DEVICE FOR TIGHTENING SHOE LACES

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I Claim. (Cl. 242—107.1)

This invention relates to a device for tightening the laces of a shoe.

The main object of the invention is to provide a construction of tightening device which is readily operable with no fingers of the one hand so as to permit loosening, braking, or automatic spring-loaded tightening of the laces.

A second object of the invention is to apply a further improvement whereby the loosening or tightening movement may be readily controlled in the manner of a friction brake by a third finger of the same hand.

According to the present invention, a device for tightening shoe laces comprises a housing apertured at spaced positions, a drum assembly rotatably mounted in the housing and having two shoe laces coiled concentrically thereon, each shoe lace passing out through one of the apertures of the housing, a spring acting between the housing and the drum assembly for rotation of the drum assembly with respect to the housing, and spring-loaded braking means acting between the housing and drum assembly and projecting at the exterior of the housing for manual shifting against the spring to free the drum assembly.

With such a construction, the shoe laces can be pulled out of the housing, when the braking means are freed, so as to unwind off the drum and at the same time wind up the loading spring. If the braking means is allowed to return to rest position the drum assembly is then locked in the tensioned condition. Subsequent operation of the braking means will allow the drum assembly to rotate under the influence of the loaded spring, whereby the tapes are drawn back into the housing.

In a preferred form, to obtain controlled movement of the drum assembly, a portion thereof projects at the exterior of the housing according to the same hand, forming a friction brake on the rotational movement of the drum assembly. In a convenient practical embodiment, the drum assembly includes a pivot shaft rotatably mounted in the housing and carrying a drum for the flexible connector means, one end of said pivot shaft projecting at the exterior of the housing for engagement by the finger.

The braking means may comprise diametrically opposed radially-slidable braking rods projecting at their outer end from the housing and each having a short portion to engage with a brake rim on the drum assembly, and spring-loading means acting outwardly against the inner ends of the rods to urge them into the position of braking engagement. In a convenient arrangement, the spring-loading means for the braking rods consists of a C-spring which is disposed concentrically with the drum assembly and is common to the two braking rods.

In order that the nature of the invention may be readily ascertained, an embodiment of device for tightening shoe laces in accordance herewith is hereinafter particularly described by way of non-limiting example with reference to the figures of the accompanying drawing, wherein:

FIG. 1 is a central vertical section through the device.
FIG. 2 is a plan view, with part cut away to show details of the construction.
FIG. 3 is a perspective view, to a smaller scale, to show the manner of operation of the device with the fingers of one hand.

In the construction illustrated, the device comprises a housing 1 which is open at its lower end 2, but is closed at its upper end by a cover 3.

The cover 3 has a central sleeve 4 which acts as a bearing for a hollow shaft 5 serving as a pivot. The shaft 5 is of reduced diameter at its lower end and carries a returner flange 6 and has a bore 7. A drum 8 has a central apertured flange 9 which is engaged on the reduced portion of the shaft 5, enabling the drum to rotate within the lower part of the housing. On the drum are wound concentrically the turns of two shoe laces 11, 12 which emerge from the housing through spaced apertures 13 in its side wall. The two laces 11, 12 are, in fact, constituted by a single length of shoe lace the central portion 14 of which lace passes through apertures 15, 16 in the drum.

In the upper space of the housing is provided a spring-drum 17 also engaged on the reduced portion of the shaft 5, the drum 17, the intermediate wall 17a, and the drum 8 being coupled by short of putting玉石 to be lost together for rotational movements. On the spring-drum 17 is mounted a spiral spring 19 one end of which is connected in any convenient manner to a fixed point of the housing, and the other end of which is connected to the intermediate wall 17a, whereby the drums are rotationally spring-loaded with respect to the housing. The upper surface of the spring-drum is provided an annular raised brake rim 20. In the upper part of the housing are provided diametrically opposed slots in which are arranged two opposed braking rods 21, 22 terminating externally in finger buttons 23, 24. Both of these rods 21, 22 but at their inner ends against an outwardly-acting C-spring 25 lodged in the housing. On the braking rods are provided brake shoe elements 26 which can engage against the raised brake rim 20 of the spring-drum so as to brake the latter against rotation. It will be appreciated that in the rest position of the assembly, the rods 21, 22 are urged outwardly into braking condition, but can be pressed radially inwardly by finger pressure so as to release the drum to rotate.

The operation of the device is as follows: assuming that the two laces 11, 12 have been fully out of the housing e.g. at the time of putting the shoe on the foot, the spring 19 will have become wound up on its spring drum, due to rotation of the latter, and will be under maximum tension. The braking rods 21, 22 prevent the rotary parts from turning, so that the spring remains under tension. When it is desired to tighten the laces, the braking rods are pressed radially inwardly by equal pressure applied on the two finger buttons 23, 24 thereby free the spring-drum and allowing the system to rotate under the action of the spring, thus causing the laces to be drawn in through the apertures 13 and wound upon the drum 8. The pivot shaft 5 is coupled, for rotation, to the two drums. Accordingly, the pressure of a third finger can be applied to the top end flange 27 of the pivot shaft, as best seen in FIG. 3, thereby acting as a friction brake controlling the rapidity of movement of the rotary assembly. According to the amount of movement permitted by the fingers, the laces will be tightened to a greater or lesser extent by the tension of the spring.

For release of the laces, the two finger buttons are again pressed radially inwards to free the spring-drum, whereupon the rotary system can rotate, winding up the spring, and allowing the laces to emerge to the desired extent from the housing. A convenient manner of operation would be simply to grasp the device between two, or three fingers, as shown in FIG. 3, and pull the housing upwardly so as to draw out the laces.

The device can be made of relatively small dimensions so as to fit unobstrusively in position on a shoe, e.g. in the form of an imitation buckle or other part of the decoration. The action of tightening and loosening is substantially instanta-
neous, and there is no possibility of formation of knots. There is little if any frictional wear involved on the laces, so that they may be expected to last for the life of the shoe without renewal.

I claim:

A device for tightening shoe laces comprising a housing having a plurality of apertures at spaced positions, a drum assembly including an axial braking rim rotatably mounted in the housing, a shoe lace coiled concentrically on the drum assembly, said shoe lace being passed out through an aperture of the housing, a coiled spring coupled to the housing and to the drum assembly for rotation of the drum assembly with respect to the housing, diametrically-opposed radially-shiftable braking rods disposed in the housing and projecting at their outer end from said housing, a shoe on the inner end of each braking rod to abut against the braking rim of the drum assembly, and a C-spring disposed in the housing concentrically with the drum assembly and abutting at its ends respectively against the inner end of the braking rods to urge said rods into braking engagement with the braking rim of the drum assembly.

References Cited by the Examiner

UNITED STATES PATENTS
171,825 1/76 Lawton 242—107.1
365,481 6/87 Lyman 242—107.15
506,649 10/93 Watson 242—107.6
522,064 6/94 Keuffel 242—107.6
727,370 5/03 Edgerton et al. 242—107.6
2,514,628 7/50 Cortes 242—107.1 X
2,923,490 2/60 Smith 242—96

FOREIGN PATENTS
683,181 11/52 Great Britain.

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