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SHOELACE GATHERING MECHANISM

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2 Sheets-Sheet 1

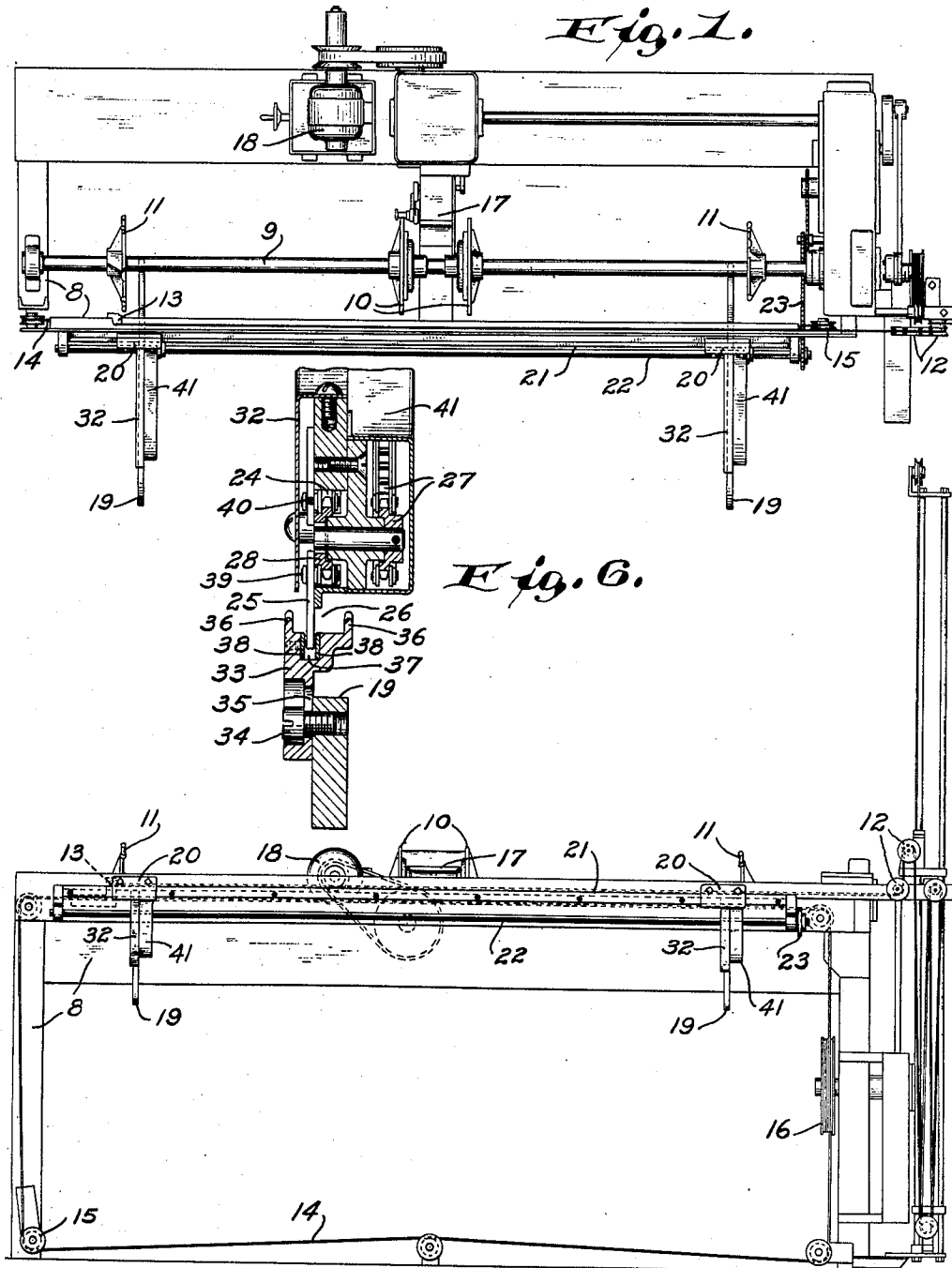


Fig. 2.

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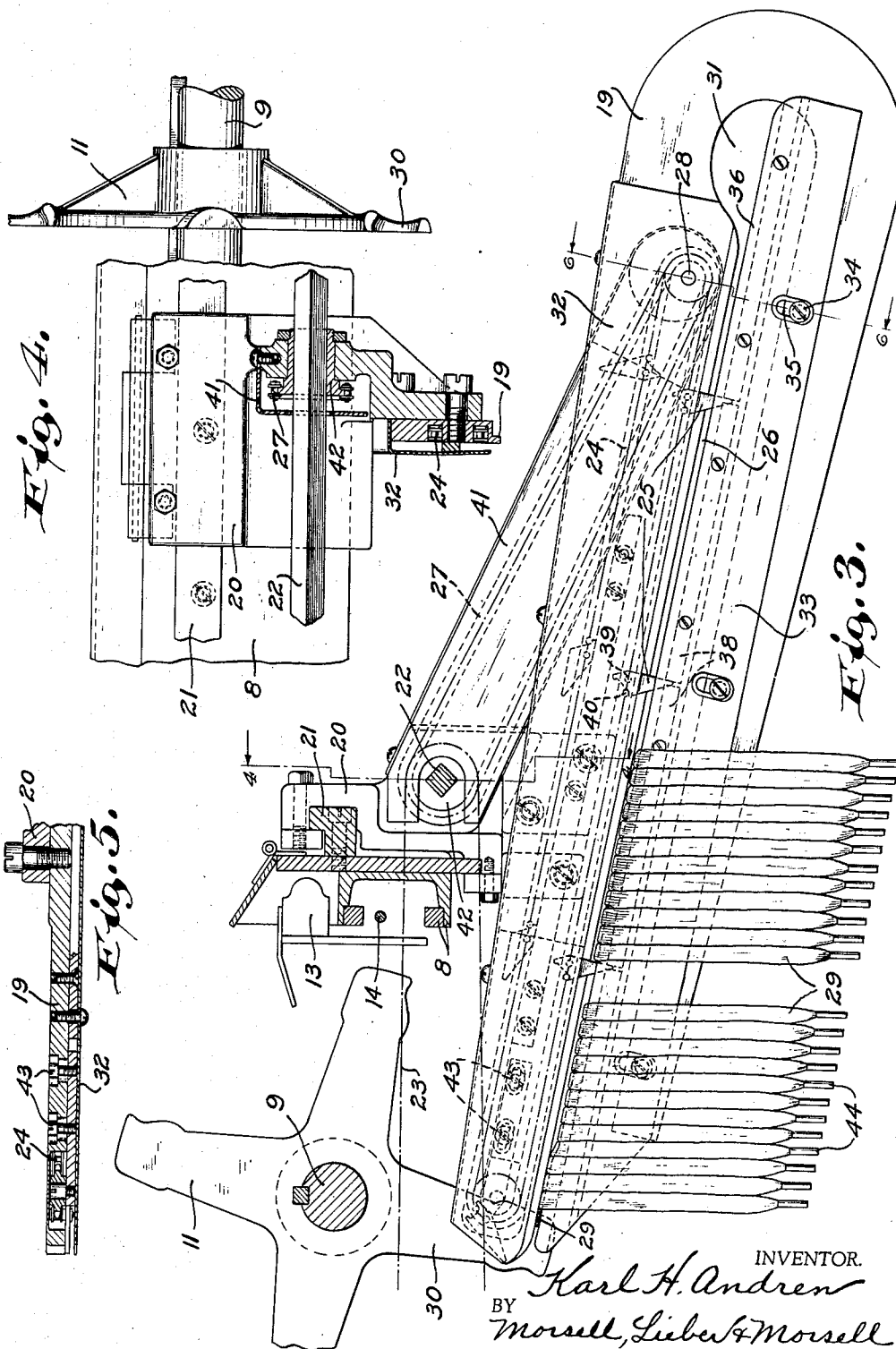
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SHOELACE GATHERING MECHANISM

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2 Sheets-Sheet 2



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SHOELACE GATHERING MECHANISM

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20 Claims. (Cl. 28—21)

This invention relates generally to improvements in the art of fabricating shoelaces or the like, and relates more specifically to improved mechanism for collecting the finished laces in orderly groups of any desired number.

Generally defined, an object of my present invention is to provide an improved mechanism associated with a shoe lace fabricating machine, and operable to automatically gather the finished laces in neat and orderly groups or bundles of any predetermined number.

It has heretofore been common practice to fabricate shoe laces by means of a machine adapted to automatically measure off successive predetermined lengths of lace stock, to apply the tips to the measured lengths with the aid of solvent and heat, and to finally sever and deliver the finished laces to a counting mechanism in bundles each containing a definite number of the completed laces. While these prior machines were adapted to accurately count the laces, these laces when finally collected or gathered were staggered and disheveled, and besides presenting an unsightly appearance, the bundles were difficult to handle and the laces could not be readily segregated for final packing and merchandising.

The present invention therefore contemplates the provision of improved shoe lace collecting mechanism which will effectively and automatically gather and arrange the completed laces in neat and regular groups having the corresponding ends of the laces in juxtaposition and the laces themselves disposed approximately parallel to each other.

Another specific object of my present invention is to provide a simple and compact collecting assemblage for shoe laces or the like, as the laces are delivered in succession from a fabricating machine, and which will arrange the finished laces in tidy bundles, regardless of the length thereof.

A further specific object of this invention is to provide a new and useful lace collecting attachment for relatively standard lace producing machines, which is adjustable to meet varying conditions of operation of the main machines, and which may also be manufactured and installed at moderate cost.

These and other specific objects and advantages of my present improvement will be apparent from the following detailed description.

A clear conception of an embodiment of the invention, and of the mode of constructing and of operating a shoe lace collecting mechanism built in accordance with my improvement, may be had

by referring to the drawings accompanying and forming a part of this specification in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a relatively diagrammatic plan view of a shoe lace fabricating machine having a pair of the improved lace collecting mechanisms associated therewith;

Fig. 2 is a similarly diagrammatic elevation of the machine of Fig. 1, looking toward the lace collecting mechanisms;

Fig. 3 is an enlarged side view of one of the improved lace collecting mechanisms, showing the same associated with a fragment of the main lace producing machine;

Fig. 4 is a similarly enlarged transverse vertical section through the mechanism, taken along the irregular line 4—4 of Fig. 3;

Fig. 5 is a transverse longitudinal section through the upper part of the lace receiving portion of the improved collecting mechanism; and

Fig. 6 is a transverse approximately vertical section through the mechanism, taken along the line 6—6 of Fig. 3.

Although I have shown and described the invention as being especially applicable to machines for fabricating shoe laces, it is not my intention to thereby unnecessarily restrict the scope or usage of the improved mechanism, since the principles involved may obviously be used in modified mechanisms for collecting other elongated flexible objects.

Referring to Figs. 1 and 2 of the drawings, the shoe lace fabricating machine shown therein comprises in general a main frame 8 having journaled thereon a horizontal shaft 9 rotatably supporting a pair of fixedly spaced clamping wheels 10 and a pair of laterally adjustable lace supporting and conveying wheels 11; lace stock supply mechanism including a series of guiding and tensioning pulleys 12 disposed at one end of the machine; a reciprocable shuttle 13 movable by a cable 14 coacting with guide pulleys 15, and by means of a reversely oscillating drive wheel 16 coacting with the cable 14; mechanism 17 for applying the successive tips to the lace stock and for subsequently severing the stock into predetermined lengths; and a propelling motor 18 for driving the machine. This general type of shoe lace fabricating machine is old and well known, and is shown generally in Church Patent No. 895,724, granted August 11, 1908, and in Armitage Patent No. 1,423,984, granted July 25, 1922.

The improved lace collecting mechanism constituting the present improvement, comprises two

similar units such as shown in detail in Figs. 3 to 6 inclusive, and each comprising a U-shaped frame 19 inclined as indicated in Fig. 3 and being slidably suspended from the frame 8 by means of a suspension bracket 20 coacting with a fixed horizontal guide rail 21; a polygonal drive shaft 22 journaled at the ends of the frame 8 and being intermittently rotatable at timed intervals by means of chain gearing 23 coacting with the driving and counting mechanism of the lace forming machine; an endless conveyor chain 24 having a series of equally spaced lace advancing pawls 25 movable by the chain 24 along the bifurcation or gap 26 of the frame 19; and driving gearing 27 interposed between the shaft 22 and the lower driving sprocket 28 of the chain 24.

The U-shaped frame 19 of each lace collecting mechanism may be of any desired overall length, and has its inner lace receiving open end disposable closely adjacent to the corresponding lace conveying wheel 11 as shown in Figs. 1 and 2. When the successive finished laces 29 are severed from the stock, the lower conveying arm 30 of each wheel 11 will cooperate with the clamping fingers of the wheels 10 to retain the severed laces taut, and the taut laterally advancing laces will thereafter enter the open end of the gap 26 in flatwise condition, as illustrated in Fig. 3. After the effective arms 30 have thus positioned the laces 29, their indexing motion ceases and the clamps are released, whereupon the ends of the laces drop free and the laces are suspended solely from the frame 19. The lower closed end of the frame 19 is preferably provided with an enlarged space 31 which communicates with the lower end of the gap 26, and the conveyor chain 24 is mounted upon the upper leg of the frame 19 and is protected by means of a removable guard plate 32. The lower leg of the frame 19 has mounted thereon an elongated lace supporting bar 33 which is vertically adjustably supported by screws 34 coacting with slots 35, and has upwardly projecting laterally spaced top flanges 36 between which a recess 37 is formed. The opposite sides of the recess 37 are lined with series of permanently magnetized bars 38 between which the depending ends of the pawls 25 are movable by steps equal to the lengths of the bars 38 and equal to the spaces between the successive pawls 25. The pawls 25 are suspended from the endless chain 24 by means of pivot pins 39 and are cooperable with stop pins 40 so as to limit the swinging movement thereof in one direction, and when these pawls are depending between the magnetic bars 38, the magnetic force exerts a drag on the pawls 25 tending to retain the same in substantially upright position, while permitting forcible displacement thereof toward the right as viewed in Fig. 3.

The chain gearing 27 which transmits motion from the polygonal horizontal shaft 22 to the lower sprocket 28 of the pawl carrying chain 24 is protected and concealed by a housing 41 and has an upper sprocket 42 which is slidable along the shaft 22. The sprocket 42 of each unit is journaled for rotation in the corresponding suspension bracket 20, as indicated in Fig. 4, thereby permitting ready adjustment of each of the lace collecting units along the shaft 22 while maintaining the driving connection therewith. The conveyor chain 24 may also be provided with suitable chain tensioning mechanism such as screws 43 coacting with slots in the frame 19 as shown in Fig. 5, and it is to be noted that I provide one of these lace collecting units for each

lace delivery wheel 11 and that these units and wheels are simultaneously or independently adjustable along the parallel shafts 22, 9 respectively. The shoe lace fabricating machine is ordinarily provided with automatic control mechanism for producing operation at desired speeds and for causing the various parts to properly perform their intended functions, and is also provided with counter devices for accurately and automatically registering the number of completed laces produced.

During normal operation of the shoe lace fabricating machine, the propelling motor 18 is operating to drive the various parts so that the shaft 9 will intermittently rotate to revolve the wheels 10, 11, and the feed shuttle 13 will reciprocate during periods of rest of the wheels 10, 11, to draw fresh lengths of lace stock from the supply source over the tensioning pulleys 12. While the clamping wheels 10 are fixedly positioned with respect to the drive shaft 9, the wheels 11 must be preliminarily set or positioned so as to determine the length of the completed laces which it is desired to produce. The lace gathering or collecting units must also be set in proximity to their respective wheels 11 so that these units will properly receive the finished laces 29 in succession. The machine will then automatically apply the tips 44 to the lace stock and will sever the stock into successive finished laces 29, and immediately following the severing operation, the lowermost arms 30 of the lace conveying wheels 11 are advanced toward the right as viewed in Fig. 3 and transfer the taut laces 29 which have just been completed, into the narrowed receiving ends of the gaps 26. This entry of the newly completed laces 29 pushes the previously admitted laces flatwise along the gaps 26, and the clamps of the wheels 10 are thereafter released when the arms 30 stop, so as to complete the transfer. The opposite end portions of the laces 29 will then depend freely from the opposite sides of the bars 33, and the corresponding tips 44 of all of the laces 29 will assume and remain in juxtaposition. When any predetermined number of laces 29 has been thus positioned within the receiving end of one of the gaps 26, the control mechanism which is operated by the counting device, will cause the chain gearing 23 to revolve the polygonal shaft 22, thus causing the pawl supporting chain 24 to advance a new pawl 25 into the receiving end of the recess 37 and simultaneously advancing the previously active pawls 25 along this recess between the magnetic bars 38 a distance equal to the length of each bar 38. Any laces 29 which may have accumulated in the lowermost section of the conveyor, will then be positioned within the enlarged space 31 of the corresponding gathering frame 19, and are ready for removal, and each intervening section of the gathering structure will have a definite number of finished laces confined and neatly collected therein. This number of laces may be varied to suit by merely adjusting the control on the counting device, but is ordinarily from one dozen to one gross; and continued operation of the machine will obviously deliver the successive batches of laces 29 into the space 31 for subsequent removal.

The magnetic bars 38 are provided for the purpose of subjecting the depending pawls 25 to a fixed resistance tending to prevent swinging thereof about their pivot pins 39. When the pawls 25 are located between the ends of the bars 38 as in Fig. 3, the opposite polarity of the ad-

5 jacent bar ends will exert a decided holding effect upon the pawls 25 and will thus prevent laces 29 from being pushed past the pawls by the action of the wheels 11. If it becomes desirable for the attendant to remove the accumulated laces from several conveying sections of the gap 26, he can readily urge the gathered batches in succession, downwardly past the successive depending pawls 25 and into the space 31, without using excessive effort. The mechanism actually operates as illustrated in Fig. 3, to gather the laces in orderly groups having the corresponding ends of the laces in each group disposed in juxtaposition, and with the same number of laces in each batch, so that the individual laces 29 may subsequently be conveniently segregated and are not undesirably crushed.

From the foregoing detailed description it will be apparent that my present invention provides a simple, compact and highly efficient mechanism for automatically gathering shoe laces or the like in orderly groups or batches. The improved lace collecting units may be readily applied to standard shoe lace fabricating machines without in any manner interfering with the normal operation thereof, and may be conveniently adjusted to properly cooperate with standard lace conveying and discharge wheels 11 regardless of the length of the laces which are being fabricated. The improved assemblages have proven highly successful in actual commercial use, and may be manufactured and operated at moderate cost and with utmost safety.

It should be understood that it is not desired to limit this invention to the exact details of construction, or to the precise mode of operation, herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

40 I claim:

1. In combination with a lace fabricating machine, a frame having a gap for receiving medial portions of the laces in succession, and means for advancing groups of the laces along said gap.

2. In combination with a lace fabricating machine, a frame having a gap for receiving medial portions of the laces in succession, and means for intermittently advancing equal groups of the laces in succession along said gap.

3. In combination with a machine for delivering shoelaces or the like in succession, a frame having an elongated gap open at one end to receive the shoelaces from said machine in succession and with the corresponding ends of the laces in juxtaposition, and means for advancing the laces along said gap.

4. In combination with a machine for delivering shoelaces or the like in succession, a frame having an elongated gap open at one end to receive the shoelaces from said machine in succession and with the corresponding ends of the laces in juxtaposition, and means for advancing equal numbered batches of the laces along said gap in series.

5. In a mechanism for gathering laces, means for retaining a succession of laces suspended from points equi-distant from the corresponding ends thereof, means for delivering the laces in succession to said retaining means, and means for segregating the laces suspended from said retaining means into equal groups.

6. In a mechanism for gathering laces, means for retaining a succession of laces suspended from points equi-distant from the corresponding

ends thereof, means for delivering the laces in succession to said retaining means, and means for urging equal groups of the suspended laces along said retaining means.

7. In combination, a frame having a lace receiving gap therein, means for feeding laces in succession into said gap, and means for separating the admitted laces into equal groups.

8. In combination, a frame having a lace receiving gap therein, means for feeding laces in succession into said gap, and means for separating the admitted laces into equal groups and for urging said groups in succession along said gap.

9. In combination, a frame having a lace receiving gap therein, means for feeding laces in succession into said gap, and means for separating the admitted laces into equal groups and for intermittently advancing said groups in succession through said gap.

10. In combination, a frame having an elongated lace supporting edge, means for delivering laces to said frame with their medial portions resting upon said edge, and a series of pusher pawls movable along said edge to urge the laces along said frame.

11. In combination, a frame having a lace supporting edge, means for suspending successive laces at their medial portions from said edge, means movable along said edge to push the laces therealong, and means for imposing a drag on said movable means.

12. In combination, a frame having a lace supporting edge, means for suspending successive laces at their medial portions from said edge, means movable along said edge to push the laces therealong, and magnetic means for retaining said movable means in predetermined position.

13. In combination, a frame having a lace supporting edge, means for suspending successive laces at their medial portions from said edge, and magnets for imposing a drag on said movable means and for retaining the same in predetermined position.

14. A lace collecting unit comprising, a frame having a lace supporting edge and a recess adjacent said edge, means for suspending laces from said edge, a pawl for shifting said laces along said edge, and magnetic means for urging said pawl toward said recess.

15. A lace collecting unit comprising, a frame having spaced lace supporting edges and a recess between said edges, means for suspending laces from said edges, and pawls movable along said recess to slide the laces along said edges.

16. A lace collecting unit comprising, a frame having spaced lace supporting edges and a recess between said edges, means for suspending laces from said edges, pawls movable along said recess to slide the laces along said edges, and means for imposing a magnetic drag on said pawls to retain the same within said recess.

17. In combination, a frame having parallel spaced edges and a recess therebetween, pawls suspended by gravity and being movable along said recess to shift elongated objects hanging over said edges along said frame, and means for magnetically retaining said pawls within said recess.

18. A lace collecting device comprising, a frame having a lace receiving gap, means for 70 delivering the medial portions of successive laces while in taut condition to the receiving end of said gap, and means for advancing successive groups of the admitted laces along said gap.

19. A lace collecting device comprising, a 75

frame having a lace receiving gap, means for delivering the medial portions of successive laces while in taut condition to the receiving end of said gap, means for subsequently releasing the laces to permit the ends thereof to fall free, and
5 means for advancing successive groups of the admitted laces along said gap.

20. In combination, means forming an inclined lace receiving gap having a constricted

open upper end, means for delivering the same medial portions of successive laces while in taut condition flatwise into said upper gap end, means for subsequently releasing the laces to permit the ends thereof to dangle from said medial portions, and means for advancing successive groups
5 of the dangling laces along said gap.

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