A New Fixed Interarch Device for Class II Correction

WILLIAM VOGT, DDS

Fixed devices are increasingly being used for molar distalization in Class II treatment because they eliminate the need for special patient compliance. These appliances fall into two main categories: intra-arch (such as the Distal Jet,* Jones Jig,* and Hilgers Pendulum**) and interarch (such as the Herbst*** and active springs). The spring appliances can be further divided into cantilever types (such as the Jasper Jumper* and Bite Fixer**) and telescoping types (such as the Eureka Spring**** and Twin Force†).

Recently, two new fixed interarch spring devices have been introduced for Class II correction: the Forsus Nitinol Flat Spring‡ (a cantilever spring) and the Forsus Fatigue Resistant Device‡ (a telescoping spring). This article describes the use of the Forsus Nitinol Flat Spring (Fig. 1).

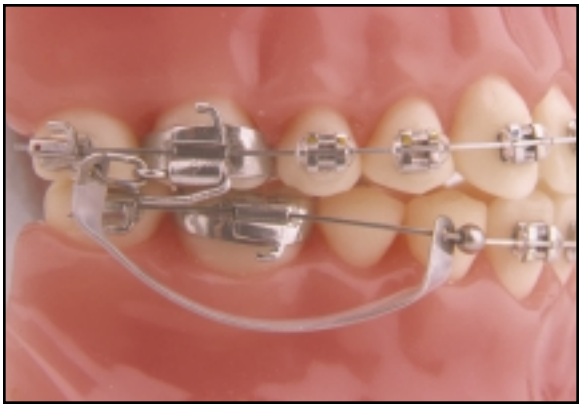

Fig. 1 Forsus Nitinol Flat Spring (photograph © 2002 3M Unitek).

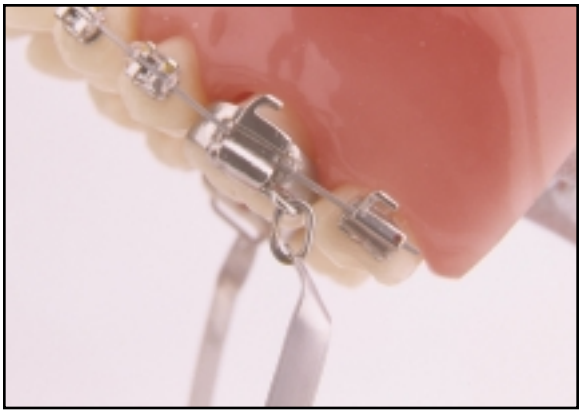

Fig. 2 "Link 'n' Loop" assembly allows wider range of motion and keeps pin from being swallowed (photograph © 2002 3M Unitek).

Appliance Design

The flat nickel titanium spring attaches to the maxillary molar bands with an attached pin-

*American Orthodontics, 1714 Cambridge Ave., Sheboygan, WI 53082.

**Ormco/"A" Company, 1717 W. Collins Ave., Orange, CA 92867.

***Dentaurum, Inc., 10 Pheasant Run, Newtown, PA 18940.

****Eureka Springs, 1312 Garden St., San Luis Obispo, CA 93401.

†Trademark of Ortho Organizers, Inc., 1619 S. Rancho Santa Fe Road, San Marcos, CA 92069.

‡Trademark of 3M Unitek, 2724 S. Peck Road, Monrovia, CA 91016. The Nitinol Flat Spring is also sold as the Ribbon Jumper by American Orthodontics, 1714 Cambridge Ave., Sheboygan, WI 53082.

Fig. 3 Bayonet bends distal to canines act as forward stops and allow springs to clear premolars (photograph © 2002 3M Unitek).

Dr. Vogt is in the private practice of orthodontics at 3501 Freemansburg Ave., Easton, PA 18045; e-mail: billvogt@rcn.com. He has a financial interest in the appliance described in this article.

and-loop assembly that slides into the headgear tube from the distal and is cinched on the mesial (Fig. 2). This assembly, called the "Link 'n' Loop", serves two purposes: it prevents the pin from being dropped during insertion, and it allows the patient to open wider.

The other end of the spring connects to the mandibular main archwire or an auxiliary bypass arch. If it is attached directly to the main archwire, a bayonet bend is placed distal to the canines to act as a forward stop and to provide clearance for the spring to pass the premolars as it slides along the archwire (Fig. 3). If the mandibular first and second premolar brackets are already in place, they should be removed to give the spring the widest possible range in which to slide and thus permit the mouth to open wider. Alternatively, the spring can be attached to an auxiliary sectional wire that hooks onto the main archwire in the canine region and passes distally through the first molar auxiliary tube, allowing the premolar brackets to remain on the teeth (Fig. 4). With either type of attachment, the mandibular archwire should be nearly full-size and cinched or tied back securely to prevent mandibular incisor flaring.

The maxillary archwire should not be cinched or tied back unless a maximum orthopedic effect is desired. A recent study found that when the maxillary archwire was tied back, the resultant Class II correction was approximately one-third orthopedic and two-thirds dentoalveolar.[1]

The Forsus Flat Spring is designed to deliver 225-250g of force when it is compressed 5mm for initial activation. Because it is made of nickel titanium, it delivers a consistent level of force from insertion to removal. If reactivation is needed, however, placing a crimpable stop on the archwire in front of the spring adds about 1.5mm of compression (Fig. 5). For midline corrections, the appliance can be activated unilaterally.

In a full Class II case, I recommend that the mandibular incisors be advanced no farther than to an edge-to-edge position before the springs are removed. Molar distalization takes about six months in the typical adolescent patient.

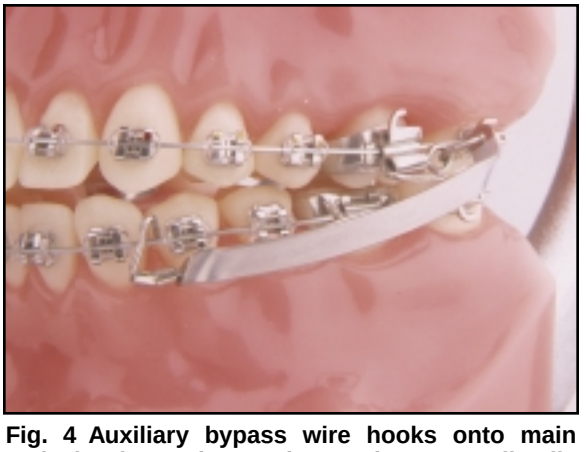

Fig. 4 Auxiliary bypass wire hooks onto main archwire in canine region and passes distally through first molar auxiliary tube (photograph © 2002 3M Unitek).

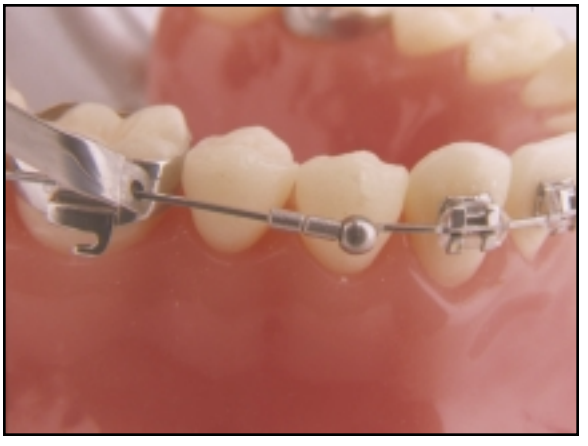

Fig. 5 Reactivation with crimpable stops (photograph © 2002 3M Unitek).

Case Report

A 15-year-old male presented with a Class II, division 1 malocclusion with moderate maxillary and mild mandibular crowding (Fig. 6, Table 1). The overjet was 4mm, and the overbite 90%. The patient's smile was slightly gummy, and the mandibular midline was off to the right.

The maxillary arch was bonded; mandibular brackets were placed six months later, after the bite had opened sufficiently. Another nine months later, when the mandibular teeth were aligned, the brackets were removed from the mandibular premolars. A cinched .019" × .025" stainless steel archwire with bayonet bends was then placed in the lower arch with a pair of Forsus Nitinol Flat Springs attached (Fig. 7). The maxillary archwire was left uncinched at the molars to allow maximum maxillary molar distalization.

After five months, larger Flat Springs were inserted (Fig. 8); the patient reported no soft-tissue irritation from either pair of springs. Another month later, the springs were removed, and Class

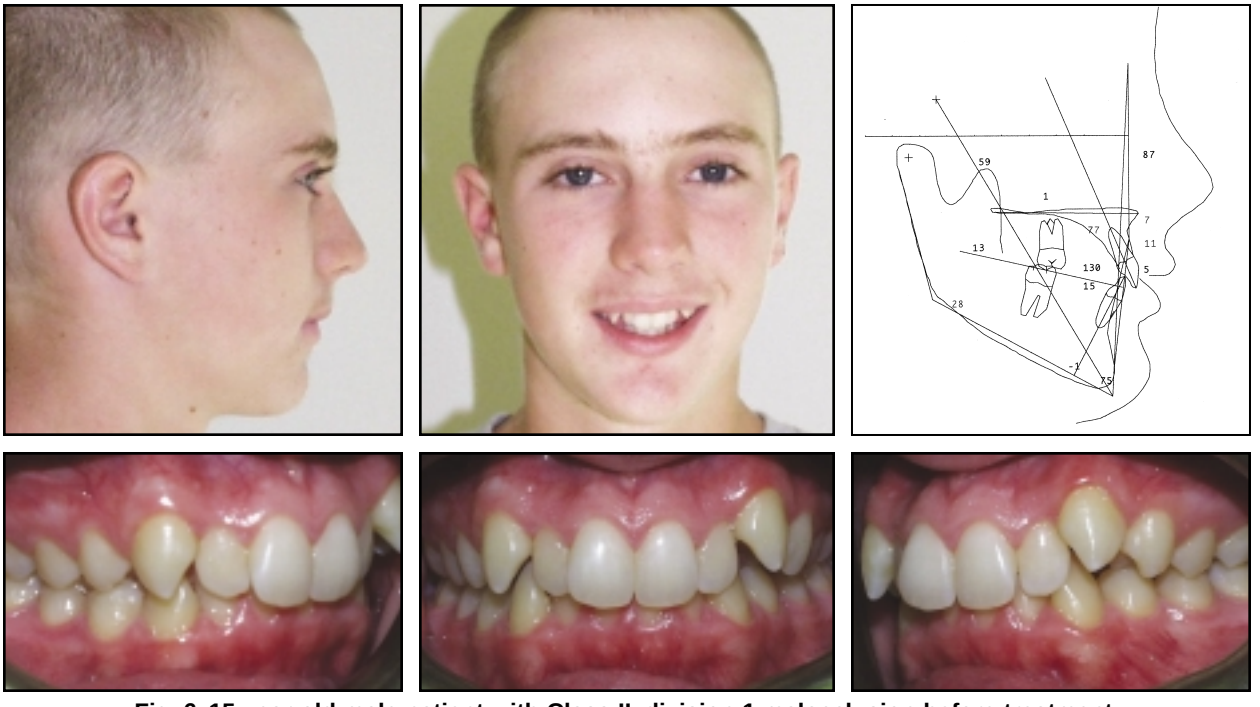

Fig. 6 15-year-old male patient with Class II, division 1 malocclusion before treatment.

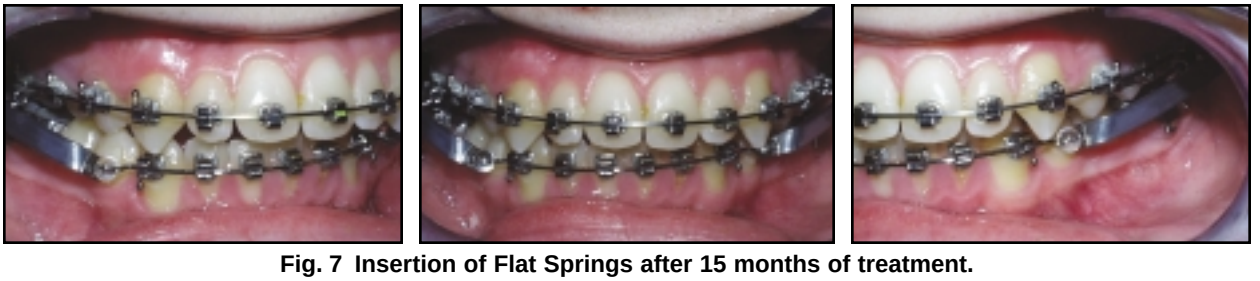

Fig. 7 Insertion of Flat Springs after 15 months of treatment.

TABLE 1
CEPHALOMETRIC DATA

	Pre-treatment	Norm	Clin. Dev.	Post-Treatment
Facial angle	87.1°	88.7°	–0.4	88.0°
Convexity	6.9°	0.0°	1.4*	3.2°
AB plane	10.8°	4.6°	1.7*	8.5°
Mandibular plane	28.4°	23.8°	1.0*	28.7°
Y-axis	59.4°	59.4°	0.0	59.6°
Occlusal plane cant	12.7°	9.3°	0.9	14.2°
Interincisal angle	129.7°	130.0°	–0.1	129.9°
Incisor-occlusal plane	14.5°	14.5°	0.0	16.9°
Incisor-mandibular plane	–1.1°	1.4°	–0.7	2.2°
1-APo	4.6mm	3.5mm	0.5	4.0mm
AB-mandibular plane	75.3°	74.0°	0.3	71.8°
Palatal plane	0.8°	0.5°	0.1	2.1°
Overbite depth	76.1%	74.5%	0.3	74.0%
Maxillary plane-AB	77.0°	81.4°	–1.0*	81.6°

II elastics were used to maintain the new positions of the posterior teeth (Fig. 9). Final space closure was performed, and artistic bends were made to finish the case.

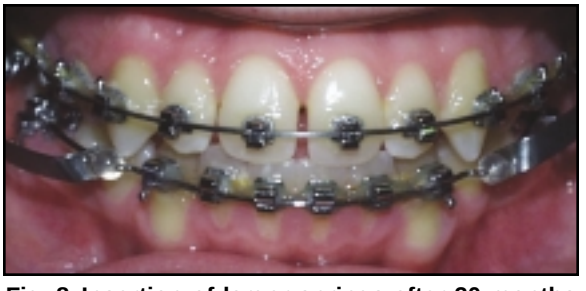

Fig. 8 Insertion of larger springs after 20 months of treatment.

The brackets were removed after a total of 28 months of active treatment (Fig. 10). The occlusion remained stable a year later (Fig. 11, Table 1).

Conclusion

For the past few years, I have been using Forsus Nitinol Flat Springs to correct most Class II cases without headgear. This appliance has the following advantages:

- It does not require time-consuming and expensive lab work or the use of stainless steel crowns.
- It produces consistent treatment results in a

Fig. 9 Removal of springs after 21 months of treatment.

Fig. 10 Patient after 28 months of active treatment.

predictable amount of time, without depending on patient cooperation.

• It can deliver an orthopedic effect to both jaws or more of a dentoalveolar effect.

• It can be activated more on one side than on the other, so it excels at correcting midline deviations.

REFERENCES

1. Heinig, N. and Goz, G.: Clinical application and effects of the Forsus Spring: A study of a new Herbst hybrid, J. Orofac. Orthop. 62:436-450, 2001.

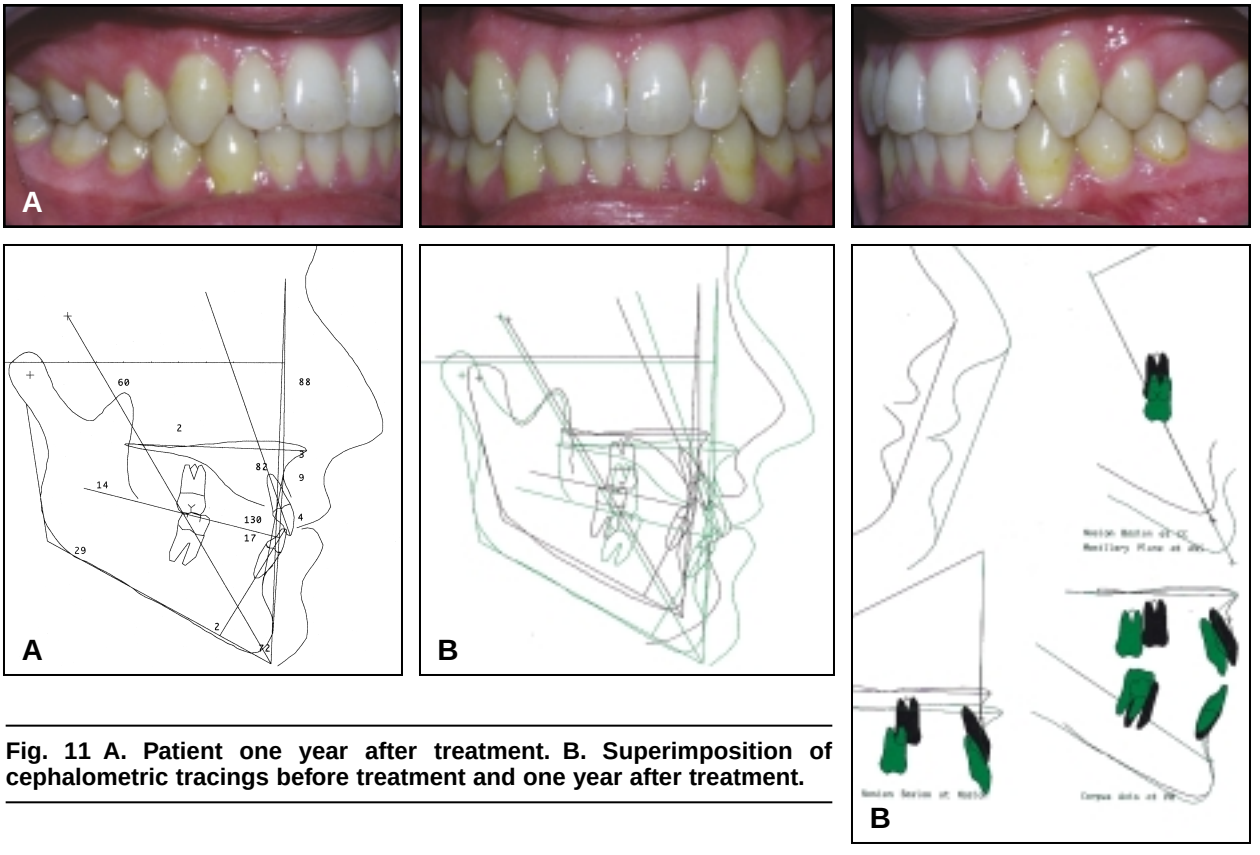

Fig. 11 A. Patient one year after treatment. B. Superimposition of cephalometric tracings before treatment and one year after treatment.