

# The Modified Pendulum Appliance with Removable Arms

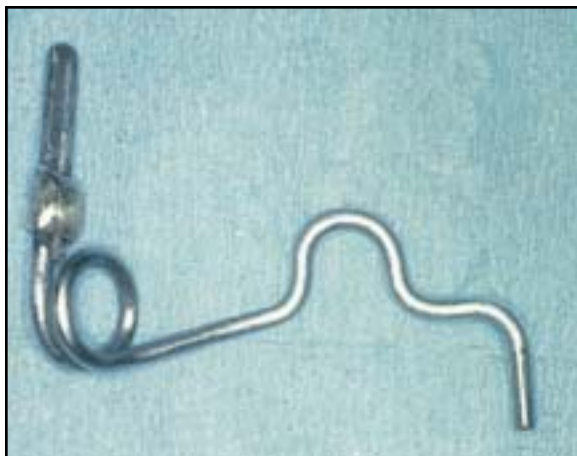
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**A**mong the methods described in the recent literature for nonextraction treatment of a Class II malocclusion by molar distalization,<sup>1-3</sup> the Hilgers Pendulum Appliance<sup>\*4-9</sup> seems to best satisfy the most important requirements:

- Avoidance of undesirable biomechanical side effects.
- Minimization of the need for patient cooperation.
- Acceptability in terms of esthetics and function.
- Economy of chairtime for placement and reactivations.

The Pendulum is a non-compliance device that uses TMA\* arms as the active components and a modified Nance button as anchorage support. The Nance button consists of an acrylic plate 1.5-2mm thick, with four occlusal rests bonded to either the deciduous molars or the first and second bicuspid. The two .032" TMA arms

\*Ormco/"A" Company, 1717 W. Collins Ave., Orange, CA 92867. TMA is a registered trademark.



**Fig. 1** Removable .032" TMA Pendulum arm with mesially oriented loop, soldered to TMA bayonet for attachment to Nance button.

are embedded in the acrylic; each arm consists of a closed helix, a convex adjustable horizontal loop, and a terminal section that fits into an .036" lingual sheath on the maxillary molar band. The arms are placed close to the button to allow for a broad, swinging arc of force and easier insertion in the sheaths.

The distally oriented adjustable loop was originally designed to compensate for the tendency toward crossbite during distalization. As described in our previous article on a modified version of the appliance (the M-Pendulum), the loop can be reversed to the mesial to provide bodily movement of both the roots and crowns of the maxillary molars, rather than tipping or rotation.<sup>10</sup> After some distalization has occurred, the loop is reactivated simply by opening it.

A further modification of the appliance is possible by using removable TMA arms that can be reactivated outside the mouth.

## Fabrication and Activation

The modified appliance is fabricated as follows:

1. Double over two 7-9mm lengths of .032" TMA wire to form bayonets (Fig. 1). Attach each



**Fig. 2** Arms embedded in acrylic sheaths.

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bayonet to an M-Pendulum arm, either by using a laser welder or by wrapping .010" ligature wire around the arm and soldering the unit together with silver wire (no cadmium) and a miniflame. After soldering, polish with a finishing bur.  
 2. Embed each bayonet in the soft acrylic that will be used to form the Nance button, producing sheaths in which to insert the removable arms (Fig. 2).  
 3. Activate the arms as desired on the working cast (Fig. 3).  
 4. Place the appliance in the mouth, inserting the terminal ends of the arms into the lingual molar

band sheaths (Fig. 4).

The removable arms can be reactivated during treatment without debonding and rebonding the occlusal rests of the Nance button (Fig. 5). Distal molar movement can then be more precisely controlled than by opening the horizontal loops in the mouth.

The conventional Pendulum or M-Pendulum produces about 5mm of distalization in three to four months. With the removable arms, distal movement can be continued at a rate of about 1.5mm per month for as long as necessary.



Fig. 3 45° activation of M-Pendulum arm before insertion of appliance.



Fig. 4 Arm inserted into lingual molar band sheath.



Fig. 5 A. Reactivation of arm outside mouth. B. Reactivated arm connected to appliance. C. Arm inserted into lingual molar band sheath.

## Conclusion

This modification offers several advantages:

- Dramatic reduction in chairtime.
- Sound biomechanical principles, producing more precise and predictable results.
- Less chance of unwanted side effects.
- Easy replacement of Pendulum springs without refabrication of the entire appliance.
- Ability to replace the active arms with passive stainless steel auxiliaries after distal movement, thus producing a “quick” Nance appliance for stabilization.

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