

[54] **DISPENSER FOR ORTHODONTIC
CHAIN-FORMED INTRAORAL DEVICES**

[75] Inventors: **Roland M. Anderson; Paul E. Klein,**
both of Lake Oswego, Oreg.

[73] Assignee: **Modcom, Inc.,** Canby, Oreg.

[22] Filed: **July 11, 1974**

[21] Appl. No.: **487,664**

[52] U.S. Cl. **32/14 D; 206/820**

[51] Int. Cl.² **A61C 7/00**

[58] Field of Search 206/390, 820; 32/14 D,
32/40 R, 66

[56] **References Cited**

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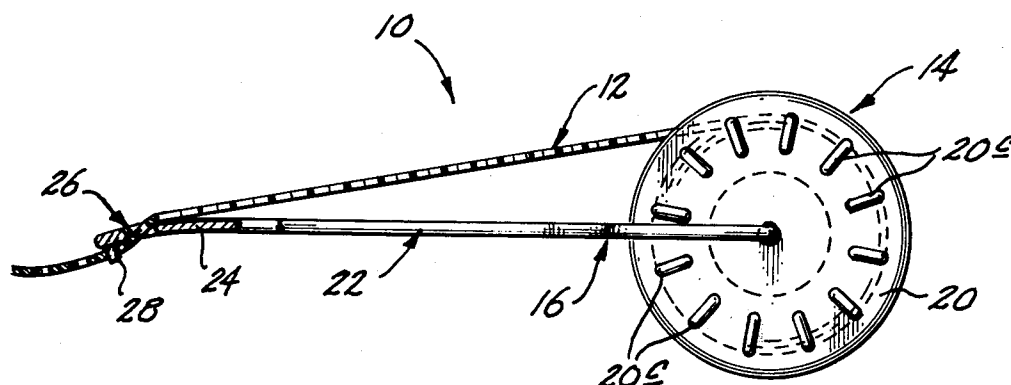
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Primary Examiner—Robert Peshock
Attorney, Agent, or Firm—Kolisch, Hartwell,
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[57] **ABSTRACT**

Apparatus including a detented rotatable supply spool, and an elongated dispensing-guiding finger on which the spool is removably and rotatably mounted, for dispensing, directly into a person's mouth, intraoral orthodontic tensioning devices of the type which are severably joined in an elongated flexible chain. A projection formed on the outer end of the finger enables releasable locking of the chain against dispensing movement relative to the finger—such locking having utility both for storage purposes when the apparatus is out of use, and for reaction purposes in many instances when installing a device in a person's mouth.

15 Claims, 5 Drawing Figures



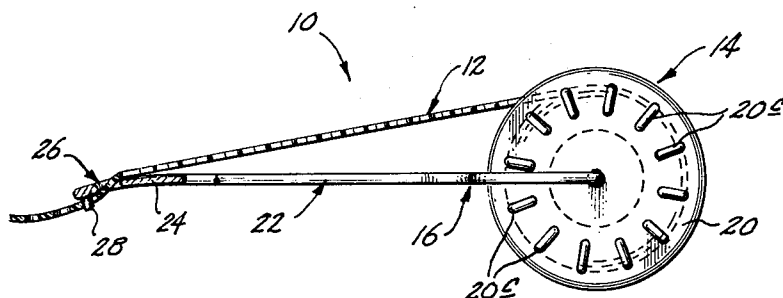


Fig. 1.

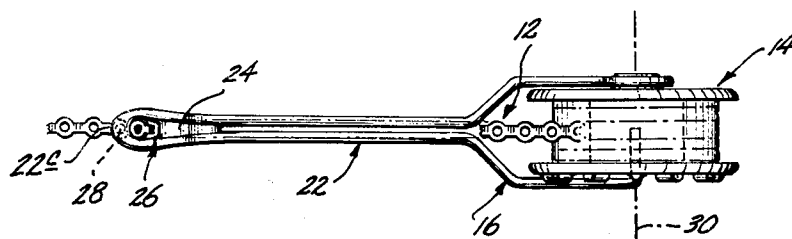


Fig. 2.

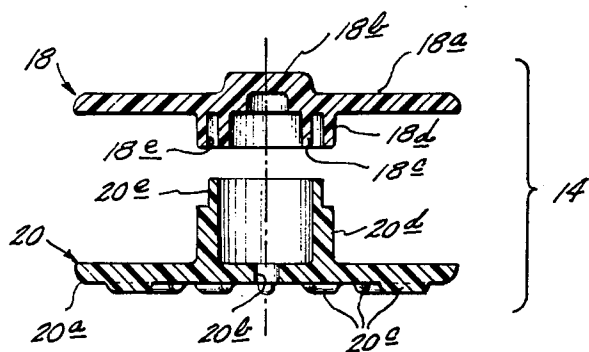


Fig. 3.

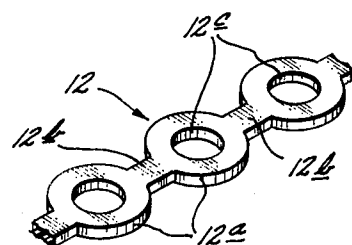


Fig. 5.

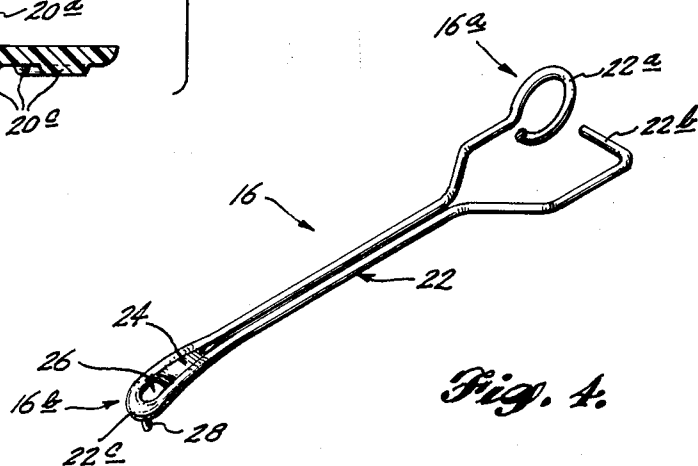


Fig. 4.

DISPENSER FOR ORTHODONTIC CHAIN-FORMED INTRAORAL DEVICES

BACKGROUND AND SUMMARY OF THE INVENTION

This invention pertains to apparatus for dispensing directly into a person's mouth various types of intraoral orthodontic tensioning devices. In particular, it pertains to such apparatus which is for dispensing devices of the type generally indicated that are formed into an elongated unitary chain, with adjacent devices in the chain severably joined to one another.

In the field of orthodontic intraoral tensioning devices, it has been found to be an especially convenient and desirable practice, with respect to certain types of devices, to manufacture, package and subsequently handle these devices in the form of an elongated, unitary, continuous chain of readily severably joined devices. Such a formation for these kinds of devices simplifies, among other things, preuse identification and in-use handling of the devices. Another advantage is that since the devices are not separated until time for their use, spillage and loss is substantially completely eliminated.

A general object of the present invention is to provide a unique, small, and extremely convenient tool, or apparatus, for storing and dispensing chain-formed devices of the type mentioned, and further for facilitating direct placement and installing of devices in a person's mouth.

A related object is to provide such a tool which is extremely simple for an orthodontist, or an assistant under his direction, to use, and which minimizes the steps involved in the installation of a device in a person's mouth.

According to a preferred embodiment of the invention, the proposed apparatus includes a detented, rotatable supply spool which is for the storage, taking-up and paying-out of a chain of devices, with this spool removably and rotatably mounted on an elongated finger-like element which facilitates guiding of and placement of a device in a person's mouth. The finger in the proposed preferred embodiment extends generally radially from the spool, with the outer end of the finger containing a closed-loop guide through which a chain extends.

Tensioning devices of the type under discussion are ones which contain apertures that enable their placement around brackets, hooks, or the like carried on tooth bands mounted within a person's mouth. A further feature of the apparatus of the invention is that provided adjacent the guide mentioned above is a projecting prong which is usable to catch the aperture in a device, thus to inhibit chain movement through the guide. Such catching is useful not only under circumstances with the apparatus stored and out of use (e.g., to maintain the outer end of a chain in a condition for ready use when desired), but is also extremely useful in providing a reaction force during the placement and tensioning of a device in a person's mouth.

The detented mounting provided for the spool inhibits free rotation of the spool, and thus prevents undesired unwinding and spillage of a stored chain of devices. With the spool in the apparatus removably mounted, it is a simple matter for the user to change

spools rapidly for the purpose of dispensing different types of devices.

These and other objects which are attained by the invention will become more fully apparent as the description which now follows is read in conjunction with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation illustrating a preferred embodiment of apparatus constructed in accordance with the present invention.

FIG. 2 is a top plan view, on about the same scale as FIG. 1, further showing the apparatus of FIG. 1.

FIG. 3 is a cross-sectional view showing the constructions of sections making up a spool in the apparatus of FIG. 1, with these sections shown separated from one another, and separated from other parts in the apparatus.

FIG. 4 is a perspective view showing the construction of a finger element used in the apparatus of FIG. 1.

FIG. 5 shows in enlarged perspective a fragment of chain of devices carried by the apparatus of FIGS. 1 and 2.

DETAILED DESCRIPTION OF THE INVENTION

Turning now to the drawings, and referring first to FIGS. 1 and 2, indicated generally at 10 is a tool, constructed in accordance with the present invention, for dispensing intraoral orthodontic tensioning devices which form part of an elongated flexible chain shown generally at 12. Included within tool 10 as major components thereof are a spool 14 which is for storing, taking up and paying out such a chain, and an elongated wire-like dispensing finger 16 on which the spool is removably and rotatably mounted, as will be explained.

Typical dimensions might include a spool diameter of about 1.25-inches, a width of about 0.5-inches, and a finger length of about 2.5-inches. A stored chain might typically have an initial length of about 3-feet.

Considering FIG. 3 along with FIGS. 1 and 2, and describing in particular the construction of spool 14, this spool herein, which is also referred to as a storage portion in the tool, is formed of two axially separable sections 18, 20. It should be understood that such spool construction, e.g., a two-section spool construction, is not a critical factor, but rather is a construction which has found to be quite convenient.

Spool section 18 includes a circular flange 18a from the upper side of which in FIGS. 2 and 3 projects a radially central cylindrical button 18b, and from the lower side of which in these two figures project two different-diameter radially central cylindrical walls 18c, 18d. As can be seen in FIG. 3, wall 18c has a smaller diameter than does wall 18d—these two walls defining between them an annular socket 18e.

Spool section 20 includes a circular flange 20a which has substantially the same diameter as previously mentioned flange 18a. Extending radially centrally through flange 20a is a bore 20b, and formed on the outside face of the flange (e.g., the lower face thereof in FIGS. 2 and 3, and the confronting face of the flange in FIG. 1) are a plurality, namely, twelve herein, of projecting, radially extending, elongated ridges, such as the ridges shown at 20c. Ridges 20c are distributed angularly equally about the flange, with adjacent ridges being separated by about 30°. Projecting radially centrally from the upper side of flange 20a in FIGS. 2 and 3, is

a cylindrical wall including a large outside-diameter portion 20d, and a smaller outside-diameter portion 20e. The outside diameter of wall portion 20d is substantially the same as that of previously mentioned wall 18e. Wall portion 20e is sized to fit snugly and frictionally within previously mentioned annular socket 18e.

Spool 14 is assembled simply by manually press-fitting together spool sections 18, 20, with wall portion 20e seating within socket 18e. In the fully assembled spool, the outside surfaces of wall 18e and of wall portion 20d define a hub in the spool for storing a chain such as chain 12. Preferably, spool 14, regardless of its specific physical construction, is formed of a suitable cold-sterilizable plastic material, of which there are many types readily available.

Turning now to FIG. 4 along with FIGS. 1 and 2, finger 16, which is also referred to herein as a dispenser, or dispensing portion, in tool 10, is formed of an elongated, stiff yet resilient wire-like element 22, bent to the configuration shown most clearly in FIG. 4. Stainless steel is used in finger 16. The finger may be thought of as having inner and outer ends 16e, 16b, respectively, with the ends 22a, 22b of element 22 together defining the inner end of the finger, and with the reverse bend 22c in the element defining the outer end of the finger.

Element end 22a is bent in the form of a circle and is sized to fit freely about previously mentioned button 18b in spool section 18. Element end 22b extends along the axis of bending of end 22a and is sized to fit freely through bore 20b in spool section 20. Ends 22a, 22b function as mounting portions in finger 16 for rotatably and removably mounting spool 14. As can be seen, element 22, progressing away from its ends 22a, 22b includes portions which are relatively widely spaced, in order to provide ample clearance for the spool, which portions then join with more closely spaced, substantially parallel portions which form the outer extent of the finger.

As shown most clearly in FIGS. 1 and 4, the outer end of finger 16, e.g., the end which is formed by reverse bend 22c, is bent slightly downwardly in these two figures. The angle of such bending herein is about 15°. Suitably joined to element 22 adjacent reverse bend 22c is a cross member 24 which, together with bend 22c, defines a closed-loop opening, or guide, 26 at the outer end of the finger (see particularly FIGS. 2 and 4). The upper side of guide 26 in FIG. 4 is referred to as an entry side, and the lower side thereof in the figure as a dispensing side. Suitably joined to the finger at the outer extremity of bend 22c, and on the dispensing side of guide 26, is a downwardly projecting prong, or catch, 28 whose function will be explained shortly.

Assembly of a spool has already been described. To mount a spool such as spool 14 on the finger, ends 22a, 22b in the finger are pulled sufficiently far apart to provide clearance for the spool, with curved end 22a then fitted about button 18b, and end 22b inserted through bore 20b. With the spool and finger thus assembled the spool is enabled to rotate about an axis shown at 30 in FIG. 2. With rotation of the spool ridges 20c successively engage that portion of element 22 which extends away from end 22b—such engagement producing what is referred to herein as a detent-like interaction between the spool and finger which inhibits free rotation of the spool.

As has been mentioned earlier, tool 10 is intended for the manipulating and dispensing of intraoral orthodontic tensioning devices of a type which are initially formed as portions of an elongated unitary flexible chain. Chain 12 shown in the drawings (see particularly FIG. 5) is but one type of such chain which may be handled by the tool—this chain including a plurality of circular, or annular, tensioning devices, such as devices 12a, severably joined through cuttable joints, such as joints 12b. Each device 12a is provided with a central opening or aperture 12c. A typical material which might be used in the formation of such a chain is a commercially available thermoset-thermoplastic, polyester-based, isocyanate-terminated urethane resin.

A chain, such as chain 12, is wound on spool 14 so that with the spool mounted on the finger, the chain pays out from the upper side of the spool with the spool positioned as in FIG. 1. From the spool, the chain extends in a reach, such as reach 12d, and thence through guide 26 from the entry to the dispensing side thereof. Under most normal circumstances, the chain will, desirably, be locked against free movement through the guide, and such locking is accomplished by fitting prong 28 through an aperture in a device in the chain, such as is illustrated in FIGS. 1 and 2.

The situation just described defines the normal stored condition of a chain in tool 10. The detent-like interaction mentioned earlier, which interaction prevents free rotation of spool 14, prevents inadvertent unwinding of the chain from the spool. Further assisting in preventing unwinding is locking of the chain on prong 28.

When it is desired to use the tool to place a device 12a within a person's mouth, the chain is released from the prong, and a sufficient amount is paid out through the guide to enable ready placement within the mouth—with the chain then typically relocked on the prong. The slender outer end portion of finger 16, along with whatever length of chain projects from the dispensing side of the guide, may then be manipulated within a person's mouth to hook the outermost device 12a over whatever it is to be engaged with. Cutting is then performed to sever this device from the chain. Locking of the chain on the prong prevents slippage of the chain, and maintains it in a condition ready for installation of the next device. Also, such locking provides a reaction force which is very useful during placement and tensioning of a device in a person's mouth.

When it is desired to use tool 10 in conjunction with a chain containing a different type of device, it will obviously be a simple matter to interchange spools on the finger for this purpose.

Thus, it is believed evident that the tool proposed herein comprises an extremely convenient one for storing, manipulating, and dispensing orthodontic devices of the type described.

A modification of the device which has been found useful in certain instances involves a change in the direction of the bend of the outer end of finger 16. In particular, there are some applications where it is more convenient to have this outer end bent up (as it would be viewed in a figure like FIG. 1) rather than down. Further, the finger may obviously be constructed from parts of other than a wire-like element and a cross member.

While a preferred embodiment of the invention has been presented, it is appreciated that variations and

modifications may be made without departing from the spirit of the invention.

It is claimed and desired to secure by letters patent:

1. Apparatus for dispensing intraoral orthodontic devices of the type which are severably joined in an elongated flexible chain, with each device in such a chain including an aperture, said apparatus comprising

a digitally manipulatable dispenser portion including means therein defining a guide for guiding the dispensing of devices from such a chain,

a storage portion mounted for movement on and relative to said dispensing portion for storing a chain of devices, movement of said storage portion relative to said dispensing portion effecting taking-up and paying-out of a stored chain,

a chain of devices when stored in the apparatus in a condition for the dispensing of devices therefrom having a reach extending between said storage portion and said guide, and

means on said dispensing portion employable releasably to lock a chain in place against dispensing movement relative thereto.

2. The apparatus of claim 1 which further includes means producing a detent-like, releasable locking interaction between said dispensing portion and said storage portion in different positions of the latter relative to the former.

3. The apparatus of claim 1, wherein said means employable releasably to lock a chain in place comprises a catch disposed adjacent said guide for catching an aperture in a device.

4. Apparatus for dispensing intraoral orthodontic tensioning devices of the type which are severably joined in an elongated flexible chain, with each device in such a chain including an aperture, said apparatus comprising

an elongated finger having means adjacent one end defining a guide for freely receiving such a chain and for guiding the dispensing of devices from a received chain,

a spool removably and rotatably mounted on said finger at a point spaced from said guide for storing a chain from which devices are to be dispensed, and for enabling the taking-up and paying-out of a stored chain,

a chain of devices when stored in the apparatus in a condition for the dispensing of devices therefrom having a reach extending between said spool and said guide, and

a catch joined to said finger adjacent said guide for releasably catching an aperture in a device thus to prevent movement of a chain past said guide.

5. The apparatus of claim 4, wherein said catch comprises an elongated prong projecting from said finger.

6. The apparatus of claim 4, wherein said guide has an entry side for receiving a chain, and a dispensing side from which devices are dispensed, and said catch is located on said dispensing side.

7. The apparatus of claim 6, wherein said catch com-

prises an elongated prong projecting from said finger.

8. The apparatus of claim 4 which further includes means producing a detent-like, releasable locking interaction between said finger and said spool in different angular positions of the spool on the finger.

9. The apparatus of claim 8, wherein said finger includes a pair of spaced-apart mounting portions for said spool, which portions are movable toward and away from one another for enabling mounting and demounting of the spool, and said means which produces said detent-like interaction comprises a plurality of ridges formed on said spool which ridges are engageable with one of said mounting portions.

10. Apparatus for dispensing intraoral orthodontic tensioning devices of the type which are severably joined in an elongated flexible chain, with each device in such a chain including an aperture, said apparatus comprising

an elongated element forming a dispensing finger in the apparatus, and including adjacent its inner end a pair of adjacent, spaced-apart portions which are movable relatively toward and away from one another,

means in said element adjacent the outer end thereof defining a closed loop guide for freely receiving such a chain and for guiding the dispensing of devices from a received chain,

a spool removably and rotatably mounted on said element adjacent its said inner end for storing a chain from which devices are to be dispensed, and for enabling the taking-up and paying-out of a stored chain,

a chain of devices when stored in the apparatus in a condition for the dispensing of devices therefrom having a reach extending between said spool and said guide, and

a catch joined to said element adjacent said guide for releasably catching an aperture in a device thus to prevent the movement of a chain past said guide.

11. The apparatus of claim 10 which further includes means producing a detent-like interaction between said element and said spool in different angular positions of the spool on the element.

12. The apparatus of claim 10, wherein said catch comprises an elongated prong projecting from said element.

13. The apparatus of claim 10, wherein said guide has an entry side for receiving a chain, and a dispensing side from which devices are dispensed, and said catch is located on said dispensing side.

14. The apparatus of claim 13, wherein said catch comprises an elongated prong projecting from said element.

15. The apparatus of claim 11, wherein said means which produces said detent-like interaction comprises a plurality of ridges formed on said spool, which ridges are engageable with one of said ends of said element.

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