

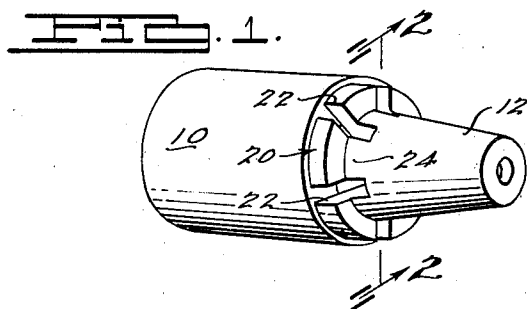
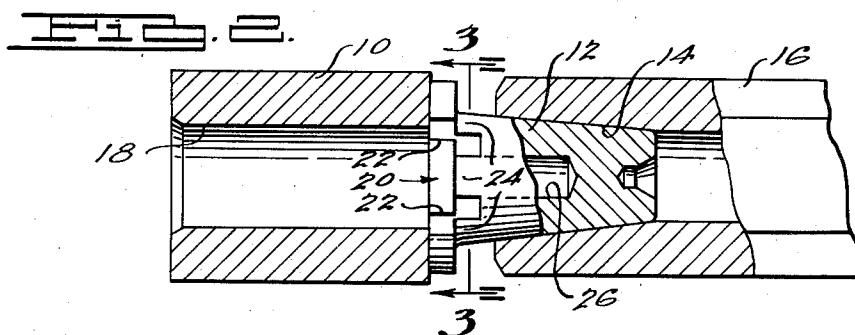
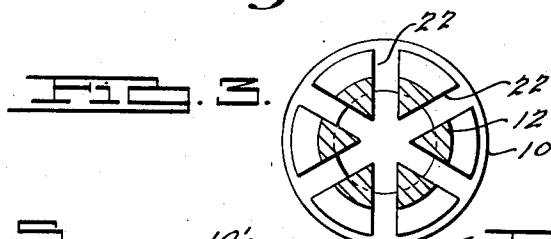
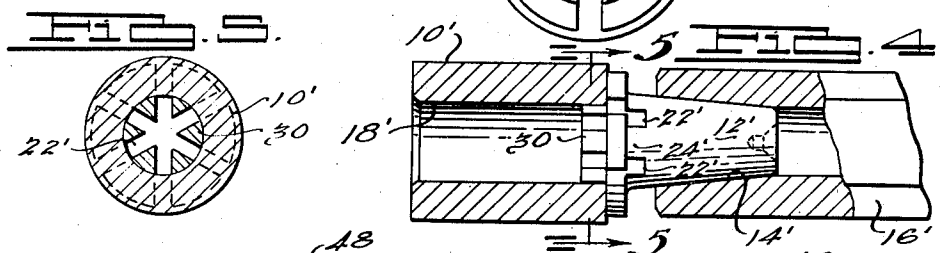
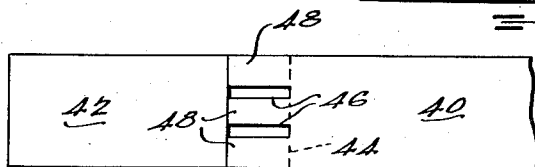
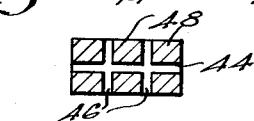
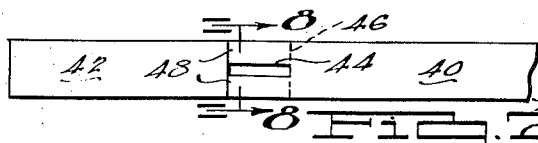
Oct. 10, 1944.

G. HOHWART

2,360,058

CONNECTION

Filed Oct. 6, 1943



INVENTOR.

George Hohwart.

BY

Harvest, Dickey & Pierce

ATTORNEYS.

UNITED STATES PATENT OFFICE

2,360,058

CONNECTION

George Hohwart, Orchard Lake, Mich., assignor to
N. A. Woodworth Company, Ferndale, Mich., a
corporation of Michigan

Application October 6, 1943, Serial No. 505,111

6 Claims. (Cl. 33—178)

This invention relates to connections and particularly to connections between a member formed from a cemented carbide material and a member made from some other metal, the principal object being the provision of a form of connection which will remain secure and because of which the cemented carbide part will not be distorted because of variations in size of the other part due to temperature changes or the like.

Objects of the invention include the provision of a member comprising a pair of parts one of which comprises a cemented carbide and the other of which comprises a common metal such as steel or the like brazed or soldered to the cemented carbide part, the second part being so constructed and arranged as to minimize the effects on the connection between it and the cemented carbide part due to variations in size of the second part caused by temperature changes; the provision of a construction as above described in which the connection between the two parts is through a plurality of relatively small and separated areas; the provision of a construction as above described in which the part to which the cemented carbide part is secured is formed to provide a plurality of yieldable finger portions through which it is connected to the cemented carbide part, the finger portions being of such character as to present a relatively small area for securement to the cemented carbide part; the provision of a construction as last above described in which the finger portions are of such size as to be readily yieldable to the extent required to compensate for changes in dimension between the two parts due to temperature changes thereof; and the provision of a device of the type described wherein a firm and permanent connection is provided between the cemented carbide part and a metallic part connected thereto and having a materially different co-efficient of expansion.

The above being among the objects of the present invention the same consists in certain novel features of construction and combinations of parts to be hereinafter described with reference to the accompanying drawing, and then claimed, having the above and other objects in view.

In the accompanying drawing which illustrates suitable embodiments of the present invention and in which like numerals refer to like parts throughout the several different views,

Fig. 1 is a perspective view of a cylindrical plug gaging element constructed in accordance with the present invention;

Fig. 2 is an enlarged partially broken, partially sectioned view taken axially through the plug

gaging element shown in Fig. 1 and illustrating the same in cooperative relationship with respect to a manipulating handle therefor, the latter being shown in fragmentary and partially sectioned view;

Fig. 3 is a transverse, sectional view taken on the line 3—3 of Figure 2;

Fig. 4 is a view similar to Fig. 2 but illustrating a modified form of construction;

Fig. 5 is a transverse, sectional view taken on the line 5—5 of Fig. 4;

Fig. 6 is a fragmentary plan view of a modified form of gage structure;

Fig. 7 is a side elevational view of the gage structure shown in Fig. 6; and,

Fig. 8 is a transverse sectional view taken on the line 8—8 of Fig. 7.

Cemented carbide, that is carbide of tungsten, tantalum, titanium, and certain other metals, either singly or in combination with each other, which are molded to form and sintered to form a solid mass, are commonly used as tips for cutting tools and the like because of their hard and wear resisting qualities. Attempts have also been made to employ such cemented carbides as the gaging surfaces of gaging members or elements. For instance, hollow cylinders of cemented carbides have been secured to steel or other supporting shanks and have been employed as plug gages. In such case the cylinders are usually made hollow in order to reduce the amount of cemented carbide used as this material is relatively expensive.

Heretofore attempts to use cemented carbides for plug gages and other gaging elements wherein they are required to be secured to a steel or other part in rigid fixed relation with respect thereto have been generally unsatisfactory. This has been for several reasons. Straight mechanical connections have not proven satisfactory for the reason that they have tended to distort the desired form of the cemented carbide parts. Most efforts have, therefore, been directed to the securement of the cemented carbide part in place by brazing, silver or other soldering, or the like, but heretofore this method has proven unsatisfactory.

I have found that there are two reasons why the brazing of cemented carbide gaging elements to steel or other metallic parts have been unsatisfactory in the past. The first reason is that because of the difference of co-efficient of expansion of the cemented carbide part and the other part, such other part in expanding or contracting due to temperature changes distorts the cemented carbide part out of its true form when

securely fixed thereto, and inasmuch as the acceptability of the gaging part is more dependent upon its accuracy in size than its ability to resist wear this has proven to be a major objection. The other reason is that due to the difference in co-efficient of expansion between the two parts the bond between the two parts seldom holds for any material length of time, with the result that the two parts become either wholly or partially disconnected, resulting in a looseness of connection between them which destroys the proper feel of the gage required for accurate gaging operations.

In accordance with the present invention I have discovered that if the area of connection between a cemented carbide part and another metallic part is made sufficiently small the difference in co-efficient between the cemented carbide part and such other part will be insufficient to break the bond between them when brazed, soldered or the like together. Ordinarily it will be appreciated that such small area of connection between two parts of the character described would be insufficient in practice so that in further carrying out the present invention I provide a plurality of such small areas of contact each separated from the other, with each area capable of readily shifting with respect to the remaining areas to the small extent required by the difference of co-efficient of expansion of the two different materials. This relative shifting of the small areas of connection is obtained by forming the steel or other connected part to provide a plurality of finger-like projections the free end of each of which is brazed, soldered, or otherwise secured to the cemented carbide part. The fingers or finger-like projections are of such dimension as to yield under the influence of the forces exerted due to the different co-efficients of expansion of the two parts without setting up any undue strains in the connection or sufficient stress in the cemented carbide part to distort it from its true form and size, and yet are of sufficient rigidity to satisfy the requirements in rigidity and strength of the connection between the two parts.

It will be appreciated that while the form of connection herein disclosed is particularly adaptable to gaging elements wherein the gaging surfaces are formed from cemented carbides because it so efficiently overcomes the disadvantages now found in gages of that construction, it may also be found to be valuable where cemented carbide parts are provided for other purposes and the invention is, therefore, not to be understood as restricted solely to gaging elements.

Referring now to the accompanying drawing and particularly to Figs. 1, 2, and 3, the gaging element there shown by way of illustration comprises a cylindrical plug gage which, except for the features of the present invention, is of conventional construction. In other words, the gaging element comprises a cylindrical portion 10 and a tapered supporting shank 12, the shank 12 being adapted to be received and be frictionally locked to the outwardly flared circular bore 14 provided in the end of a gaging handle such as 16 illustrated in Fig. 2.

In accordance with the present invention the cylindrical portion 10 is formed from a cemented carbide material in the conventional manner and in order to reduce the amount of material therein and thus render it less expensive it is provided with a central bore 18. In the present

case the shank 12 is provided at its larger end with a radially projecting flange or portion indicated generally at 20 arranged in concentric and abutting relationship with respect to one axial end of the cemented carbide cylinder 10.

In accordance with the present invention and in order normally to provide a plurality of small areas of contact between the shank member 12 and the cylinder 10 and simultaneously to provide flexible finger portions the flange portion 20 and the adjacent end of the tapered shank 12 are slotted. The number of slots and the manner in which the slots are provided will, of course, depend to some extent upon the size of the flange portion 20, its shape, etc. Where the gage is relatively small and the flange portion 20 therefore of relatively small diameter in the type of construction illustrated in Figs. 1 to 3, inclusive, a single diametrical slot therethrough may be sufficient, while in a larger size a materially larger number of slots will be required.

In the particular case shown it is assumed that the size of the flange member 20 is such as to require it to be slotted to provide six different finger-like portions and consequently it is provided with six radial equally angularly spaced slots 22 therein which cut completely through the thickness of the flange portion 20 and into the tapered shank portion 12 for a sufficient distance to provide a corresponding number, namely six, finger-like portions 24 serving to connect the solid portion of the shank 12 with the cylinder 10. Preferably a central bore 26 is provided in the slotted end of the shank member to facilitate the slotting thereof and serves to further space the radially inner edges of the fingers 24. The flange portion 20 is arranged in abutting relation with respect to the end surface of the cylinder 10 and the various finger-like portions 24 are secured by brazing, soldering, or the like to the end face of the cylinder 10. The slots 22 are particularly helpful in providing a sound brazed connection between the finger-like portions 24 and the cylinder 10 inasmuch as they expose corners formed at the junction between the two parts at which the brazing or soldering metal may be deposited and where the character of the connection may be more or less visually inspected.

It will be appreciated that with the form of construction shown and described the area between the end of each finger-like portion 24 and the end of the cylinder 10 is relatively small and preferably so small that the difference in co-efficient of expansion of the material from which the shank 12 is formed and the cemented carbide from which the cylinder 10 is formed that any stresses developed because of changes in size of the two parts during variations in temperature of the gaging element will have little or no effect on the security of the connection. Furthermore, it will be appreciated that the finger portions 24 being of relatively small cross-sectional area will be more or less readily yieldable in a lateral direction under the small changes in dimensions caused by ordinary temperature changes of the gaging element so as to prevent such stresses being set up in the cylinder 10 as to cause it to be deformed out of its desired true condition. It, therefore, provides an extremely efficient and ideal form of connection between the two parts of the character desired.

The construction illustrated in Figs. 4 and 5 is

identical to that shown in the preceding views except for a relatively minor variation in the construction of the shank member. Accordingly, all of the parts illustrated in Figs. 4 and 5 are indicated by the same numerals as in Figs. 1 to 3, inclusive, except that such numerals bear a prime mark, and the differences only in the two structures will be explained, thereby making the entire structure understood. The only difference in the two structures is that the shank member 12' in Figs. 4 and 5 is provided with a short pilot extension 30 of such diameter as to be relatively closely received in the bore 18' of the gaging cylinder 10', the slots 22' being continued through the pilot portion 30 so as to retain the same flexibility of the finger portions 24' as in the first described construction. The primary object of providing the pilot portion 30' is to aid in centering the shank 12' on the cylinder 10' during the brazing operation and its provision is simply a matter of choice. Otherwise the constructions are identical.

It is not to be understood that the present invention is limited solely to its application to cylindrical or the like gages as it is equally applicable to gages of any cross-sectional shape or conformation. For instance, it is applicable to those types of gages employed for gaging the thickness of slots or the like and in which case the gage of the general character illustrated in Figs. 6 and 7 may be employed.

In the construction illustrated in Figs. 6, 7, and 8 the gage comprises a rectangular handle portion 40 and a rectangularly sectioned gaging portion 42, the handle portion 40 and the gaging portion 42 being shown as of the same cross-sectional size and shape although this feature is immaterial. In the present case it is assumed that the gaging portion 42 is formed from a cemented carbide material of the character described for the cylinder 10 of the first described construction and the handle portion 40 may be formed of any suitable metal but preferably from steel. The faces of the portions 40 and 42 at the point of junction between them are flat and perpendicular to the longitudinal axis of the gage and are simply arranged in abutting relationship with respect to each other. The end of the handle portion 40 which is joined to the gage portion 42 is longitudinally slotted so as to provide the same type of reduced areas of junction between the handle portion 40 and the gage portion 42 as well as to provide the same type of flexible finger portions as in the first described constructions. While, as in the case first described, the number of slots thus provided will be dependent upon the relative sizes of the portions 40 and 42, in the particular case shown it is assumed that a single slot 44 is projected through the connected end of the portion 40 parallel to the plane of its thickness and midway between the corresponding faces. The portion 40 being wider than it is thick, a pair of transverse slots 46 are projected through the connected end of the portion 40 in perpendicular relationship with respect to the slots 44, the slots 46 being so spaced from one another as to provide three fingers 48, in plan view as illustrated in Fig. 6, of equal width, the first slot 44 acting to form a similar number of fingers on the opposite side of the gage.

In the construction illustrated in Figs. 6, 7, and 8 the free ends of the fingers 48 are, of course, brazed, soldered, or otherwise secured to the cemented carbide portion 42, the areas of the ends of the fingers 48 so secured to the portion 42

being sufficiently small that the difference in coefficient of expansion between the fingers 48 and the cemented carbide portion 42 during changes of temperature therefor will not be sufficient to break the bond between them, and the fingers 48 are of sufficient flexibility that they will give under the slight movement occasioned by the variations in size due to changes in temperature of the two portions 40 and 42 to prevent any material stress being placed on the portion 42 because of this fact.

Having thus described my invention, what I claim by Letters Patent is:

1. A gage or the like comprising a portion 15 formed of a cemented carbide and a second portion formed of a metal having a co-efficient of expansion different therefrom, and a plurality of portions on said second portion yieldable with respect to each other and providing spaced areas 20 of limited extent arranged in abutting relationship to said first portion and fixed thereto, said areas forming the sole connection between said first and second portions.

2. In a gage device, in combination, a gaging 25 part formed of a cemented carbide and a supporting part formed of a metal having a co-efficient of expansion different therefrom, a plurality of portions relatively yieldable with respect to each other on said second part arranged in generally spaced relation with respect to each other, each 30 of said relatively yieldable portions providing a surface of limited area arranged in substantially abutting relationship with respect to said gaging part and fixed thereto, said areas forming substantially the sole connection between said parts.

3. A gaging device comprising a gaging part 35 formed from cemented carbide and a supporting part formed from a metal having a co-efficient of expansion different therefrom, a plurality of generally parallel fingers fixed with respect to said second part and arranged in generally spaced relation with respect to each other, said fingers providing areas of limited and separated contact between themselves and said gaging part and being 45 rigidly fixed to said gaging part.

4. A gage device comprising a gaging part 40 formed from a cemented carbide and a supporting part, a plurality of generally spaced fingers integral with said supporting part arranged in generally parallel relationship with respect to each other and to the longitudinal axis of said supporting part, the free ends of said fingers providing limited areas of contact between them and said gaging part and being rigidly fixed to said 55 gaging part.

5. A gage device comprising a gaging portion 60 formed from a cemented carbide and a supporting portion formed from steel, one end of said supporting portion being slotted in generally parallel relationship with respect to the axis thereof to provide a plurality of laterally separated finger portions, the free end portions of said finger portions abutting and being rigidly fixed to said gaging portion.

6. A plug gage comprising a cylindrical portion 65 formed from cemented carbide and a shank portion formed from steel, said supporting portion including a frusto-conical shank portion and a head portion, said head portion being slotted whereby to provide a plurality of substantially parallel laterally spaced fingers, said fingers abutting one end of said gage portion and being brazed thereto.

GEORGE HOHWART.