April 1, 1941. A. CAVEDON 2,237,049

TRANSFER MECHANISM FOR CARDING MACHINES

Filed Jan. 30, 1939 2 Sheets-Sheet 1

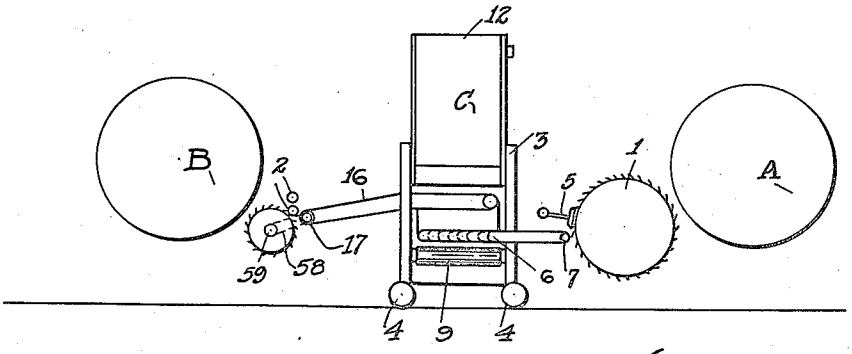


Fig. 1.

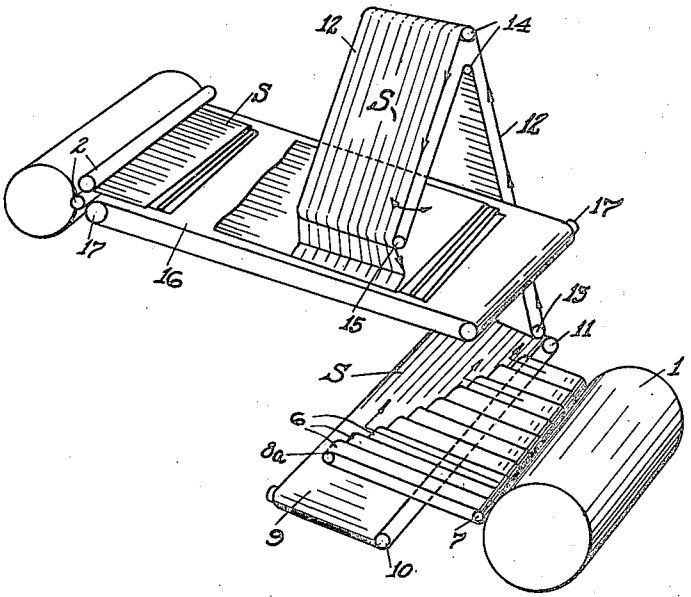


Fig. 2.

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TRANSFER MECHANISM FOR CARDING MACHINES

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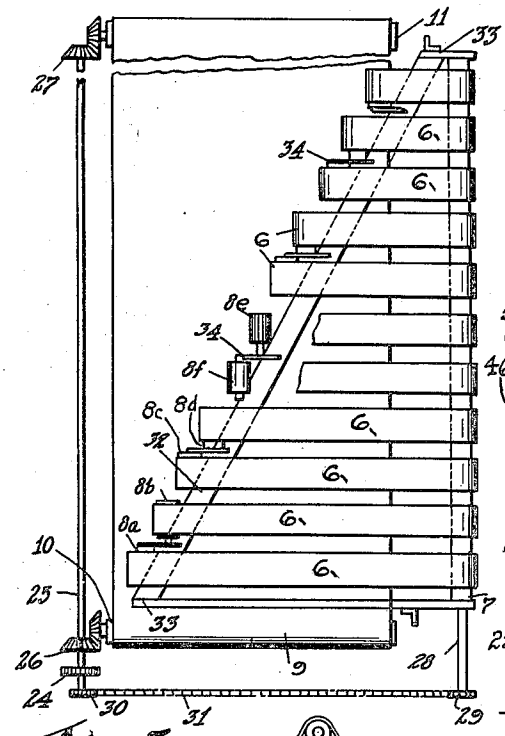


Fig. 5.

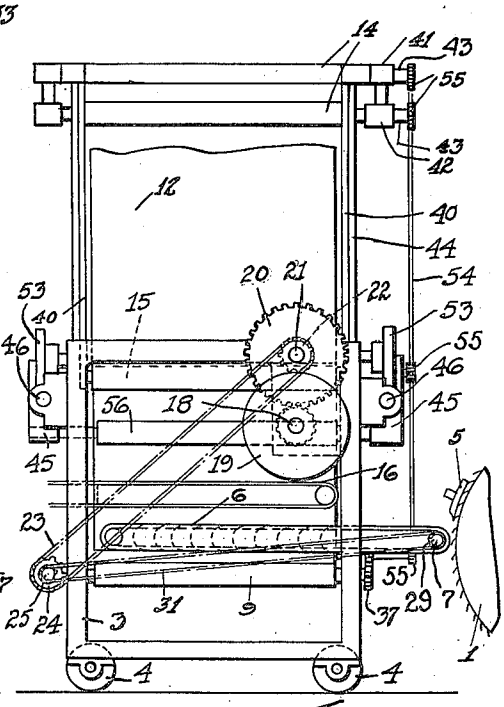


Fig. 4.

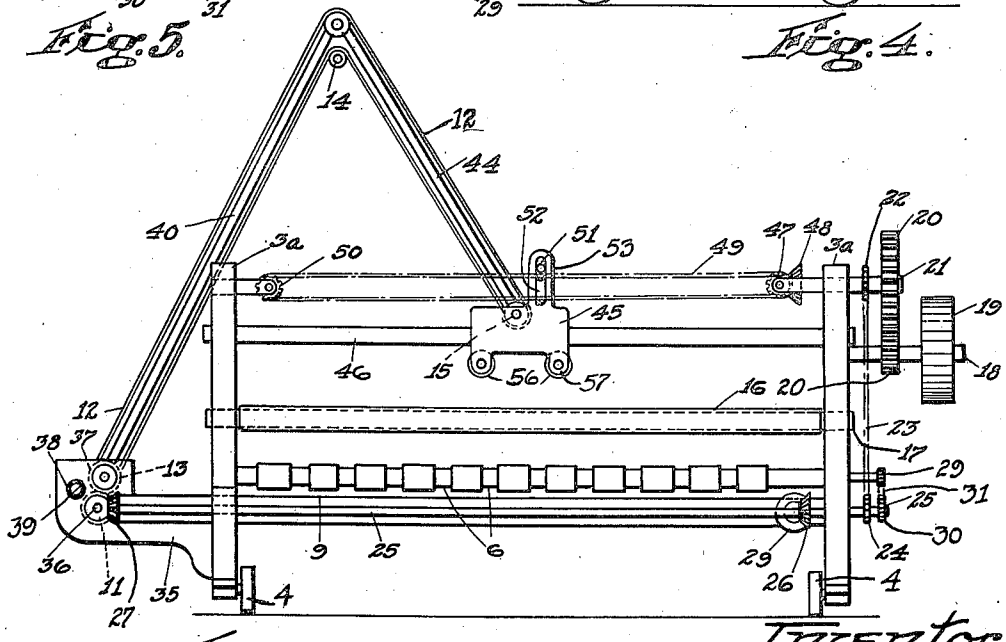


Fig. 3.

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UNITED STATES PATENT OFFICE

2,237,049

TRANSFER MECHANISM FOR CARDING MACHINES

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Application January 30, 1939, Serial No. 253,572

11 Claims. (Cl. 19—163)

The present invention relates to an improved mechanism for transferring a web of carded fibres from one carding machine to another, in such manner that the web will retain substantially the same thin sheet form in which it is originally conveyed from the first machine.

According to the invention, the transfer mechanism, or equalizing feed, as it may be called, is constructed as a unit for installation between adjacent carding machines; as for example, between a breaker card and a finishing card. The mechanism is particularly adapted for the handling of carded material in the manufacture of wool, or other yarns of various types, made on the woolen system, since the transfer from one card to another is effected, without appreciably altering the original arrangement of the fibres in the sheet or web that is doffed from the first, or breaker card. As a result, when this thin web is laid back and forth for feeding in to the second card, the fibres in a large number of overlying layers of the web are simultaneously operated upon, and a lap of an extremely uniform character is produced for conversion into yarn. The above and other advantageous features of the invention will hereinafter more fully appear from the following description, with reference to the accompanying drawings, in which:

Fig. 1 is a view in side elevation, showing the transfer mechanism of the present invention located between two carding machines.

Fig. 2 is a diagrammatic view, illustrating, in perspective, the relation existing between the essential parts of the transfer mechanism and associated cards.

Fig. 3 is a view in front elevation, showing the transfer mechanism of Fig. 1 on an enlarged scale.

Fig. 4 is a side elevation of the mechanism of Fig. 3, as viewed from the right.

Fig. 5 is a fragmentary plan view of the parts of the width reducing means shown in Fig. 4.

Like reference characters refer to like parts in the different figures.

Referring first to Fig. 1, the doffer of a carding machine A, such as a breaker card, is indicated at 1, and the feed-in rolls of a second carding machine B, such as a finishing card, are indicated at 2. The transfer mechanism, or feed, embodying the present invention, is generally indicated at C, and is carried by a portable frame 3, movable on rolls 4, so that the entire mechanism can be shifted as a unit, and positioned between the carding machines A and B, in proper relation to the doffer 1 and feed-in rolls 2.

As best shown in Fig. 2, the thin web of fibres doffed from the card A by the comb 5, falls upon a series of relatively narrow transfer belts 6 of different lengths, with the ends of all of the belts 6 nearest the doffer 1, in alinement and passing around a common driving roll 7. The other ends of the belts 6 pass around independently mounted guide rolls 8*a*, 8*b*, etc., see Fig. 5, so that the belts 6 terminate at different distances from the axis of the doffer 1. A collecting apron 9 carried by rolls 10 and 11 passes beneath the stepped transfer belts 6 in a substantially horizontal plane, so that the sheet S of carded fibres delivered to the belts 6 by the comb 5, is distributed directly by the belts 6 across the traveling apron 9 and conveyed at right angles to its original direction of movement, without appreciable alteration of its sheet form. It is also to be noted that the transfer of the carded fibres from the belts 6 to the apron 9 is accomplished with some reduction in the width of the sheet, but without materially disturbing the original arrangement of the fibres as doffed from the card A, due to the multiplicity of the transfer belts 6, which distribute the fibres evenly on the apron 9 as the change of direction is accomplished.

The sheet S of carded fibres on the collecting apron 9, is then conveyed laterally of the frame 3 to the upwardly inclined portion of a distributing apron 12, the lower end of which is supported by a roll 13. Parallel portions of the apron 12 extend upwardly from the roll 13 over spaced top rolls 14, and then downwardly around a roll 15. The lower portion of the apron 12 carried by the roll 15, terminates above a delivery apron 16 overlying the collecting apron 9 and mounted on rolls 17, so driven that the upper surface of the apron 16 travels in the direction of the feed-in rolls 2 of the card B, at a slight downward inclination, indicated in Fig. 1.

As hereinafter more fully described with reference to Figs. 3 to 5, inclusive, the roll 15 carrying the lower end of the distributing apron 12, is adapted to be moved back and forth over the delivery apron 16, coincidentally with travel of the apron 12 over the rolls 13, 14 and 15, so that the sheet S of carded fibres carried by the apron 12, is laid in a series of folds on the delivery apron 16. The width of the sheet S and the frequency of the back and forth movement of the apron roll 15, are such that as a given point on the apron 16 travels under the apron 12, an appreciable number of folds are laid in overlying relation on the apron 16. A number of folds in the sheet S are indicated at the broken-away por-

tion, and it is also evident that the folds will have such a slight overlap that the folded web will be of uniform thickness throughout, as the material enters between the feed-in rolls 2 of the card B.

As a result of the functioning of the elements described above, it is evident that the fragile web of fibres, as doffed from the card A, does not undergo any appreciable alteration of its original thin sheet form in traveling from the doffer 1 of the card A to the feed-in rolls 2 of the card B. Furthermore, the overlying folds of the sheet S, as laid on the delivery apron 16, are of extremely uniform character, with all of the fibres retaining their original arrangement in the sheet. Consequently, a large number of overlying layers of the web are simultaneously acted upon by the finishing card B, and when the resulting sliver is condensed by any suitable mechanism, the yarn produced therefrom is of an extremely uniform quality.

Referring now to Figs. 3 to 5, inclusive, there is shown as an illustrative embodiment of the invention, the manner in which the various elements, previously described with reference to Fig. 2, are mounted on the frame 3 and driven in unison to produce the results desired. A shaft 18 is rotatably driven from any suitable source of power, not shown, by a pulley 19, and is connected by gearing 20 to a countershaft 21. A sprocket 22 on the countershaft 21, is connected by a chain 23 to a sprocket 24 mounted on a shaft 25, extending horizontally across the frame 3 at substantially the same level as the apron 9. The cross shaft 25 drives the apron rolls 10 and 11 in unison through pairs of bevel gears 26 and 27, and a shaft 28 extending from the roll 7 carrying the alined ends of the belts 6, is also driven from the shaft 25 through sprockets 29, 30 and chain 31. The belts 6 are thus driven in unison with the apron 9, and being of different lengths, serve to transfer the web of fibres received from the doffer 1 to the horizontally moving upper surface of the apron 9, which is traveling just below the belts. Thus the web supporting means, as constituted by the belts 6, progressively deposits the entire web of fibres transversely of and directly upon the collecting apron 9.

As the web passes from the belts 6 to the apron 9, it undergoes a reduction in width, together with a slight increasing in thickness, simultaneously with its change in direction of movement with the uniform density of the web being substantially unaffected. The extent of the reduction in width undergone by the web is determined by the angle which a line connecting the delivery ends of the belts 6 makes with the line of travel of the apron 9, or, in other words, the relation which the difference in length between the longest and shortest belts 6 bears to the original width of the web.

As best shown in Fig. 5, the rolls 8*a*, 8*b*, etc., carrying the stepped ends of the belts 6, are mounted on a cross member 32, extending diagonally above the upper surface of the apron 9, and carried by arms 33 attached to the frame 3. The cross member 32 provides a series of brackets 34, arranged at intervals between pairs of belts 6, with each bracket 34 supporting a pair of rolls 8*a*, 8*b*, or 8*c*, 8*d*, etc. Obviously, the angularity of the cross member 32, with respect to the apron 9 and the number of belts 6 carried thereby, may be varied to bring about either a reduction or increase in the width of the web transferred to the belt 9.

The roll 13 carrying the lower end of the distributing apron 12, is mounted between brackets 35 projecting from the frame 3, and is adapted to be driven from the shaft 36 of the roll 11, through gearing 37, indicated in dotted lines. The upper surface of the apron 9 and the lower end of the apron 12, are thus driven in the same direction, so that the web of fibres on the apron 9 passes readily onto the apron 12, and moves upwardly, away from the apron 9. In order to expedite the transfer of the web from the apron 9 to the apron 13, a pipe 38 extends parallel to the rolls 11 and 13, and is connected to a suitable source of air pressure, not shown. Holes 39 in the pipe 38 are adapted to deliver a jet of air between the aprons 9 and 12 at their point of tangency, so as to maintain the web in contact with the apron 12 as it moves upwardly. The force of the air delivered by the pipe 38 is only sufficient to keep the web from exhibiting any tendency to continue movement with the horizontal apron 9.

The brackets 35 also serve to pivotally support apron arms 40 extending upwardly, and each providing at its upper end a pair of spaced bearings 41 and 42, for rotatably supporting shafts 43, carrying the upper apron rolls 14. A second pair of spaced apron arms 44, are pivotally mounted on the upper shaft 43, and extend downwardly, with their lower ends pivotally connected to a pair of bearing brackets 45, for rotatably supporting the roll 15. The bearing brackets 45 are each slidable on the cross rods 46, so that the lower right-hand end of the apron 12 can be moved back and forth between the rods 46, by a mechanism which will next be described.

As best shown in Fig. 3, the shaft 21 extends inside one end frame member 3*a*, and drives a sprocket wheel 47 through bevel gears 48. A chain 49 passes around the wheel 47, with the other end of the chain 49 being supported by a sprocket wheel 50 carried by the other frame member 3*a*. The chain 49 carries a driving pin 51, which is received in a slot 52, provided in an arm 53 extending upwardly from each bracket 45. Therefore, travel of the chain 49 around the sprockets 47 and 50, causes the pin 51 to impart a back and forth movement to the connected bracket 45. This movement is imparted to the apron roll 15, it being evident that the pivotal relation between the pairs of apron arms 40 and 44, will permit the lower right-hand end of the apron 12 to travel in a straight line, at a uniform distance from the upper surface of the delivery apron 16. Travel is imparted to the apron 12 simultaneously with its back and forth movement, through driving of the roll 13 in unison with the roll 11, and the rolls 14 and 15 are driven in unison with the roll 13, by means of a continuous chain 54, passing around sprockets 55 mounted on the shafts 43 of the upper rolls 14, and shaft extensions provided by the rolls 13 and 15, respectively, see Fig. 4.

As the swinging end of the apron 12 lays folds of the web sheet S back and forth on the delivery apron 16, as previously described, these folds are lightly compressed by a pair of parallel rolls 56 of relatively small diameter, mounted in bearings 57 extending downwardly from the sliding brackets 45. These rolls 56 are spaced far enough apart, so that the web from the apron 12 can pass freely between them. Consequently, as the end of the apron 12 swings back and forth, and the overlying folds build up, the rolls 56 exert a light compressing action, which tends to impart a uniform density to the folds as they travel on the

apron 16 to the feed-in rolls 2 of the second card B.

The rolls 17, supporting the apron 16, are driven in any suitable manner, so as to impart a surface speed to the apron, such that the desired number of folds will build up, with a very slight overlap. As indicated in Fig. 1, the outside apron roll 17 just below the feed-in rolls 2, can be conveniently driven off the second card B, as by means of a chain 53 and sprockets 59.

When operating the transfer mechanism to handle stock having different qualities of fibre, the invention contemplates proper adjustment of the speed of the belts 6 and collecting apron 9 to provide a speed of travel for the web, best suited for this fibre structure. Furthermore, the frequency of oscillation of the distributing end of apron 12, with relation to the speed of the apron 16, is chosen to give the desired build-up of the overlying folds.

Due to the arrangement of the transfer belts 6, the collecting apron 9 and the delivery apron 16 in overlying planes, it is possible to mount substantially the entire transfer mechanism as a portable unit. As is evident from Fig. 1, this unit may be readily installed in the space between existing carding machines, without the necessity of making any adjustments or attachments in connection with either machine other than the mounting of the outside apron roll 17 adjacent the feed-in rolls 2 of the card B. Thus the entire transfer mechanism, as mounted on the frame, may be readily moved away from the first carding machine A, to give complete access to the latter for the purposes of cleaning and stripping.

From the foregoing, it is apparent that by the present invention there is provided improved transfer mechanism for carding machines, characterized by the maintenance of the web in sheet form, with its original arrangement of fibres, as it passes from one card to another. Furthermore, due to the formation of closely overlying flat folds of the thin sheet web, before it enters between the feed-in rolls of the second card, a large number of folds are acted upon simultaneously in the succeeding carding operation, thereby resulting in the final production of a lap of extremely uniform quality for subsequent conversion into yarn. Such uniformity of quality results largely from the fact that any variations, or inequalities, in the fibre structure of the many overlying folds of the web are distributed throughout the final product and are not discernible in the finished yarn.

I claim:

1. Transfer mechanism for carded material, comprising means for doffing a web of carded fibres in sheet form from a carding machine, a series of transfer elements for receiving said web and conveying groups of fibres therein different distances away from the point of doffing, a collecting apron cooperating with said transfer elements for receiving said web and changing its direction of movement, means for further conveying said web away from said transfer elements and apron, and means for laying said web in flat overlying folds for delivery to a second carding machine.

2. Transfer mechanism for carded material, comprising means for doffing a web of carded fibres in sheet form from a carding machine, a series of moving belts for receiving said web, with said belts terminating at different distances away from the point of doffing, a collecting apron cooperating with said belts for receiving said web and changing its direction of movement, means for further conveying said web away from said belts and apron, and means for laying said web in flat overlying folds for delivery to a second carding machine.

3. Transfer mechanism for carded material, comprising means for doffing a web of carded fibres in sheet form from a carding machine, a series of transfer belts of different lengths and a collecting apron cooperating with said belts for receiving said web and changing its direction of movement, a distributing apron for receiving the web from said belts and collecting apron and further conveying it, and means for operating said distributing apron to lay said web in flat overlying folds for delivery to a second carding machine.

4. Transfer mechanism for carded material, comprising means for doffing a web of carded fibres in sheet form from a carding machine, a series of transfer belts of different lengths and a collecting apron cooperating with said belts for receiving said web and changing its width, in accordance with the difference in length between the longest and shortest of said belts, a distributing apron for receiving the web from said belts and collecting apron and further conveying it, and means for operating said distributing apron to lay said web in flat overlying folds for delivery to a second carding machine.

5. Mechanism for handling a web of carded fibres in sheet form, as doffed from a carding machine, comprising a series of transfer belts of different lengths for receiving the web, an apron extending under the offset ends of said belts for collecting said web and changing its direction of movement, a distributing apron for receiving the web from said collecting apron and conveying it away therefrom, a delivery apron underlying said distributing apron and means for operating said distributing apron to lay said web in flat overlying folds on said delivery apron for feeding-in to a second carding machine.

6. Mechanism for handling a web of carded fibres in sheet form, as doffed from a carding machine, comprising a series of transfer belts of different lengths for receiving the web, an apron extending under the offset ends of said belts for collecting said web and changing its direction of movement and width, in accordance with the difference in length between the longest and shortest of said belts.

7. Transfer mechanism for handling a web of carded fibres in sheet form, as doffed from a carding machine, comprising a series of transfer belts of different lengths for receiving the web, an apron extending under the offset ends of said belts for collecting said web and changing its direction of movement and width, a delivery apron extending in the direction of a second carding machine, with said delivery apron and belts being in overlying relation, and a distributing apron for receiving the web from said collecting apron and laying it in flat overlying folds on said delivery apron.

8. Mechanism for handling a web of carded fibres in sheet form, as doffed from a carding machine, comprising a collecting apron traveling transversely to the direction of the movement of the web through the carding machine, and movable web supporting means acting to receive the doffed web to simultaneously convey groups of fibres therein different distances away from the line of doffing, accompanied by the progres-

sive deposit of said web transversely of and directly upon said collecting apron.

9. Transfer mechanism for installation as a unit in the space between the doffer and feed-in rolls of adjacent carding machines, comprising a portable frame carrying movable supporting means for directly receiving a web of carded fibres in sheet form from the doffer of one machine, a collecting apron traveling on said frame transversely of the direction of movement of the web through said carding machines, for receiving the web from said supporting means, a second apron carried by said frame, in overlying relation to the first apron and traveling in the same direction as the movement of the web through said carding machines, and means also carried by the frame for laying the web, as received from the first apron, in overlying folds on said second apron for delivery to the feed-in rolls of the other machine.

10. Mechanism for handling a web of carded fibres in thin sheet form as doffed from a carding machine, comprising a collecting apron traveling transversely to the direction of movement of the web through the carding machine, and movable web-supporting means for receiving the doffed web and conveying it away from the line of doffing towards said apron a distance gradually increasing from one edge of the web to the other, said web-supporting means being disposed in overlying relation with respect to said apron for depositing the web progressively directly upon said collecting apron, at an acute angle to the path of travel of said apron.

11. Mechanism for handling a web of carded fibres in thin sheet form as doffed from a carding machine, comprising movable web-supporting means for receiving the doffed web and conveying it away from the line of doffing a distance gradually increasing from one edge of the web to the other, and a collecting apron traveling transversely to the direction of movement of the web through the carding machine and partially underlying said web-supporting means, for receiving the web directly from said supporting means at an acute angle to the path of travel of said apron and for further conveying the transferred web without material alteration of its sheet form.

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