Oct. 17, 1933. G. S. VARCOE ET AL 1,930,669

CHUCK ADAPTER

Filed Feb. 2, 1931 2 Sheets-Sheet 1

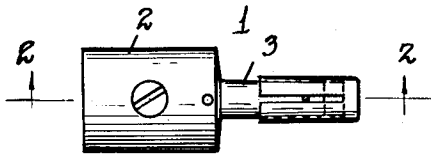


FIG. 1

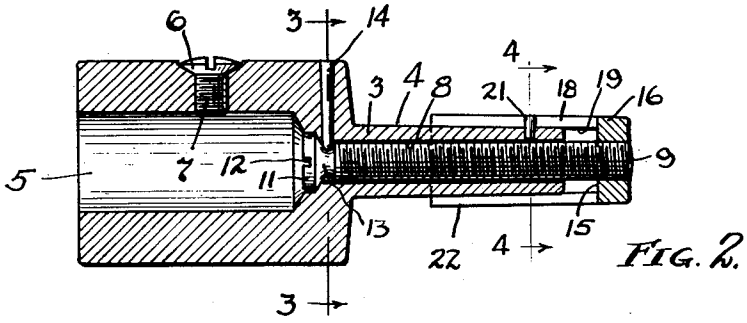


FIG. 2.

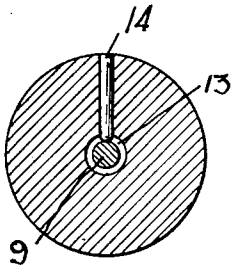


FIG. 3

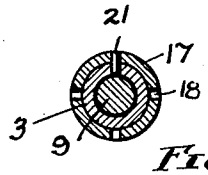


FIG 4

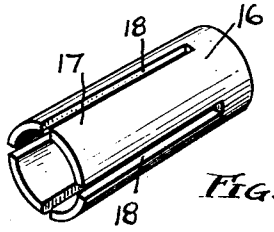


FIG. 5

INVENTORS
Garland S. Varcoe and
Edwin A. Purdy
BY
Day, Oberlin & Day
ATTORNEYS.

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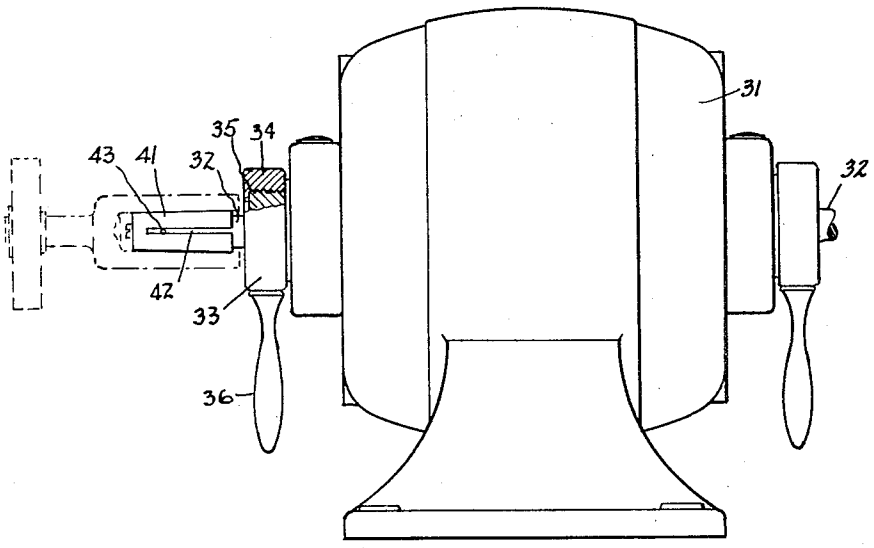


FIG. 6.

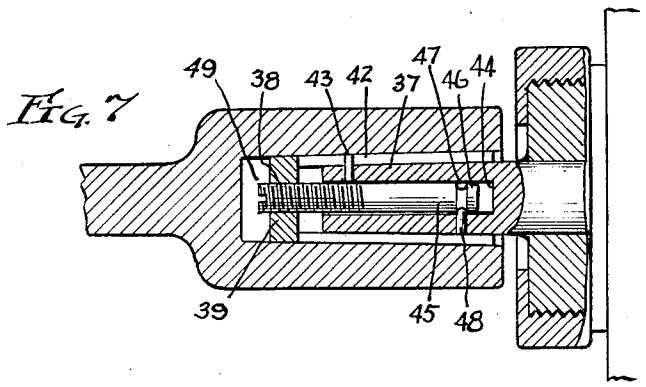


FIG. 7

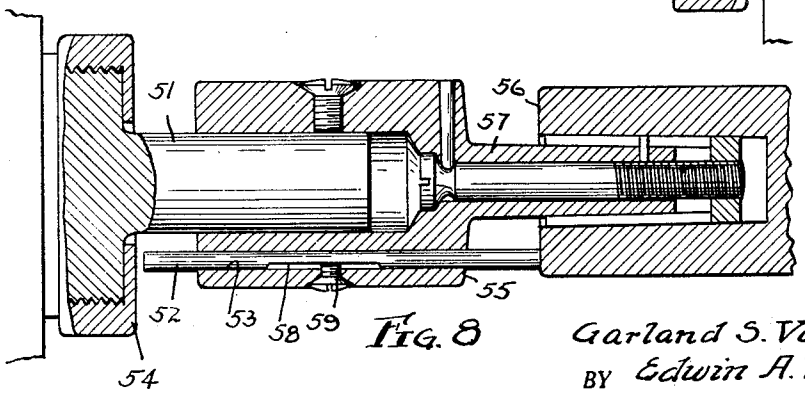


FIG. 8

INVENTORS
Garland S. Varcoe and
BY Edwin A. Purdy
Fay Oberlin & Fay
ATTORNEYS.

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CHUCK ADAPTER

Garland S. Varcoe, East Cleveland, and Edwin A. Purdy, South Euclid, Ohio

Application February 2, 1931. Serial No. 512,929

10 Claims. (Cl. 279—2)

This invention, as indicated, relates to adjustable chuck engaging and driving means for laboratory motors and the like. More particularly it comprises a device which may be provided upon the shaft of a laboratory motor or the like which will compensate for wear taking place on the shaft or spindle, or inside the chuck carrying the grinding, cutting, polishing or other appurtenances to be applied to the motor shaft. The device may be in the form of a modified motor shaft terminal or in the form of an attachment provided at its free end with an expansible friction spindle in true alignment with the shaft of the motor upon which spindle may be engaged the chucks of the usual grinding, cutting or polishing devices, particularly those used in dental laboratory operations, and the like.

Heretofore it has been the practice to engage grinding, cutting and polishing devices upon the shaft of a laboratory motor by forcing the same into frictional engagement with the solid tapered end of the shaft of said motor frequently while said motor was revolving at high speed. Through the frequent application and detachment of said chucks carrying such operating devices there results the wearing away of the surface of the motor shaft or the interior of the chucks, the wear of said parts being at the point of attachment of the same, with the result that ultimately the frictional engagement will be insufficient to drive the grinding, cutting or polishing device, and it will be necessary to improvise some means of securing the same to the shaft. Such means ordinarily used to cause this frictional engagement comprises thin sheets of paper, wood or metal, and quite frequently the use of such expedients throws the grinding, cutting or polishing device out of true alignment or mounts it eccentrically with respect to the shaft, and accurate work is therefore impossible.

The present invention has in view the avoidance of the difficulty above explained through the provision of an expansible terminal provided directly on the motor shaft or on an attachment which may be designated the chuck adapter, which may be attached to the end of the motor shaft and secured thereto in axial alignment therewith. The free end of the motor shaft or chuck adapter provides a tapered spindle with which the buffing and polishing devices may be frictionally engaged in the usual manner. This spindle, in place of being merely a solid shaft as in the case of the tapered motor shaft now ordinarily provided, is formed with an expansible construction, so that, as wear takes place it may be slightly adjusted so as to compensate for such wear. Thus the device prolongs the usefulness of a laboratory motor and the chuck elements of grinding, cutting, polishing or like attachment therefor indefinitely in that a spindle operating in true alignment with the motor shaft may at all times be assured and such spindle may be maintained in any predetermined degree of adjustment, so that frictional engagement therewith, by a chuck of the character referred to, will always be sufficient to drive such appurtenances without lost motion and in true axial and radial alignment.

Other features and objects of the invention will appear in the course of the following description. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims; the annexed drawings and the following description setting forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but several of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:

Fig. 1 is a side elevation showing a chuck adapter embodying the principles of the invention; Fig. 2 is a central vertical sectional view taken along the line 2—2, shown in Fig. 1, looking in the direction of the arrows; Fig. 3 is a transverse sectional view taken along the line 3—3, shown in Fig. 2, looking in the direction of the arrows; Fig. 4 is a transverse sectional view taken along the line 4—4 shown in Fig. 2, looking in the direction of the arrows; Fig. 5 is a perspective view of the expansible sleeve forming part of the construction; Fig. 6 is a side elevation of a motor provided with an expansible device embodying the principles of the invention mounted on the projecting tapered end of the motor shaft and showing a chuck and buffing wheel in dotted lines; Fig. 7 is an enlarged sectional view showing the expansible device illustrated in Fig. 6; and Fig. 8 is an enlarged sectional view showing an extension knock-off device applied to an adapter of the type illustrated in Figs. 1 and 2.

As indicated, the drawings show several forms of construction. Figs. 1 to 5 and Fig. 8 show the device in the form of a chuck adapter adapted to be attached to a standard solid tapered motor shaft, whereas Figs. 6 and 7 illustrate the device in connection with the motor shaft itself which is provided with an extension terminal.

In the form clearly shown in Figs. 1 to 5 of the drawings, the chuck adapter 1 comprises a body portion 2 formed with a spindle 3 projecting to one side thereof and having a tapered outer surface 4. The body portion of the device is provided with a large central bore 5 extending from one end throughout the greater portion of its length and of a size to closely fit upon the projecting shaft of a laboratory motor or the like. The set screw 6, engaged in a transverse aperture 7 through said body, is adapted to lock the same upon the shaft of the laboratory motor. The spindle portion of the device is provided with a central aperture 8 which communicates with the enlarged bore in the body portion and an adjusting screw 9 is engaged to rotate within said bore through the spindle, said adjusting screw projecting beyond the end of said spindle so as to engage the body portion of the expansible sleeve presently to be described. The adjusting screw, at its inner end, is provided with an enlarged head 11 having a screw slot 12 which may be engaged by a suitable implement to turn said adjusting screw as desired. Immediately below the head portion of said adjusting screw, an annular depression 13 is formed, said depression being adapted to be engaged by the end of a pin 14 extending transversely through the body portion, which holds said screw against longitudinal movement, but permits free rotation thereof.

The projecting end of the adjusting screw, as stated, is screw threadedly engaged with the head 15 of an expansible sleeve 16. The expansible sleeve comprises a member having a solid head portion centrally threaded to receive the adjusting screw and having rearwardly projecting members 17 formed by providing a plurality of slots 18 which, in the instance illustrated, are four in number extending from the enlarged end of the sleeve to a point closely adjacent said head portion. The sleeve, as is more clearly shown in Fig. 2, is engaged with the tapered spindle by having its tapered interior portion 19 engaged over said spindle with the fixed pin 21 on said spindle engaged with one of the slots of said sleeve, which prevents rotary, but permits longitudinal movement of said sleeve. The adjusting screw is formed of such length that it will engage through the end wall of said sleeve, but not extend appreciably beyond the same when the device is expanded to the degree necessary to frictionally engage the chuck carrying the grinding, cutting or polishing devices.

The outer surface 22 of the sleeve thus presents a slightly tapered surface with which said chucks of the grinding, cutting or polishing devices may be frictionally engaged. This operation is usually performed while the motor shaft is revolving at high speed.

When wear takes place upon the outer surface of the expansible sleeve or interior of chuck all that is necessary to secure the required degree of friction to hold the operating devices in firm engagement with the sleeve, is to turn the adjusting screw slightly in a direction to draw the sleeve inwardly until the expansible sleeve is moved against the tapered surface of the spindle and expanded to the slight degree necessary to provide the desired amount of friction. This operation is, of course, carried out while the adapter is removed from the motor shaft. The adapter is then engaged over the motor shaft and locked in firm position thereon by means of the set screw.

The device thus permits the continuous use of the laboratory motor and chucks designed to operate thereon without giving any attention to preserving the same from undue wear on the contacting parts, inasmuch as any wear which takes place may be readily compensated for through the adjustment of the expansible sleeve, and such adjustment always insures the accurate alignment and concentricity of the means carrying the buffing elements which are frictionally applied to the adapter.

The frictional engagement may be made such that all danger of slippage of the grinding, cutting, polishing or like device will be eliminated and work of a higher degree of accuracy may thus be carried out through the use of a device of this character than where various expedients are resorted to to attach such devices with a sufficient degree of friction after the ordinary motor shaft or chuck socket has become worn. By applying an adapter to a new motor shaft for which the adapter is designed to be accurately fitted, true alignment of the spindle with the motor shaft is constantly maintained.

The construction illustrated in Figs. 6 and 7 provides for an adjustment of the projecting tapered shaft of the motor, such as is used in dental laboratories and the like, and which is frequently designated a dental lathe. In such construction the motor 31 is provided at each end with a projecting shaft 32, the detail construction of which will be presently described. Inwardly of the projecting end of the shaft a chuck remover 33 is provided, said chuck remover comprising a threaded sleeve 34 engaging over a fixed hub 35 on the motor housing, said hub having cross threads conforming to the threads of said sleeve. The chuck remover is provided at its lower side with a handle 36 by means of which the sleeve may be rotated in a direction to move the same outwardly so as to abut against the end of the chuck and dislodge the same from frictional engagement with the motor shaft.

As more particularly illustrated in Fig. 7, the projecting end of the motor shaft is provided with a tapered portion 37, over which is engaged a sleeve 38 substantially the same in construction as that illustrated in Figs. 1, 2 and 4, said sleeve having a solid head portion 39 centrally threaded to receive an adjusting screw and having rearwardly projecting members 41 formed by providing a plurality of slots 42, preferably four in number, extending from the enlarged end of the sleeve to a point closely adjacent said head portion. The sleeve is engaged over the tapered surface of the shaft and is held from rotary movement by means of a pin 43 engaged in one of said slots. In order to provide for longitudinal adjustment of said sleeve, the end of the shaft is provided with an axial recess 44, within which an adjusting screw 45 is engaged for free rotation. Said adjusting screw is provided with a head 46 on its inner end provided with an annular groove 47 immediately beneath the same. A pin 48, set in a transverse aperture through said shaft is adapted to engage said groove and hold said adjusting screw against longitudinal displacement. The outer end of the adjusting screw is provided with a slot 49. By means of a screw driver engaged in the slot 49 the adjusting screw may be rotated in either direction to provide the required degree of frictional engagement of such end of the shaft with the chucks of the various appurtenances which it may be desired to use upon said motor shaft.

It should be explained that where chucks are

used on dental lathes which have non-adjustable shafts which have become worn and upon which sections of paper or other wedging expedients have been used, some times such chucks are worn out of true concentricity with the shaft. In such cases it has been found that when such devices are applied to the shaft of a motor or to the spindle of an adapter equipped with the device above explained a species of reaming action takes place which restores the interior of said chuck to complementary taper and true concentricity.

In the form of construction shown in Fig. 3 a chuck adapter of the type illustrated in Figs. 1 and 2 is shown as applied to the tapered shaft 51 of a dental lathe. The body portion of the adapter, however, is provided with a sliding bar 52 which is engaged through the longitudinal channelway 53 formed through said adapter with the inner end of said bar closely adjacent the inner face of the sleeve 54 of the chuck remover, which may be of construction similar to that illustrated in Fig. 6. The opposite end of said bar projects beyond the outer face 55 of the body portion of said adapter so that it may be moved into contact with the end face 56 of a chuck or tapered socket of an operative device, such as a dental laboratory grinding, cutting or polishing tool, applied to the expansible spindle 57 of the adapter. The bar 52 is provided with a flat surface 58 on one side and a set screw 59 is engaged through the side of the adapter adjacent the channelway 53 on its inner end projecting into said channelway at said cut-away portion of the bar. The set screw 59 thus serves as a stop to prevent the bar falling from the adapter when the same is removed from the dental lathe. As has already been stated, the bar provides for the regular operation of the chuck remover on a standard dental lathe even though the chuck to be removed is spaced outwardly from said chuck remover a distance slightly greater than the length of the body portion of the chuck adapter.

Other modes of applying the principle of our invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

We therefore particularly point out and distinctly claim as our invention:

1. An apparatus of the character described including in combination a motor shaft, and means adapted for frictionally engaging operative tapered sockets of devices while said motor is in continuous operation, provided on the end thereof along the axial line of said shaft, said means having a tapered surface, and means for adjusting the degree of said taper.

2. An apparatus of the character described including in combination a motor shaft, and means adapted for frictionally engaging operative tapered sockets of devices while said motor shaft is in continuous operation, provided on the end thereof along the axial line of said shaft, said means having a tapered surface, and means for adjusting the degree of said taper, said means including a rotatable screw longitudinally fixed with reference to said shaft and engaging a screw-threaded portion of said means having a tapered surface.

3. An apparatus of the character described including in combination a motor shaft, and means on the end thereof adapted for frictionally engaging operative tapered sockets of devices while said motor shaft is in continuous operation, said means comprising a tapered supporting member, a rotatable screw longitudinally fixed with reference to said member, and an expansible member non-rotatably engaged on said supporting member and presenting a tapered outer surface, and screw-threadedly engaged with said screw.

4. An apparatus of the character described having in combination a body portion and a spindle projecting therefrom, means for engaging said body portion on a motor shaft with said spindle in axial alignment therewith, and frictional means presenting a tapered outer surface held against rotary displacement adapted for securing operative elements with tapered sockets to said spindle while said spindle is in continuous operation.

5. An apparatus of the character described having in combination a body portion and a spindle projecting therefrom, means for engaging said body portion on a motor shaft with said spindle in axial alignment therewith, means presenting a tapered outer surface held against rotary displacement adapted for securing operative elements with tapered sockets to said spindle while said spindle is in continuous operation, and means for adjusting said last-named means.

6. An apparatus of the character described having in combination a body portion and a spindle projecting therefrom, means for engaging said body portion on a motor shaft with said spindle in axial alignment therewith, frictional means presenting a tapered outer surface held against rotary displacement adapted for securing operative elements with tapered sockets to said spindle while said spindle is in continuous operation, and means for adjusting the degree of such frictional engagement.

7. An apparatus of the character described comprising a body portion having a central bore adapted to engage a motor shaft, means for locking the same to said motor shaft, and a spindle projecting from said body portion in axial alignment with said motor shaft and providing a tapered outer relatively non-rotatable surface adapted for engagement while said spindle is in continuous operation with operative devices having tapered sockets.

8. An apparatus of the character described comprising a body portion having a central bore adapted to engage a motor shaft, means for locking the same to said motor shaft, a spindle projecting from said body portion in axial alignment with said motor shaft and providing a tapered surface adapted for engagement while said spindle is in continuous operation with operative devices having tapered sockets, and means for adjusting the angular position of said tapered surface.

9. An apparatus of the character described comprising a body portion having a central bore adapted to engage a motor shaft, means for locking the same to said motor shaft, a spindle projecting from said body portion in axial alignment with said motor shaft and providing a tapered surface adapted for engagement while said spindle is in continuous operation with operative devices having tapered sockets, means for adjusting the angular position of said tapered surface, and a bar engaged in said body member and projecting therefrom parallel to said spindle to serve as a knock-off extension.

10. An apparatus of the character described having in combination a member providing an enlarged body portion adjacent one end and a tapered spindle at its opposite end, an enlarged

bore extending through the greater portion of said body portion to provide a socket for engagement over a motor spindle, a bore extending through said spindle and communicating with said enlarged bore in said body portion, an adjusting screw mounted in said last-mentioned bore with the head thereof projecting into the recess provided in said body portion, means for holding said adjusting screw against longitudinal displacement, a sleeve having internal and external tapered surfaces, and having a solid outer end wall and longitudinally slotted throughout the greater portion of its length in a direction toward said end wall to provide expansible members, the end wall of said sleeve being provided with a screw-threaded aperture for engagement with said adjusting screw, and means to prevent rotary displacement of said sleeve with reference to said spindle.

GARLAND S. VARCOE.
EDWIN A. PURDY.

CERTIFICATE OF CORRECTION.

Patent No. 1,930,669. October 17, 1933.

GARLAND S. VARCOE, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, lines 53 and 61, claims 1 and 2, respectively, strike out the word "operative" and insert the same after "of" in lines 54 and 62, of said claims; line 74, claim 3, strike out the word "operative" and insert the same after "of" in same line and claim; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 3rd day of April, A. D. 1934.

F. M. Hopkins

(Seal) Acting Commissioner of Patents.