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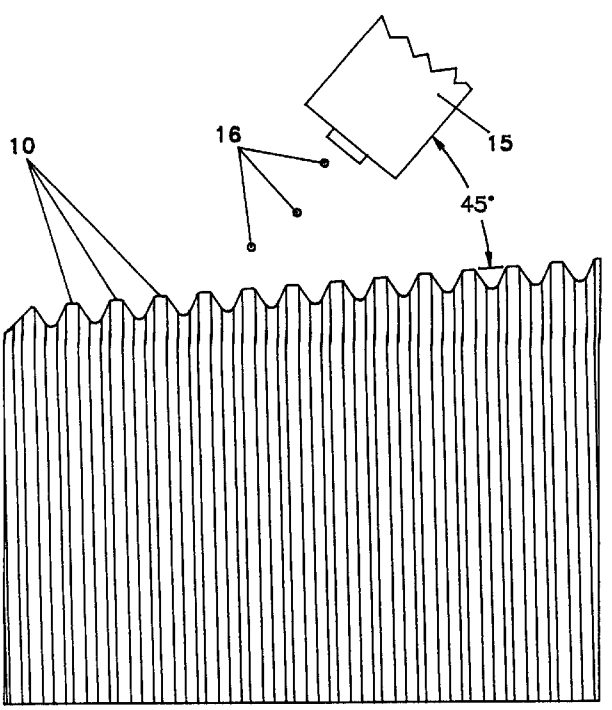
(54) Titre : METHODE POUR RENFORCER ET REPARER DES FILETS ABIMES
(54) Title: METHOD OF STRENGTHENING AND REPAIRING DAMAGED THREADS



(57) Abrégé/Abstract:
A method of strengthening and repairing damaged threads. Firstly, remove metal buildup from the damaged threads. Secondly, peen the damaged threads using glass beads. The glass beads are not less than .02 of an inch and not more than .03 of an inch in diameter. They are projected substantially at right angles to the damaged threads at pressures of not less than 80 and not more than 110 pounds per square inch. This method is particularly suited for repairing threads that still gauge properly.

"METHOD FOR STRENGTHENING AND REPAIRING DAMAGED THREADS"

The present invention relates to a method for repairing the damaged threads of oilfield tubular pipe.

BACKGROUND OF THE INVENTION

A metal on metal connection of mating oilfield tubular threads, such as drill pipe threads, can be subject to galling and impact damage. When this occurs, metal damage or protrusions, such as burrs and the like, can make the threads unusable. According to conventional practice, the joints of pipe are then returned to a machine shop to have their damaged threads repaired by remachining.

Repair by remachining has a number of drawbacks. Firstly, it is an expensive and time-consuming procedure. Secondly, remachining can only be performed a limited number of times; for each time remachining occurs, material is removed.

When the damage to the threads is not too severe, the damaged threads still gauge properly. In such cases it is a waste of resources to subject the threads to remachining.

SUMMARY OF THE INVENTION

What is required is an alternate method of repairing the damaged threads of an oilfield tubular pipe , when the damaged threads still gauge properly.

According to the present invention, there is provided a method for repairing threads, such as drill pipe threads, which have been damaged by galling and impact. The method comprises: removing metal damage from the threads, for example by applying an abrasive rotating wheel, to produce 'cleaned' threads; and then peening the cleaned threads using glass bead shot.

Preferably, peening is accomplished using glass bead shot (referred to hereinafter as 'glass beads') having a diameter in the range .02 to .03 inches, the shot being propelled at the thread surface to be peened at an angle in the range 45 to 110 degrees, more preferably at an angle of about 90 degrees, and at a pressure in the range 80 to 110 pounds per square inch.

It is known that peening with metal shot will improve the fatigue strength of materials. This is taught in United States Patent 3,073,022. It is also known that peening with metal shot has the effect of mending microcracks; this is taught in United States Patent 5,205,145. These teachings have not, to applicant's knowledge, been commercially applied to repair damaged threads, particularly oilfield tubular pipe threads, as most forms of metal shot used in peening are harmful to the threads. In other applications, any type of shot within the size range described and propelled within the pressure ranges described could accomplish a beneficial result. The problem is that as metal shot is reused it becomes deformed and undersize. If shot is undersize, then pressures within the beneficial pressure range can propel the shot at speeds sufficient to cause damage.

In accordance with the present invention, glass beads are used as the type of shot. Glass beads tend to disintegrate upon impact before damage to the threads occurs. The glass beads travelling at a high rate of speed disintegrate upon impact and turn to dust without harming the threads. As previously stated, applicant has determined glass bead shot peening conditions which are preferred for repairing metal oilfield pipe threads. If the glass beads used are smaller than the size range described or are propelled at pressures less than the range described, they may not repair the microcracks in the damaged areas of the threads. If the glass beads are larger than the size range described or are propelled at pressures exceeding the range described, they may further damage the damaged threads.

Using the method, as described above, the threads are repaired. The glass beads compress the surface of the threads with a plurality of substantially uniform microscopic indentations. This indenting enables the threads to retain lubricant and makes it less likely that galling will occur in future.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features of the invention will become more apparent from the following description in which reference is made to the appended drawings, wherein:

Figure 1 is a side elevation view of part of a threaded pin end of an oilfield tubular pipe, said pin end having damaged threads undergoing metal damage removal by abrasion;

Figure 2 is a side elevation view showing the pin end of Figure 1 after the threads have been 'cleaned' by removal of the metal damage, said threads now undergoing peening with glass shot propelled from a nozzle;

Figure 3 is a side elevation view , similar to Figure 2, showing the nozzle positioned at a different angle; and

Figure 4 is a side elevation view showing the threads of the threaded pin end of an oilfield tubular pipe, repaired in accordance with the teachings of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The preferred method of repairing damaged threads will now be described with reference to Figures 1 through 4.

Referring to Figure 1, there is illustrated the damaged threads 10 of an oilfield tubular pipe, which have some metal build-up or damage 12 and yet are still in gauge. The first step of the method is to remove the metal damage 12 from the damaged threads 10. In Figure 1, it is illustrated that this step is performed using an abrasive rotating wire wheel 14, but this can be done using a file (not shown) or other instrument suited for the purpose. Otherwise stated, the damage 12 is removed by abrasion to produce 'cleaned' threads. Care is taken to limit the removal of metal so that the threads remain in gauge. The excessive removal of metal can affect the gauging of threads 10.

Referring to Figure 2, the second step of the method involves peening the cleaned threads 10 using glass beads 16 (commonly referred to as 'glass bead shot'). In the peening process, glass beads 16 are propelled by air out of nozzle 15. The

preferred operative angle can be between 45 and 110 degrees. Referring to Figure 3, it is more preferred that the angle used be approximately 90 degrees, relative to the surface to be peened. It is preferred that the glass beads 16 have a diameter in the range .02 to .03 inches. The air pressures used to propel the glass beads 16 should be in the range 80 to 110 pounds per square inch.

Referring to Figure 3, when glass beads 16 within the size range described are propelled within the pressure range described at cleaned threads 10, the beads tend to disintegrate upon impact and turn into smaller particles 18 or dust without harming threads 10. If the glass beads used are smaller than the size range described or are propelled at pressures less than the range described, they may not repair the microcracks in the damaged areas of the threads. If the glass beads are larger than the size range described or are propelled at pressures exceeding the range described, they may further damage the damaged threads. Using the method, as described above, the threads are repaired. The surface area of the repaired threads is compressed and is marked by a plurality of substantially uniform microscopic indentations. This indentation enables the threads to thereafter retain lubricant and makes it less likely that galling will occur in future.

It will be apparent to one skilled in the art that modifications may be made to the illustrated embodiment without departing from the spirit and scope of the invention as defined by the claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE AS FOLLOWS:

1. A method for repairing damaged threads of an oilfield tubular pipe end, said threads having metal damage, comprising:

removing the metal damage from the threads by abrasion to produce cleaned threads; and

then peening the cleaned threads using glass bead shot having a diameter in the range of .02 to .03 inches and propelled at the thread surface to be peened at an angle in the range 45 to 110 degrees at a pressure in the range 80 to 110 pounds per square inch.

2. The method of claim 1 wherein the metal damage comprises protrusions.

3. The method of claim 1 or 2 wherein the metal damage has arisen from galling and impact.

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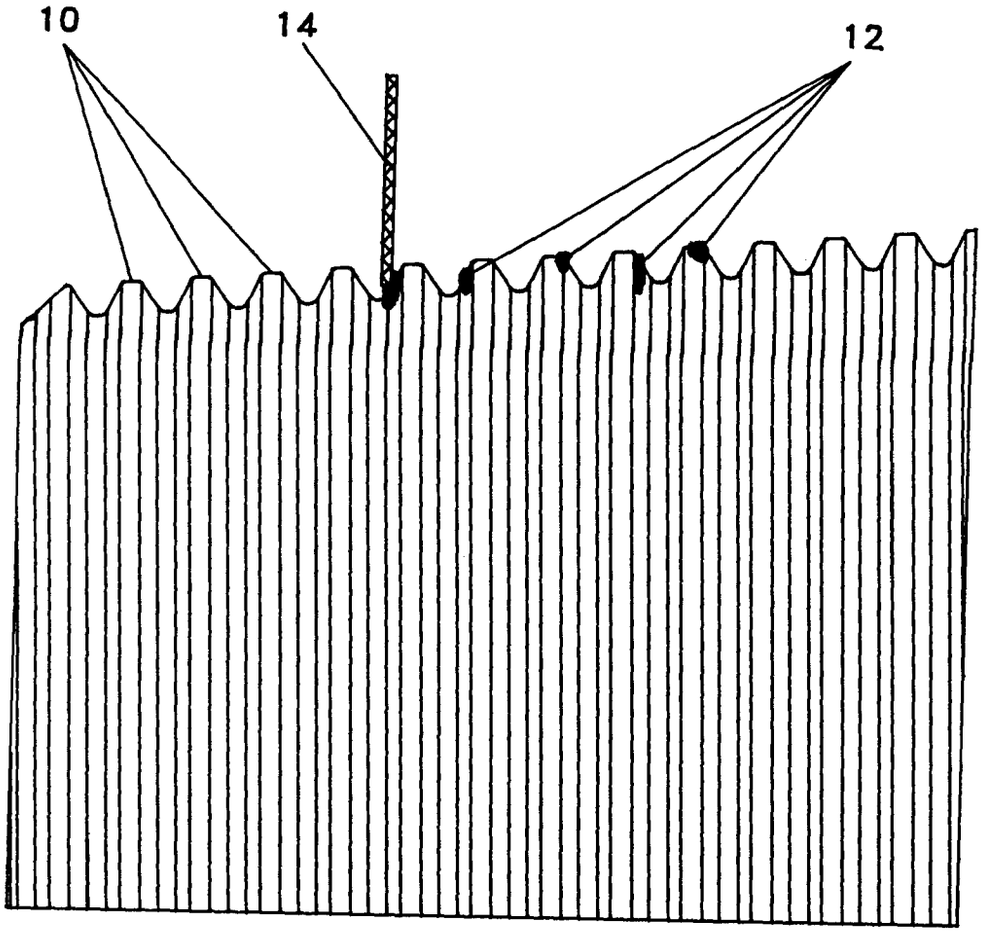

Figure 1

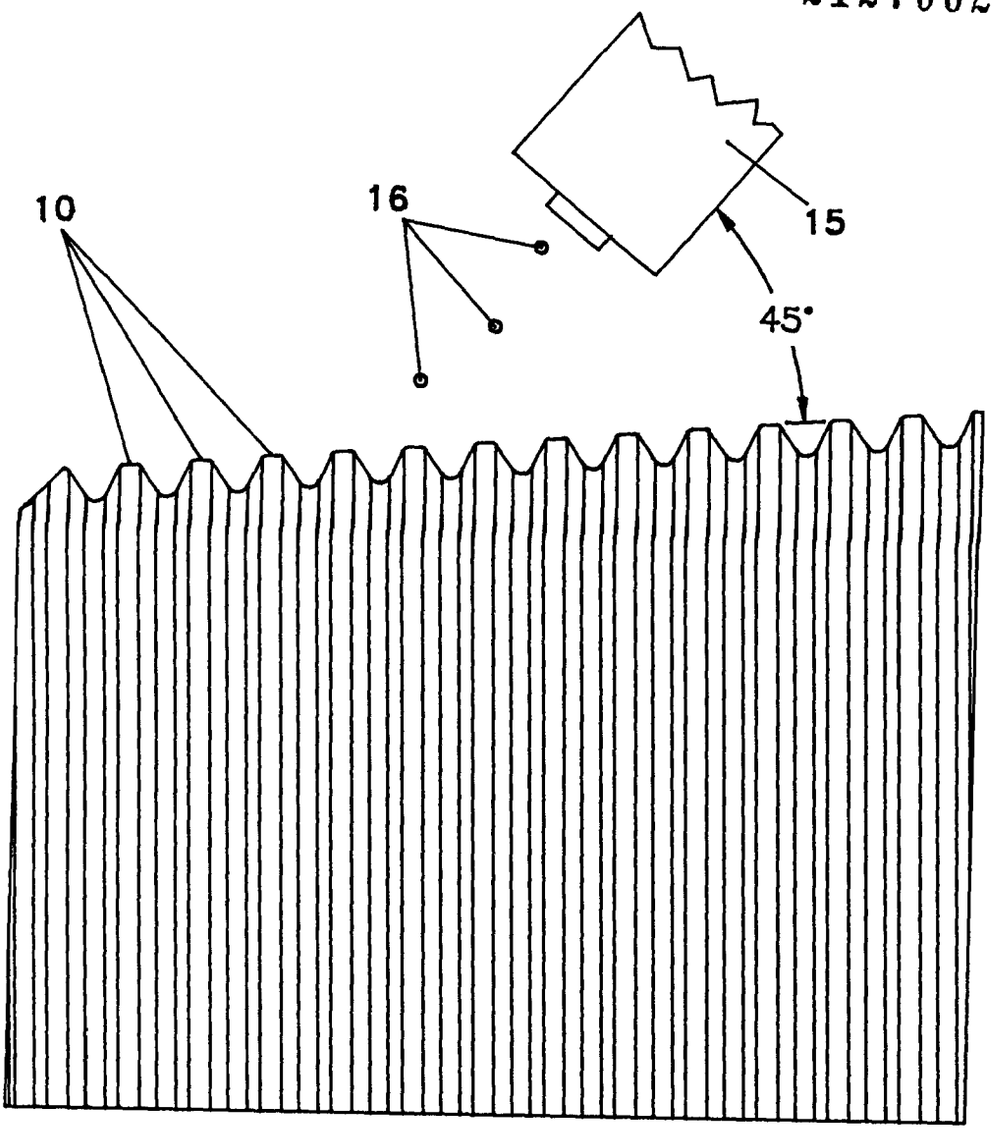

Figure 2

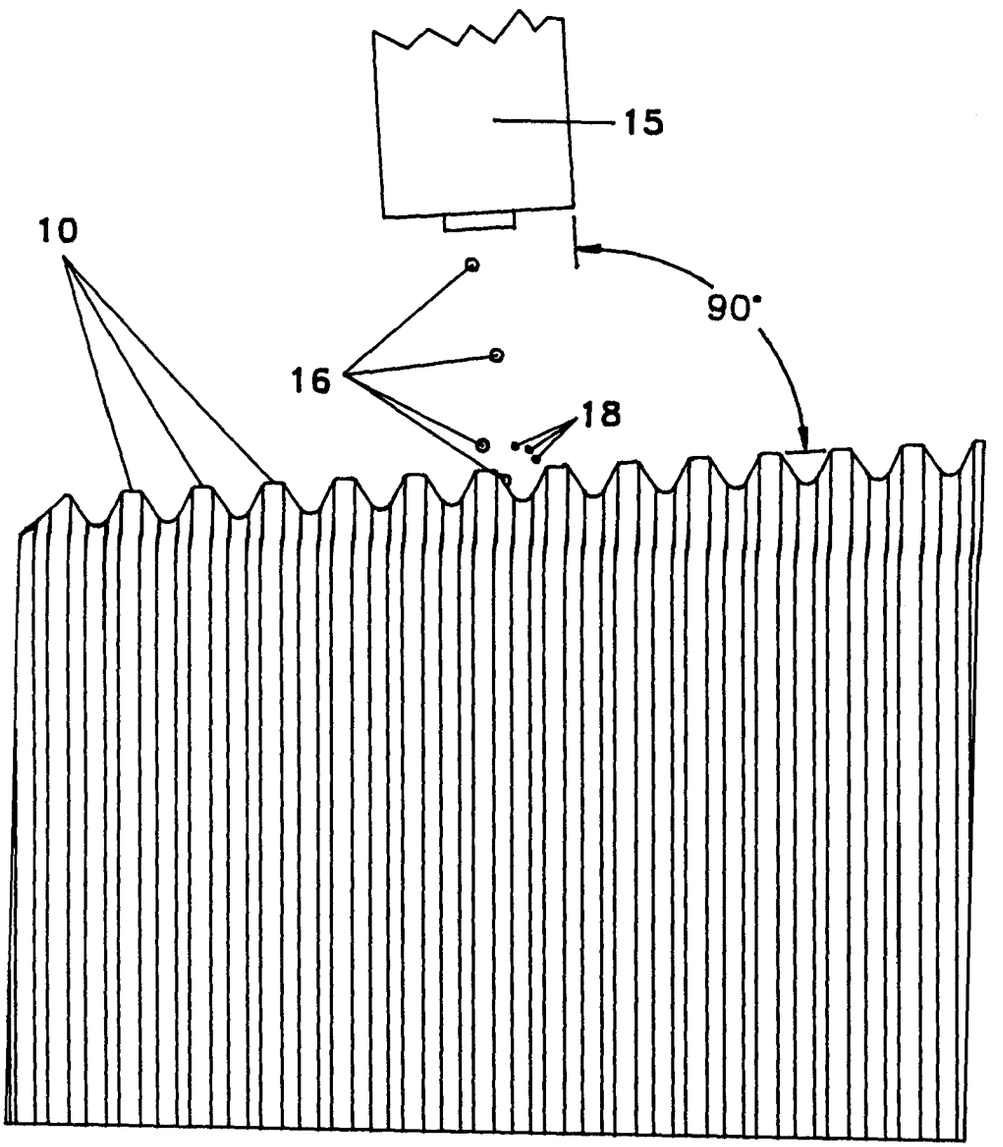

Figure 3

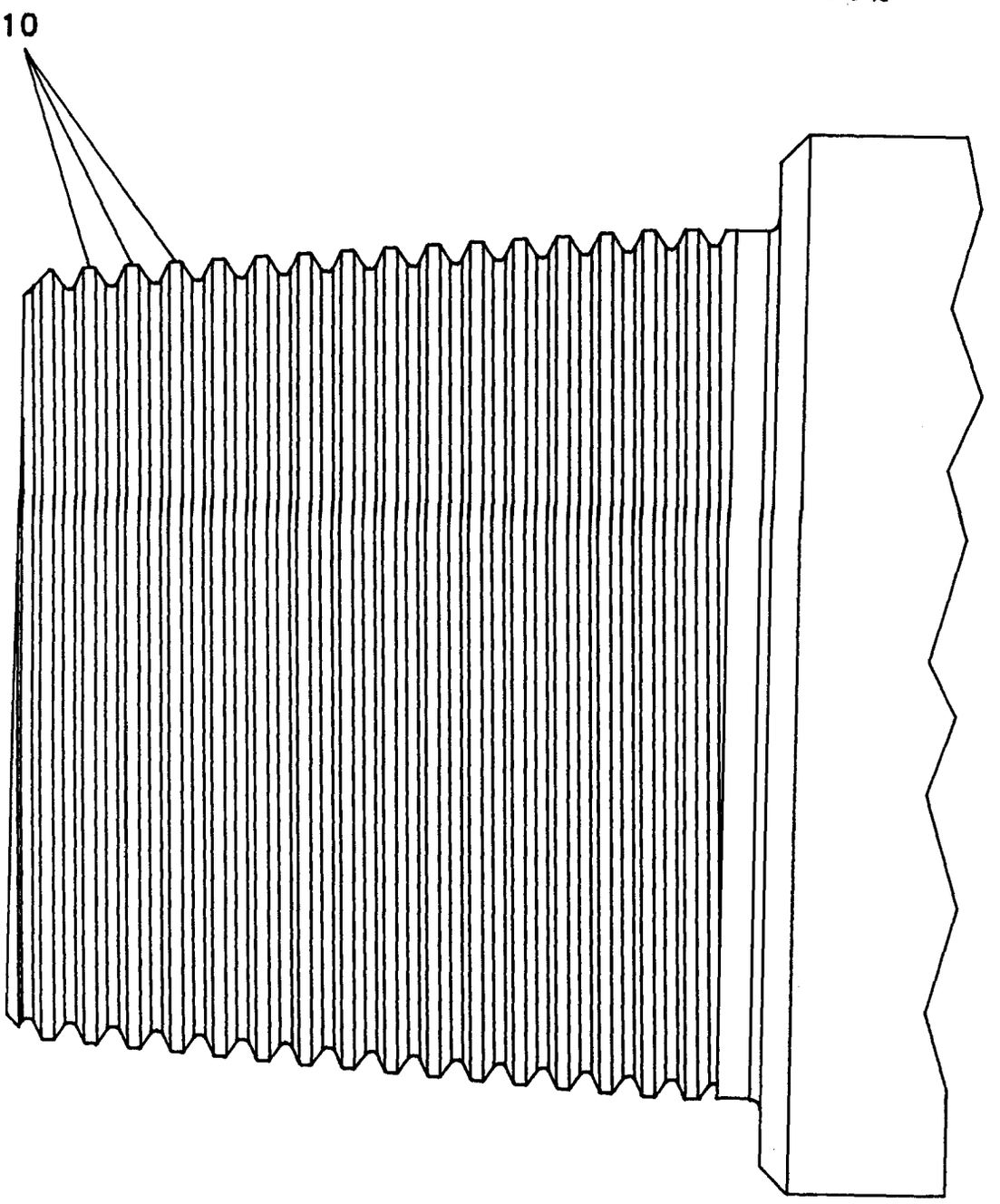

Figure 4