Jan. 31, 1956 P. LA HIRT 2,732,622

CHANGE SPEED ATTACHMENT

Filed Feb. 8, 1954

FIG. 1

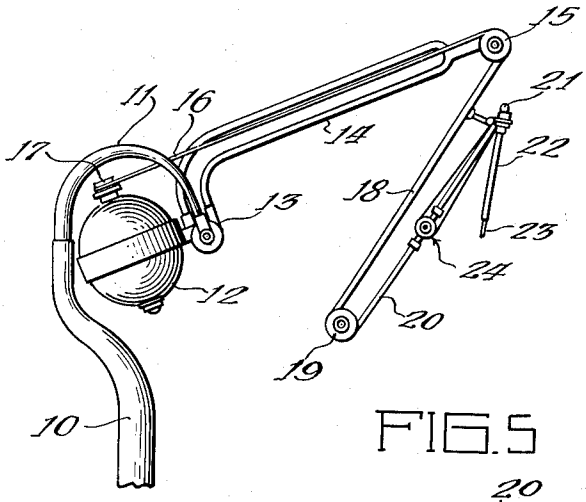


FIG. 2

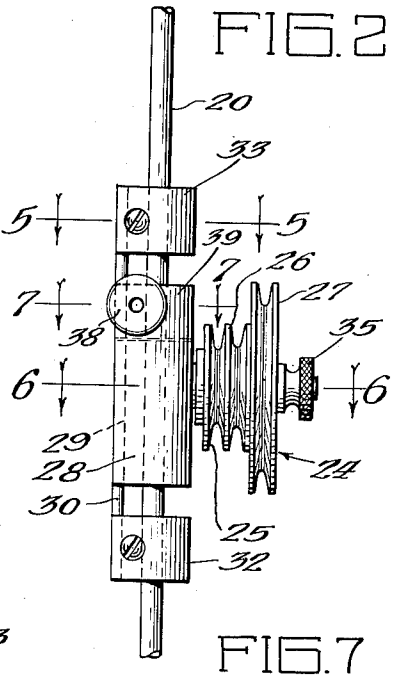


FIG. 5

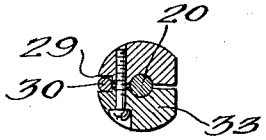


FIG. 3

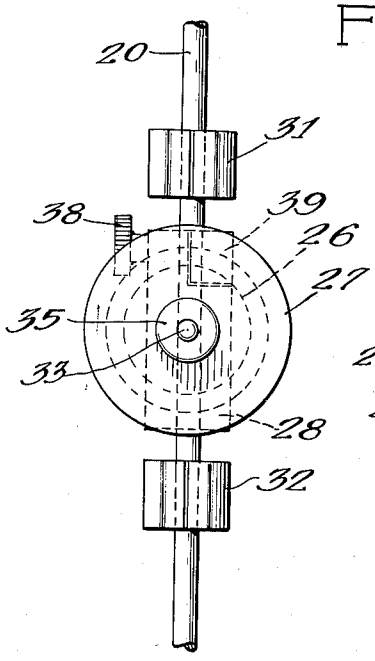


FIG. 4

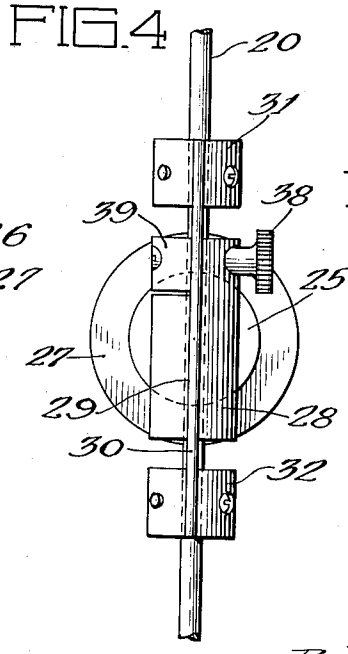


FIG. 7

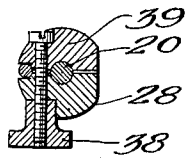
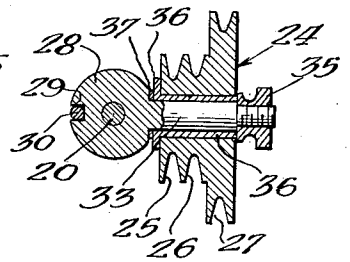


FIG. 6



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CHANGE SPEED ATTACHMENT

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5 Claims. (Cl. 32—23)

This invention relates to a dental engine and more particularly to a change speed attachment for a dental engine.

The dental engine, which is a familiar instrument in a dentist's office, drives a handpiece by an electric motor through flexible belts which pass over pulleys carried by arms provided for universal movement of the handpiece. Steel burrs are used for cutting in preparatory work to a considerable amount in dental surgery and other operations in the oral cavity. The speed at which such a steel burr is operated is dependent on the efficiency of the cutting within the range which is comfortable for the patient. Heating is particularly to be avoided. It has been found that a steel burr driven at about 5,000 R. P. M. best provides cutting without heating and without particular patient discomfiture. Recently, carbide tipped burrs have been used. The speed at which they do the best cutting is exceedingly higher than that for steel burrs. An effective speed for carbide tipped burrs is around 11,000 R. P. M. Very little heating occurs and no patient discomfiture although the cutting is much faster.

A problem exists in the use of the usual dental engine for cutting alternately with steel burrs and carbide tipped burrs. While the carbide tip cuts much faster than the steel, the carbide tip can cut three times as fast if run at 11,000 R. P. M. rather than 5,000. If the dental engine is converted by changing the pulleys to provide for the higher speed, the use of the engine for steel tips is destroyed. On the other hand, if the carbide tipped burr is used with an engine which will drive the handpiece at 5,000 R. P. M., the cutting will only be about one third as fast as could be accomplished and no particular advantage is achieved.

The present invention provides a device for easily and quickly converting a dental engine to use either carbide or steel tipped burrs while using the same motor speed and without risking running the pulleys on the flexible arms of the engine at a speed conducive to their early failure. The present device is secured to the usual dental engine adjacent the handpiece. This permits the pulleys between the attachment and the engine to run the same as provided originally and to run at a speed for which they were designed and at which they generally have a long life.

A preferred embodiment of the present invention is illustrated in the accompanying drawings in which:

Figure 1 is a fragmentary side elevational view of a dental engine diagrammatically showing the mounting of the present device on an arm of the engine;

Figure 2 is a side elevational view of the present device shown in mounted position upon a fragmentary portion of an arm of the dental engine;

Figure 3 is a front view of the device;

Figure 4 is a rear view of the device illustrated in Figures 2 and 3; and

Figures 5, 6 and 7 are sectional views taken respectively along lines 5—5, 6—6 and 7—7 in Figure 2.

While this invention is susceptible of embodiments in

many different forms, there is shown in the drawings and will herein be described in detail one specific embodiment, with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

The dental engine illustrated in Figure 1 includes a supporting standard **10** having a supporting yoke **11** at the upper end. An electric motor **12** is pivotally supported at the outer end **13** of the yoke and connected for swinging movement about the outer end along with an engine arm **14** extending outwardly from the end of the yoke. A pair of pulleys **15** are mounted on the outer end of the engine arm. A flexible belt or cord drive **16** extends from a pulley **17** on the engine shaft outwardly over the pulleys **15**. An intermediate arm **18** is connected by a swinging joint to the end of the engine arm **14** and carries a pair of pulleys **19** over which the belt **16** also passes. A third arm **20** extends from a pivotal connection with arm **18** outwardly to a short anchored connection **21** with a handpiece **22**. The belt **16** ordinarily extends from the motor to the handpiece **22** to revolve a central part **23** in the handpiece. This central part may receive cutting burrs or other rotary instruments normally used by dentists.

In the present invention, the drive from the motor **12** to the rotary part **23** of the handpiece is to an intermediate change speed attachment **24** secured on the arm **20**. This change speed attachment in essence comprises a compound pulley having a drive sheave portion **25** over which the belt **16** passes. At least a pair of driven sheave portions **26** and **27** are provided on the pulley and are of different diameters to receive a driven belt extending from the compound pulley to the rotary part **23** of the handpiece. The driven belt may thus be manually changed from one sheave portion to the other of the compound pulley to effect a speed change of the rotary part in the handpiece.

The drive belt **16** and driven belt extending from the handpiece are each of a flexible character permitting some change in their length without materially affecting the driving qualities of the belts. The sheaves portion **27** being of larger diameter than the smaller driven sheave portion **26** requires the belt to stretch in order to pass over the larger portion. The tension in the belt is applied through this change speed attachment to the drive belt **16** and these tensions are permitted to balance by virtue of the structure supporting the attachment.

The particular supporting structure includes a base **28** having a central bore to receive the arm **20** of the dental engine. A groove **29** in the base slidingly receives a rod **30** held parallel to the arm **20** by a pair of clamp members **31** and **32**. These clamp members are spaced apart a distance in excess of the longitudinal length of the base so that the base may slide between the clamp members. This sliding permits an equalization of the tension in the drive and driven belts when the latter is changed from one driven sheave portion to another.

The particular structure for supporting the compound pulley includes a stud **33**, secured in the base portion, upon which the compound pulley is idly mounted and held in place by a thumb nut **35**. The pulley may be provided with a bronze sleeve **36** running against a washer **37** adjacent the base.

It is desirable in some instances to lock the base portion to the arm after a change in the driving relation has been made by moving the driven belt to a different driven sheave portion. After the belts have automatically equalized the tension by shifting the position of the compound pulley along the arm **20**, the pulley may be locked in position by tightening a thumb nut **38** to draw a slide

portion 39 of the base tightly against the arm 20 and rod 30. After such tightening, the compound pulley will remain in position. If a change in the speed of the device is desired after the pulley has been tightened in position, it should be loosened to permit the belts to automatically adjust the position of the pulley to equalize the tension.

Portions of the compound pulley may be selected to attain the desired speeds. In the preferred embodiment illustated, the driven portion 26 of the pulley will produce the normal 5,000 R. P. M. for the rotary part of the handpiece. The larger driven portion 27 has a diameter such that the speed of the rotary part may be increased to 11,000 R. P. M. while maintaining the same motor speed. By the use of the present invention, the pulleys between the change speed attachment and the motor are not required to run faster than their original design called for and yet the rotary part of the handpiece may be driven at a much faster rate.

Dentists may convert their present dental engines very simply by attaching the present attachment, permitting them to use a single engine most effectively with both steel and carbide tipped burrs. The efficiency of the necessary cutting operations can thus be improved without a major change in the dental engines which might otherwise be required. The incorporation of the present attachment may be easily made in most dental engines by removing the arm 20 so that one end is exposed to permit the base 28 to be passed over the arm lengthwise to a chosen position along the arm. The clamps 32 and 33 may be applied to the arm in any desired position by merely tightening the associated screws. The time required for making the attachment is negligible. At the same time, the cost of the attachment is small, particularly compared with the increased efficiency and flexibility it permits in the use of an existing dental engine.

I claim:

1. A change speed attachment for a dental engine having a driving motor, adjustable arms carrying flexible belt driving means and a hand piece having a driven rotary part, comprising: a rotatable compound pulley having a base and mounted upon one adjustable arm for sliding movement longitudinally of the arm clamp, clamp means secured to the arm on each side of the pulley for limiting said sliding movement to a portion of the length of the arm, means secured to the arm and slidingly engaging a portion of said pulley base to hold the pulley against rotation about the arm, a drive belt means passing over one portion of the pulley and connected to said motor for driving the pulley, said pulley having other portions of different diameter and a driven belt means selectively placeable on said other portions to vary the driven speed thereof, said compound pulley automatically adjusting its position along the arm under tension of said belt drive and driven means, said driven belt means being connected in driving relation with the rotary part of the hand piece to provide different speeds of the rotary part without changing motor speed.

2. A change speed attachment for a dental engine having a motor and swingably adjustable arms carrying flexible belt driving means for rotating a part of a hand piece comprising: an elongated rod member having a clamp member at each end adapted to clamp upon one arm of the dental engine adjacent the hand piece and to position the rod substantially parallel to said arm; a compound pulley having a supporting shaft and a base member with the pulley idly rotatable on the supporting shaft, said base member having a bore passing therethrough and an outer groove parallel to the bore embracing said elongated rod and slidable therealong between the clamp members, said base member bore being adapted to receive said arm of the dental engine upon which the clamps are placed with said groove holding the base member against rotation upon the arm, said pulley having a drive sheave and a pair of driven sheave portions of different diameter so that the driven flexible belt driving means may be selectively placed on either of said driven sheave portions to change the speed of the hand piece part without changing the motor speed, and a lock member on the base member for securing the base in an immovable position on the arm between said clamp members.

3. A change speed attachment for a dental engine having a motor, swingably adjustable arms carrying flexible belt driving means and a hand piece having a rotary part, comprising: a base member having a longitudinal bore mounting the base member on one arm of said dental engine with said arm passing through the bore; a guide rod clamped to said arm and having a portion engaging the base member to prevent relative rotation between the arm and base member; a compound pulley secured to the base member and having a drive sheave and at least a pair of driven sheaves of different diameters, a drive belt means connected with the motor and passing over the drive sheave of said pulley; and a driven belt means connected with the rotary part of the hand piece and selectively placeable upon either of said driven sheaves to vary the speed of said rotary part with a single motor speed.

4. A change speed attachment for a dental engine having a motor, swingably adjustable arms carrying flexible belt driving means and a hand piece having a rotary part, comprising: an elongated rod member having a clamp member at each end adapted to clamp upon one arm of said dental engine adjacent the hand piece to hold the rod substantially parallel to the arm; a base member having a bore with said arm passing therethrough and an outer groove parallel to the bore for embracing said rod to hold the base against rotation on the arm, said base member being mounted between said clamp members, an outwardly extending stub shaft on the base member and a compound pulley idly rotatable on the shaft, said pulley having a drive sheave portion and a pair of driven sheave portions of different diameter so that the driven flexible belt driving means may be selectively placed on either of said driven sheave portions to change the speed of the hand piece part without changing the motor speed.

5. A change speed attachment for a dental engine having a motor, swingably adjustable arms carrying flexible belt driving means and a hand piece having a rotary part, comprising: an elongated rod member having a clamp member at each end adapted to clamp upon one arm of said dental engine adjacent the hand piece to hold the rod substantially parallel to the arm; a base member having a bore with said arm passing therethrough and an outer groove parallel to the bore for embracing said rod to hold the base against rotation on the arm, said base member being mounted between said clamp members, an outwardly extending stub shaft on the base member and a compound pulley idly rotatable on the shaft, said pulley having a drive sheave portion and a pair of driven sheave portions of different diameter so that the driven flexible belt driving means may be selectively placed on either of said driven sheave portions to change the speed of the hand piece part without changing the motor speed, said base member and pulley being slidable on the arm between said clamp members and automatically adjusting its position between said clamp members under tension of said belt driving means, and a lock member for securing the base immovable relative to said arm after such automatic adjustment.

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