Jan. 1, 1952 C. H. ARNOLD 2,581,226

WORK REST BLADE

Filed Jan. 9, 1948

Fig. 1.

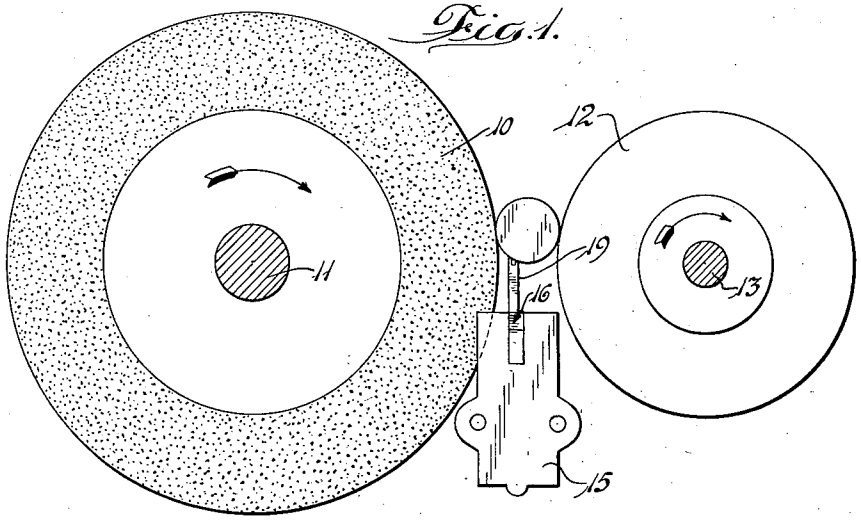


Fig. 2.

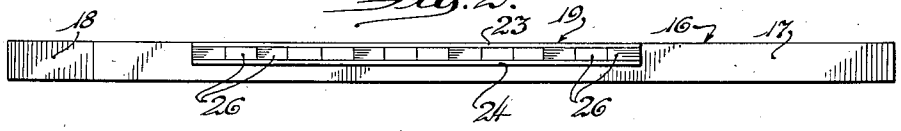
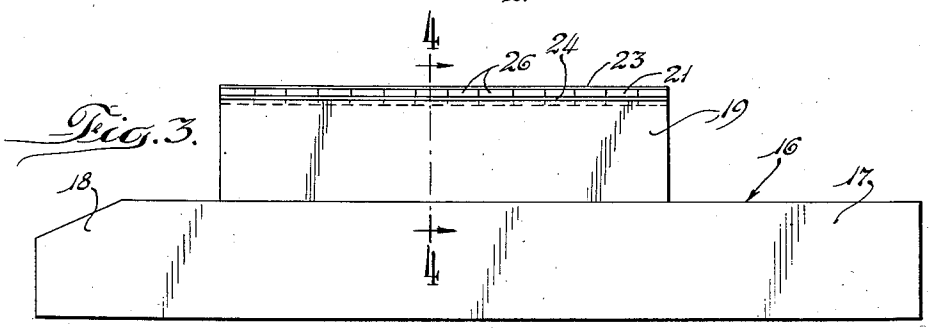


Fig. 3.



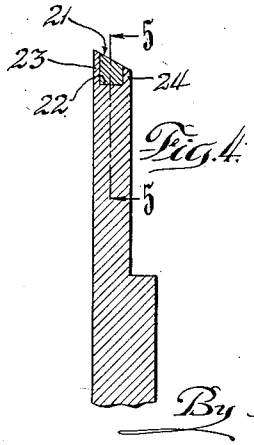


Fig. 4.

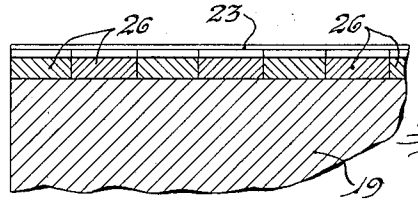


Fig. 5.

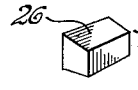


Fig. 6.

INVENTOR:

Clifford H. Arnold

By Hinkle, Norton, Ahlberg, Hausmann & Wappler

Attorneys.

Patented Jan. 1, 1952

2,581,226

UNITED STATES PATENT OFFICE

2,581,226

WORK REST BLADE

Clifford H. Arnold, Chicago, Ill.

Application January 9, 1948, Serial No. 1,452

3 Claims. (Cl. 51—238)

1

This invention relates to a work rest blade for centerless grinders. The invention in particular provides a simple work rest blade which will have a long useful life in centerless grinders, and which will be free from the objections present in work rest blades of the prior art.

As is well known, centerless grinding is effected by feeding the work between a grinding wheel rotating at high speed and a regulating wheel. The work itself is fed along a line parallel to the axes of the grinding and regulating wheels. During the process of grinding, it frequently occurs that the wheels tend to grab the work, and causes the work to vibrate up and down against the work rest blade. This effect is particularly noticeable when the grinding is carried on too high above the center line of the wheels. If the height of the work above center is decreased too much, there will be a tendency for the grinding to be inaccurate and produce high spots. Thus, it is evident that for great accuracy it is desirable to grind under conditions where chattering of the work against the work rest blade may occur.

The chattering of the work against the work rest blade has frequently resulted in damage to the blade. The work itself generally has a hard surface. Whether or not the work has a hard surface, the work rest surface must resist considerable wear and tear. Thus, hard abrasive dust is present on the work rest surface. The work itself generally rotates at a high speed with reference to the work rest surface so that considerable wear between the work and work rest surface may occur. In addition, a portion of heat energy generated during grinding is transmitted to the work rest surface.

As a result of the above conditions, the work rest surface, whether it be in the form of a blade or any other means, generally operates under adverse conditions and wears quite rapidly. Thus, the general practice is to provide an active work rest surface of such materials as cast steel, tool steel, "Stellite," cemented tungsten carbide, or other materials, depending upon the nature of the grinding operation. Where the work has a hard surface, it has been the practice to use cemented carbide for a work rest surface. This cemented carbide has generally been provided in the form of an upstanding ridge projecting above the surface of the work rest blade body. The various materials specified above for work rest surfaces have generally failed under impact when hit repeatedly by the work, with the result that the work rest blade has been fractured.

In these prior constructions, a strip of the

2

hard metal, such as tungsten carbide, was brazed or silver-soldered to the body of the blade. These blades unaccountably frequently developed minute or microscopic cracks in the hard metal. During the use of the blade, due to these cracks, chips were broken from the hard material, making the blade useless. If the voids left by the chips were not too large, the blade could sometimes be reground to provide a new working surface, but since in most instances the minute and microscopic cracks still remained, the regrinding of the blades frequently did not extend their useful life sufficiently to warrant the expense of regrinding.

I have discovered that the breakage of the hard metal strips providing the wearing surfaces of such prior work rest blades, resulted from the fact that in cooling, after the brazing or soldering operation, strains were set up within the hard metal, such as cemented tungsten carbide strip. The length of the hard metal providing the wearing surface, depending upon the character of the work and the type of centerless grinder with which the blade is to be used, is usually within the range of ten to thirty inches. The strains set up in the cemented tungsten carbide or similar hard metal used to provide the working surface of the blade, are therefore considerable, and either initially or after some use, microscopic cracks developed to relieve, or partially relieve, these internal strains.

By the work rest blade of my invention, this difficulty is overcome in a very simple and effective manner.

When a work rest blade is damaged, substantial expense is involved in the loss of a blade. In addition, it is necessary to stop the machine and change the work rest blade.

In accordance with my invention, there is provided a work rest blade whose surface hardness is equal to that of any work rest blade, but which is free from the objection of being fragile and wearing fast. The work rest blade embodying the present invention comprises a composite structure of relatively short blocks of one or more hard materials inserted in a groove in the steel body of the blade, and brazed or silver-soldered in place. These blocks of the hard material are of relatively short length, so short that internal strains resulting from heating and cooling during the brazing or silver-soldering process are insufficient to cause cracking or fracture of the blocks even though the block is subjected to the chattering blows of a work piece resting thereon.

A work rest blade embodying the present in-

vention has been found to have an unusually long and satisfactory life, and has been found to be far superior to any work rest blades of the prior art.

My invention in general provides a work rest blade whose active work supporting surface consists of a plurality of short pieces of such hard material as cemented tungsten carbide, with or without intermediate "Alnico," as an example. The "Alnico," as is well known, is an alloy whose principal use is in connection with the manufacture of permanent magnets. This material is very hard and has highly desirable properties for use in a work rest blade. As previously pointed out, cemented tungsten carbide has long been used in connection with the manufacture of high speed cutting tools and also as the active surface for work rest blades. The work rest blade itself may follow along conventional lines as far as overall dimensions and shape are concerned. In general, it is preferred to have a channel cut out of a conventional work rest blade of cast or cold rolled steel or the like, which channel is inlaid with short blocks of the hard material such as cemented carbide with or without intermediate short blocks of "Alnico," as one example. The blocks are silver-soldered or brazed to retain them in position. The entire work supporting surface is finished, as by grinding, to provide a smooth surface at the desired angle to the plane of the body.

While my invention is susceptible to various modifications one example is illustrated in the drawing.

Referring to the drawing:

Fig. 1 is a generally diagrammatic view of a centerless grinder with a work rest blade embodying the present invention;

Fig. 2 is a top plan view of a work rest blade embodying the present invention;

Fig. 3 is a side elevation of the work rest blade shown in Fig. 2;

Fig. 4 is a sectional detail on line 4—4 of Fig. 3;

Fig. 5 is a sectional detail on line 5—5 of Fig. 4; and

Fig. 6 is a perspective detail of one of the pieces of hard material which may be used in the work rest blade.

This application is a continuation in part of my prior application, now abandoned, Serial No. 654,458, filed March 11, 1946.

Referring to Fig. 1, a centerless grinder is shown consisting of grinding wheel 10 secured to a rotatable shaft 11. A regulating wheel 12 mounted on shaft 13 is provided in spaced relation to grinding wheel 10. The two wheels are spaced apart and between them is disposed work holder 15 of any well known construction. Rigidly clamped in work holder 15, by the usual means, is work rest blade 16.

Inasmuch as my invention is particularly concerned with work rest blade 16, the construction will be described in detail. Thus, work rest blade 16 consists of an elongated generally rectangular base portion 17 having front nose portion 18. Arising from a central portion of base portion 17 and integral therewith is work supporting portion 19. Portion 19 is generally not as wide as base 17 and, as shown, is laterally displaced toward the left side of base 17 when viewed from front nose portion 18. Thus, one side 20 of the entire work rest blade may be flat from base 17 up through to top portion 19.

Portion 19 has work supporting face 21 which is generally flat and tilted at some definite angle.

The amount of angle of face 21 will vary with the nature of the work and may be selected to suit desired operating conditions.

Portion 19 of the work rest blade, together with base 17, may be formed of any suitable material, such as steel, and has a rectangular channel 22 cut out therefrom along the length thereof. Thus, thin side wall portions 23 and 24 are left. Disposed in channel 22 are blocks 26 of a hard material, such as cemented carbide, as one example.

As previously indicated, these blocks are of relatively short length, in the order of one-quarter inch to one inch, so that internal strains introduced therein by heating and cooling during the brazing or silver-soldering process are relatively small and insufficient to cause the development of small cracks and incipient fractures, even though the blade is subjected to the relatively severe pounding as may occur when a hard work piece commences chattering as it passes between the grinding and regulating wheels.

While the blocks are set adjacent to one another in the channel 22 formed in the upper edge of the top portion 19 of the blade, a thin film of the brazing alloy or silver solder will flow into the minute spaces between adjacent blocks, and form a rigid bond between the blocks as well as between the bottom and side walls of the channel 22.

In a modified form of the invention, alternate blocks 26 may be made of different materials, such as alternate blocks of cemented tungsten carbide and "Alnico." In the latter event, depending upon the particular grinding operation which is to be performed, the blocks of "Alnico" may be either of the same length or shorter than the cemented tungsten carbide blocks. In such instances where the blade is to be used in grinding operations which do not require the highest resistance to wear, the blocks of cemented tungsten carbide may be separated by preferably shorter blocks of a material having less wear resistance than the cemented tungsten carbide, such as blocks of hard tool steels. If desired, more than two different materials may be used for the blocks 26, with at least about half of the wearing surface formed by blocks of cemented tungsten carbide, although using alternate blocks 26 of cemented tungsten carbide and "Alnico" has been found to provide equally satisfactory wearing qualities in the performance of most grinding operations.

Inasmuch as the blocks are securely anchored in the channel 22, as by brazing or silver-soldering, it is necessary that the materials used for the blocks 26 be capable of withstanding the temperatures of brazing or silver-soldering without loss of temper.

The dimensions of the blocks may vary and one may be different in length from the other. However, blocks one-half inch in length, i.e., the dimensions along the length of the entire work holder, have been successively used. In this particular example, the width of the work holding portion was one-quarter inch as measured transversely across portion 19. The actual width of walls 23 and 24 were of the order of one sixty-fourth inch. The length of work supporting surface 21 in this particular instance was seven inches.

It is understood that the above dimensions are merely exemplary and may be varied within wide limits. The above dimensions are those of one style of work holder in common use. The inven-

tion itself is not restricted to the dimensions given, except that the blocks of cemented tungsten carbide shall be sufficiently short that the internal strains therein, due to the heating and cooling to which the blade is subjected, will not be great enough to cause the development of cracks and fractures, even though the blade is subjected to severe conditions of use.

By virtues of the invention, a structure embodying the same may be made to provide as long and as wide a work rest surface as may be required by the grinding operation to be performed. Furthermore, the blocks of hard material, or materials, upon which the work is supported, are themselves supported on the sides and the bottom in the main body of the work rest blade, and thus are mechanically strengthened and backed up to withstand shock. By virtue of this construction, the hard work supporting surface need only withstand the abrasive action of the work as well as the sharp blows upon the work supporting surface resulting from chattering.

In addition to a work rest blade for simple grinding, my invention may be embodied in guide blades upon which long pieces of work may rest at opposite ends of the normal work rest blade disposed between the grinding and regulating wheels.

In addition, hard wear resistant surfaces consisting of inlaid blocks of cemented carbide, with or without alternate blocks of "Alnico" silver-soldered or brazed in a support, may be used as guideways in machines having wear. Thus, the guides in various types of lathes, drill presses, screw machines, and other mechanical devices, may be constructed in a form embodying the invention. Other and various applications will occur to those skilled in the art.

As is well known, a large number of variations of the basic alloy of aluminum, nickel, and iron, are known for use in connection with permanent magnets. Thus, in addition to the metals previously specified, quantities of cobalt, copper, titanium, and other metals and materials, have been added to impart varying characteristics. It is therefore to be understood that all of the permanent magnet alloys in the "Alnico" group are considered to be embraced by the term "Alnico."

While I have shown and described preferred embodiments of my invention, it will be apparent that numerous variations and modifications thereof may be made without departing from the underlying principles of the invention. I therefore desire, by the following claims, to include within the scope of the invention all such variations and modifications by which substantially the results of my invention may be obtained through the use of substantially the same or equivalent means.

I claim:

1. A hard wear and shock resisting work support for use in metal working machinery comprising, a metal base with a face having substantial length along which wear normally occurs, said base having a channel longitudinally thereof in the face exposed to wear, alternate inlays of cemented tungsten carbide and a hard metal filling and firmly anchored in said channel by films of a brazing alloy, said inlays having their outer surfaces finished smooth to provide a wear resisting surface.

2. A work rest blade for centerless grinders comprising a metal work support blade having a work rest surface, said blade having inlaid alternate blocks of cemented tungsten carbide and a hard metal extending along the length of the work rest surface and a brazing alloy film between the blocks and the adjacent surfaces of the support blade and between adjacent blocks for rigidly maintaining said blocks in said blade, said blocks having the work rest surface finished.

3. A wear and shock resistant work rest for use in a centerless grinder comprising, a tough metal blade having an edge in the plane of the work rest surface, there being a groove of polygonal cross section extending along said edge; a plurality of blocks inlaid side by side in the groove, of cross section conforming to that of the groove, and of length much less than that of the groove, alternate blocks being made of cemented carbide and a hard metal alloy of the type used for permanent magnets and having as its principal constituents, iron, aluminum, nickel, and cobalt; and a brazing alloy bonding the blocks to each other and to the walls of the groove in the blade.

CLIFFORD H. ARNOLD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,691,061	Heim	Nov. 13, 1928
1,741,236	Heim	Dec. 31, 1929
1,860,275	Chapin	May 24, 1932
1,908,887	Breeler et al.	May 16, 1933
2,016,478	Becker	Oct. 8, 1935
2,087,874	Indge	July 20, 1937
2,474,138	Zimmerman	June 21, 1949