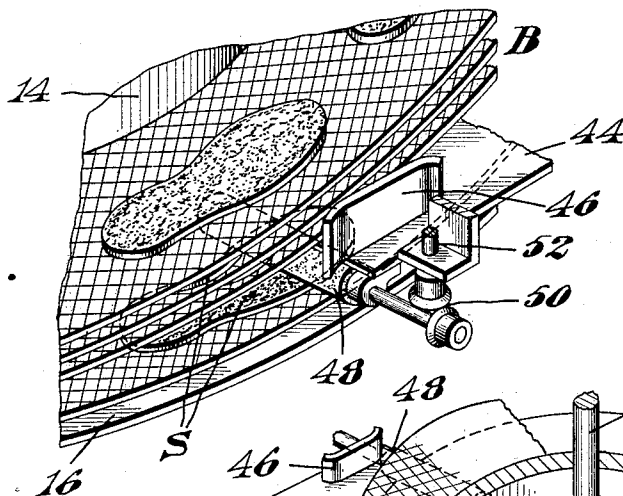


Fig.3.

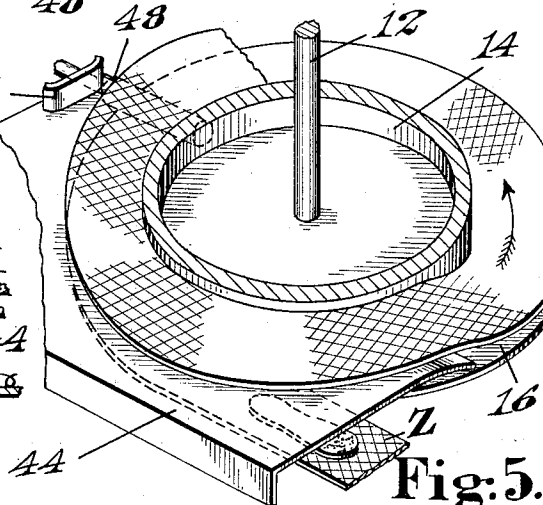


Fig.5.

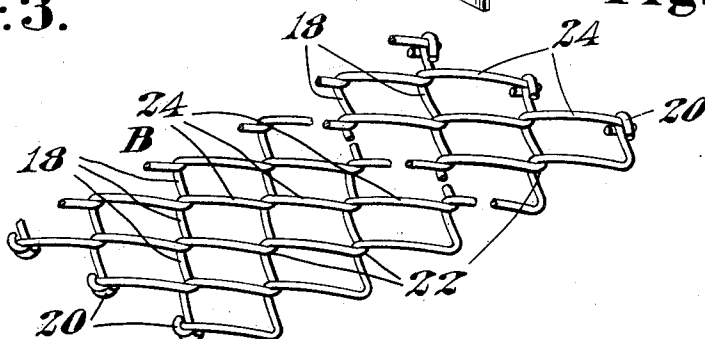


Fig.4.

INVENTOR  
Fay D. Kinney  
By his Attorney,  
Harlow M. Davis

# UNITED STATES PATENT OFFICE

FAY D. KINNEY, OF WENHAM, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY CORPORATION, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY

## CONVEYER

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My invention relates to conveying apparatus, it being especially adapted for so separately forwarding coated articles that their coating may be at least partially dried before they are handled in connection with their utilization or storage.

In such operations as the making of shoes, certain work-portions, of which the soles furnish an example, are coated with cement. Before these are used or placed in books to be distributed to operators, they are exposed for a time to the air, so they shall not be unduly sticky. In this connection, a common practice is to deliver the articles from the cementer to a long conveyer, which extends as far as possible through the factory, they being sufficiently dried when they have reached the opposite extremity. This is obviously wasteful of space, and factory buildings are often of such a character that the necessary extent of travel is difficult to obtain. It is an object of this invention to provide, in a simple manner, as long a path as is necessary through which the work-pieces may advance, this path lying within a relatively contracted area and also having comparatively small vertical dimensions. To this end, I arrange a belt-conveyer in a coil with successive convolutions of the coil resting one upon another and along which articles are conveyed, and with this conveyer associate means for causing its travel. To apply this driving power, the belt, which is preferably endless, is extended from the coil in a loop, and power means is associated with this loop. The coated pieces may be delivered to one extremity of the coil and removed at the other extremity, passing between the successive convolutions or vertical layers, the number of these being sufficient to give the desired length of travel. To allow access of the air to the drying articles, the belt, which is flat, is preferably foraminous, the particular form illustrated being reticulated, with the meshes formed by successive links. The coil is shown as carried upon a support, which is rotatable to permit the free advance of the belt, its axis being preferably vertical, and there being a flange at the lower extremity of the support upon which the coil rests. The

links of the belt are movable relatively to each other, which enables said belt to adjust itself to the form of the support, and rest smoothly upon the flange. Any tendency of the layers to depart from a relatively flat position may be counteracted by a pressure member, as a yieldable roll, acting upon the upper portion of the coil. To prevent the work-pieces from being disturbed in their position upon the belt at points where the loop leaves and returns to the coil, there may be employed means for separating convolutions of the coil, as a terminal convolution and that adjacent to it, which means may consist of inclined plates or walls extending between said convolutions. Additional power means may be associated with a separator, as between the last layer of the belt and the adjacent layer. This assists in advancing the belt, especially overcoming the frictional resistance of the separator. Means is provided for guiding the belt toward and from the coil at its extremities to form the loop. Over the guides the belt is preferably drawn at the lower end of the coil, and returned vertically to the upper extremity, so it is led by gravity upon the top layer or upon the separating wall associated with said layer.

A specific embodiment of this invention appears in the accompanying drawings, in which

Fig. 1 shows my improved conveyer in perspective;

Fig. 2 is an enlarged detail in perspective of one extremity of the lower separator and its more closely associated elements;

Fig. 3 is a vertical section taken transverse of the axis of the roll co-operating with the lower separator;

Fig. 4 is a perspective view illustrating the construction of the belt, and

Fig. 5 is a perspective view looking toward the edge of the lower separator, with the drum broken away.

In a frame 10 is fixed a vertical spindle 12, about which is supported for rotation a drum 14 having its lower extremity an annular flange 16. Resting with its lowest layer upon the flange is a coil of conveyer-belt B, its inner edge contacting with the pe-

riphery of the drum. The belt is perforated, being preferably formed by successively interwoven links 18 of wire, each link extending in a zigzag direction transversely of the belt. At their extremities, adjacent links are joined by eyes 20, between which there is some play. This, with the capacity for relative movement between the portions crossing at 22, enables the belt to accommodate itself to the curvature of the drum and to lie substantially flat on the flange 16. The supporting surface of this belt gives comparatively small areas of contact with the objects which it carries, these being along narrow lines made up of sections 24 of different links, such lines being spaced from each other and inclined across the face of the conveyer. The belt B is endless and is led in a loop from the upper and lower extremities of the coil. Considering the outgoing end of the coil, it leaves its support upon the flange 16 and passes, preferably in a substantially horizontal direction, over a guide-roll 26 rotatable about a horizontal axis upon the end of the frame, then below this and the drum to a guide-roll 28 turning in the opposite extremity of the frame. From the roll 28, the belt rises to an abutment-roll 30, between this and a co-operating driving roll 32 preferably faced with some such yieldable material as rubber. The contact of this yieldable surface with the irregular face of the belt produces a good driving engagement. The roll 32 receives power from a pulley 34 or the like and draws the belt from the coil, rotating the drum about its spindle, said belt being returned to the top of the coil over a roll 36, which is shown as adjustable in slotted standards 38 upon the top of the frame. The height chosen for the roll 36 is sufficient to cause the vertical run of the belt to descend under the influence of gravity, and at the same time take up the portion between the driving rolls 30, 32 and the guide-roll 36.

At the points where there is a change of direction of travel of the belt from the coil to the loop and the reverse, there might be interference with the advance of the work-pieces being conveyed. The entrance of these pieces between the upper and succeeding layer might be resisted, while their passage in leaving the coil between the tangential lower layer and that above it would tend to displace the pieces. These effects I prevent by the introduction of separating plates or walls between each outer convolution of the coil and that adjacent to it. Beneath the incoming layer is placed a plate 40 mounted upon the frame and inclined downwardly from a point somewhat to the rear of the belt descending from the roll 36 until it is above the second turn of the coil. A vertical flange 42 upon the plate 40 retains the belt at this point against outward displacement. The plate here forms a tapered throat, into

which the work-pieces readily enter when passing on the second layer beneath the first. Between the outgoing run of the belt and the layer above it extends a plate 44 with a guard-flange 46 at its outer edge. This so separates the straight portion of the loop from the curved convolution of the coil above it that, during the change of direction of the articles conveyed, they are in contact only with the former.

Assistance may be given to the power-roll 32 in forwarding the belt by auxiliary driving means. This is of peculiar utility where the weight of the coil causes it to drag upon the plate 44. I therefore place at the inner end of this plate a yieldable-surfaced roll 48 journaled in the frame transversely of the belt, and the upper portion of which is just above the supporting surface of the plate 44. Rotation is imparted to the roll, in the direction of the arrow in Fig. 3, through bevel-gearing 50, a vertical shaft 52, bevel-gearing 54, a horizontal shaft 55 and belt-gearing 56, from the shaft of the roll 32. The roll 48 holds the belt away from the adjacent edge of the plate 44, and at the same time urges it forward over said plate, sharing with the roll 32 the driving action.

It is sometimes found that the coil of belt tends to rise at its inner side under the influence of the pull upon it, thus giving a downwardly and outwardly inclined surface, rather than the substantially flat surface desired. This may be prevented by applying pressure to the upper layer of the coil, as by an idle roll 58 rotatable about a spindle projecting from an arm 60 pivoted upon the frame. This roll is of sufficient weight to hold the belt in place upon the support, but may rise as the work passes beneath it.

In using this conveying and drying apparatus, the belt B is caused to advance constantly through power applied at the rolls 32 and 48. The coated work-pieces such as soles S are delivered, as from a cementing machine, coated sides down, to the upper layer of the belt at or near the point A. From this they are delivered to the throat beneath the plate 40, thus entering upon the second layer and so continuing, convolution by convolution, to the bottom of the coil. On account of the limited area of contact of the belt-links at 24 with the under sides of the pieces, the coating which they carry is not materially disturbed even as the pressure imposed by the coil increases. Reaching the point where the outgoing portion of the loop leaves the coil, the pieces, which are now sufficiently dried, are prevented by the separator 44 from being interfered with as to their angular positions by the layer next above that upon which they are emerging from the coil. At or near the point Z, the pieces are removed from the belt by an attendant, or they may be delivered to an automatic stacking mechanism. With-

in reasonable limits of vertical height, it will be evident that the path through which the work travels may be as long as desired, without increasing the area occupied by the apparatus, such area being very small. Air passes freely between the meshes of the belt, thus facilitating the drying operation, and this may be further hastened by delivering a current of heated air upon the coil. On account of the relatively small space occupied by the conveyer, such a delivery of air may be made more effective by enclosing the apparatus in a housing.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A conveyer comprising a belt arranged in a coil with successive convolutions resting one upon another and along which the articles are conveyed, and means for causing the travel of the belt.

2. A conveyer comprising an endless belt arranged in a coil and a loop extending from the coil, a support upon which the coil rests at one extremity only, and means for applying a driving force to the loop.

3. A conveyer comprising an endless belt arranged in a coil and a loop extending from the coil, means for applying a driving force to the loop, and means for applying a driving force to a convolution of the coil.

4. A conveyer comprising an endless belt arranged in a coil and a loop extending from the coil, means for applying a driving force to the loop to draw the belt from the coil, and guiding means for the belt arranged to allow its return to the coil by gravity.

5. A drying conveyer comprising a belt of foraminous material arranged in a coil with successive convolutions resting one upon another, and means for rotating the coil.

6. A drying conveyer comprising an endless belt having successive links extending transversely of the belt and connected to move relatively to one another, and a rotatable support about which the belt is coiled with the convolutions resting one upon another.

7. A conveyer comprising a flat belt arranged in a coil with successive convolutions resting one upon another, a rotatable support for the coil, and means for applying power to the belt to rotate the support.

8. A conveyer comprising a belt arranged in a coil with successive convolutions resting one upon another, means for causing the travel of the belt, and pressure means contacting with an outer convolution of the coil.

9. A drying conveyer comprising a belt of foraminous material arranged in a coil with successive convolutions resting one upon another, and a yieldable pressure member resting upon the upper convolution of the coil.

10. A conveyer comprising a flat belt arranged in a coil with successive convolutions resting one upon another, means for causing

the travel of the belt, and separating means associated with a terminal convolution and an adjacent convolution only of the coil.

11. In a drying conveyer, the combination with a support, of a coil of flat conveyer-belt resting at its bottom extremity only upon said support, means for advancing the belt, and means for guiding the belt toward and from the coil at its extremities.

12. In a drying conveyer, the combination with a support rotatable about a substantially vertical axis, of a coil of endless flat conveyer-belt carried thereby, means for guiding the belt toward and from the coil at its extremities, and means independent of the support for causing the travel of the belt.

13. In a drying conveyer, the combination with a support rotatable about a substantially vertical axis, of a coil of conveyer-belt carried by the support, means for drawing the belt horizontally from the lower end of the coil, and means for returning said belt vertically upon the upper extremity of the coil.

14. In a drying conveyer, the combination with a support, of a coil of flat conveyer-belt carried thereby, means for guiding the belt toward and from the coil at its extremities, and means independent of the support for applying power to the belt at a plurality of points.

15. In a drying conveyer, the combination with a support rotatable about a substantially vertical axis, of a coil of flat conveyer-belt carried thereby, and means independent of the support for applying power to the belt to draw it from the support and thereby rotate said support.

16. In a drying conveyer, the combination with a support, of a coil of conveyer-belt carried thereby, means for guiding the belt toward and from the coil at its extremities, and a separator extending between convolutions of the coil near an extremity thereof.

17. In a drying conveyer, the combination with a support, of a coil of conveyer-belt carried thereby, means for guiding the belt toward and from the coil at its extremities, a separator extending between the convolutions of the coil near an extremity thereof, and means for applying power to the belt adjacent to the separator.

18. In a drying conveyer, the combination with a support, of a coil of conveyer-belt carried thereby, means for guiding the belt toward and from the coil at its extremities, and separating means extending between convolutions of the coil at opposite extremities thereof.

19. In a drying conveyer, the combination with a support, of a coil of conveyer-belt carried thereby and consisting of successive convolutions of reticulated material resting one upon another, and power means engaging the reticulated surface of the belt.

20. In a drying conveyer, the combination

with a support, of a coil of conveyer-belt carried thereby and consisting of successive convolutions of reticulated material resting one upon another, power means engaging the  
5 reticulated surface of the belt, and a pressure member engaging said belt.

21. The combination with a support rotatable about a substantially vertical axis and having a flange at its lower portion, of a coil  
10 of flat conveyer-belt resting upon the flange, and means for drawing the belt from and returning it to the support.

22. The combination with a support rotatable about a substantially vertical axis and  
15 having a flange at its lower portion, of a coil of conveyer-belt resting upon the flange, a roll extending between the lowest layer of the coil and the adjacent layer, and means for rotating the roll.

23. The combination with a support rotatable about a substantially vertical axis and having a flange at its lower portion, of a coil of conveyer-belt resting upon the flange,  
20 walls extending respectively between the upper and lower layers of the coil and the layer adjacent to each, and means for drawing the belt from and returning it to the support.

24. The combination with a support rotatable about a substantially vertical axis and  
30 having a flange at its lower portion, of a coil of conveyer-belt resting upon the flange, walls extending respectively between the upper and lower layers of the coil and the layer adjacent to each, a guide-roll for the belt  
35 situated above the upper wall, guide-rolls lying substantially in the plane of the lower wall, and a driving roll engaging the belt.

25. The combination with a support rotatable about a substantially vertical axis and  
40 having a flange at its lower portion, of a coil of conveyer-belt resting upon the flange, a guide-roll for the belt situated above the upper layer of the coil, guide-rolls lying substantially in the plane of the lower layer,  
45 and a driving roll engaging the belt between the coil and one of the guide-rolls.

26. The combination with a support rotatable about a substantially vertical axis and having a flange at its lower portion, of a  
50 coil of conveyer-belt resting upon the flange, a guide-roll for the belt situated above the upper layer of the coil, guide-rolls lying substantially in the plane of the lower layer, and a driving roll engaging the belt between  
55 the convolutions of the coil.

27. The combination with a support rotatable about a substantially vertical axis and having a flange at its lower portion, of a  
60 coil of conveyer-belt resting upon the flange, means for drawing the belt from and returning it to the support, and a pressure-roll contacting with the upper layer of the coil.

In testimony whereof I have signed my name to this specification.

65  
FAY D. KINNEY.