July 4, 1939. F. L. GREEN 2,164,741

DEVICE FOR THE REMOVAL OF BURS FROM METAL SURFACES

Filed June 11, 1937

Fig. 1.

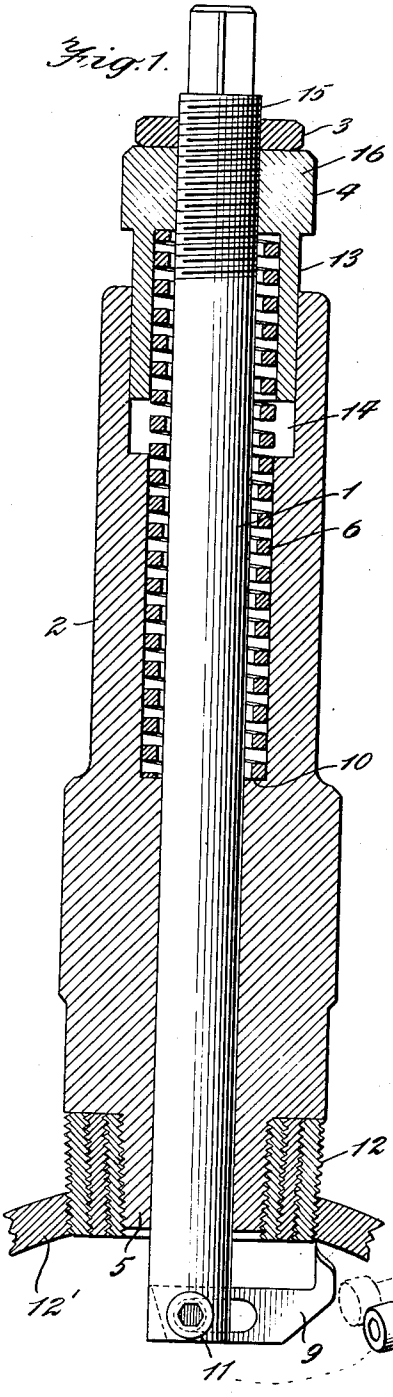


Fig. 3.

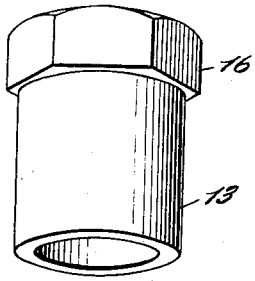


Fig. 4.

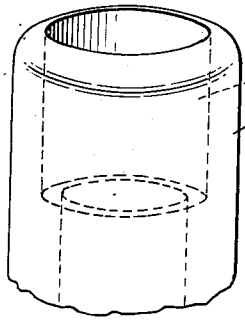


Fig. 5.

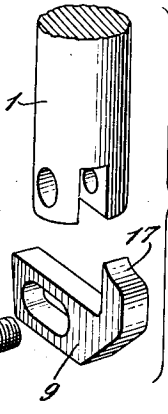
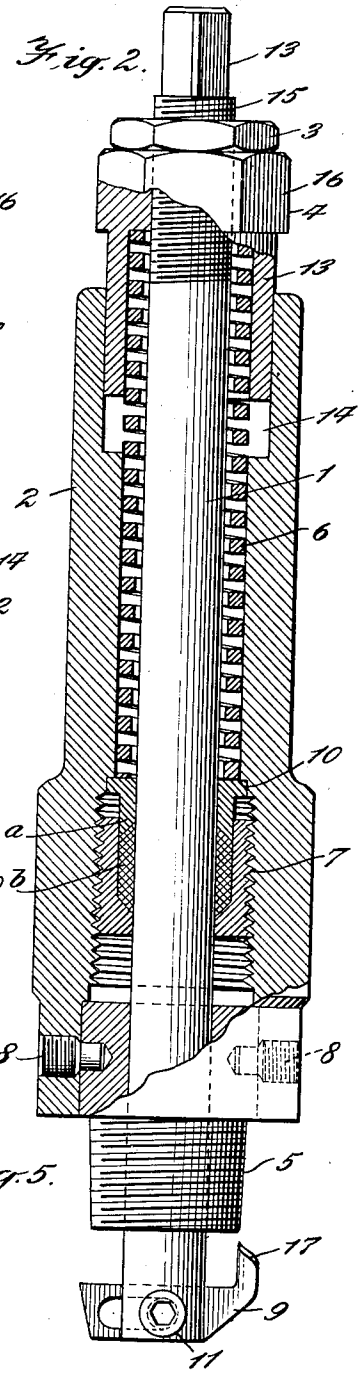


Fig. 2.



INVENTOR.
Frederick L. Green

BY

Louis Burgess
ATTORNEY.

Patented July 4, 1939 2,164,741

UNITED STATES PATENT OFFICE

2,164,741

DEVICE FOR THE REMOVAL OF BURS FROM METAL SURFACES

Frederick L. Green, Irvington, N. Y.

Application June 11, 1937, Serial No. 147,613

13 Claims. (Cl. 77—69)

In the drilling or punching of holes through metal, a bur is formed on the under-side of the metal and it is not only desirable but in many cases even necessary to remove such bur as it often seriously interferes with the purpose for which the hole is drilled or punched. Bur cutting devices are not new in the art but they are attended by a series of disadvantages and drawbacks which render their use in many instances highly unsatisfactory. The most serious drawback of the hitherto known bur cutting devices is that their successful operation is confined to substantially plane surfaces. They have proven practically useless when confronted with the problem of removing burs from curved surfaces as they are for instance formed in the drilling or punching of holes in pipes, tubings, curved sheet metal and such similar metal objects with a substantially curved or concave under-surface.

One object of my invention comprises inter alia a bur cutting or removing device which will satisfactorily and uniformly operate not only on a bur formed on a substantially plain surface but also on a bur formed on a curved or concave surface.

Another object of my invention comprises a bur cutting device in which a cutting tool while being actuated is at all times automatically held in effective cutting position regardless of whether the bur formation is substantially uneven or not and regardless of the shape or form of the surface upon which the cutting tool has to operate for the removal of a bur formed thereon.

Further objects and advantages of my invention will be seen from the following description read in conjunction with the drawing in which:

Fig. 1 is a cross section through one embodiment of my invention,

Fig. 2 is a side view of an alternative form of the device in accordance with the invention with parts in cross section,

Fig. 3 is a perspective view of a fitting showing tubular guide extension,

Fig. 4 is a perspective view of the upper part of the device with the tubular fitting and shank removed and

Fig. 5 is an exploded perspective view of the lower end of the shank and attached cutter.

As illustrated in the drawing a shank 1 carrying at its lower extremity a cutting tool 9 is rotatably mounted in a housing 2. A fitting 4 comprising a head piece 16 and a guide extension 13 is adjustably secured to and preferably threaded onto the upper portion 15 of shank 1. Guide extension 13 is slidably arranged in the groove or pocket 14 situated in the upper part of housing 2. Fitting 4 may be locked in position by suitable means such as lock nut 3. A spring 6 situated in its lower portion between the housing 2 and shank 1 and its upper portion between the guide extension 13 and shank 1 and resting on a support or base 10 bears against fitting 4. Housing 2 carries the exteriorly threaded end 5 through which shank 1 extends and which may be threaded directly into a drilled or punched hole. Adapters 12 are provided so that the tool can be threaded into a hole of any size as for example the hole defined by the section of pipe 12'.

Inasmuch as the guide extensions of the fitting means serve primarily the purpose of guiding the up and down motion of the shank and are not absolutely essential to the successful operation of the device they may be dispensed with if desired.

In the practical operation of my device, lock nut 3 is loosened and the fitting 4 including its guide extension 13 is backed off, thereby lowering the entire shank 1 and thus the cutter 9. The lower portion of shank 1 projecting beneath the threaded end 5 of housing 2 together with the cutter 9 is then inserted into the hole and preferably by slightly tilting the tool and inserting the cutter by a sort of hooking motion. End 5 is then threaded into the hole and preferably only partway in. After the tool is in place the fitting 4 is threaded downwardly until the proper degree of upward pressure is exerted by the spring 6 on fitting 4. In this manner the cutting edge 17 of the cutter 9 is brought into operating position by being pressed against the bur and when shank 1 is then turned, as for instance by means of the angular head 13, the spring 6 permits shank 1 and cutter 9 carried thereby to move up and down, thereby causing the cutting edge 17 of cutter 9 to follow the surface of not only the bur but also of the object from which the bur is to be removed. In this manner regardless of the surface upon which the bur has formed whether it be curved or plain the bur will be cut out completely and in a clean manner.

In most cases, though the inner surface of housing 2 may be angular, it is preferable to have the same in cylindrical form so as to allow a snug fit of the cylindrical spring around shank 1 within the housing, thus avoiding unnecessary play. It is of advantage to have the inner curved surface of the guide extension in substantial alignment with the inner cylindrical surface of the housing surrounding the spring and I prefer

to use a tubular guide extension as shown in Fig. 3, consisting of a tube with its lower end open and secured with its upper end to the head piece 16. As illustrated in Fig. 4, groove 14, in which the guide extension is slidably arranged, should be preferably of substantially annular construction.

The positioning of the guide means in slidable arrangement within the housing need not be necessarily adjacent the spring though I prefer such arrangement as being structurally more convenient. If desired the spring may be solely encased by the cylindrical walls of the housing and suitable annular slide groove may be arranged at any point in the upper part of the housing between the inner wall surrounding the spring and the outer wall of the housing.

Though I have found it in most cases satisfactory to manually rotate shank 1, it is of course possible to accomplish the rotation by mechanical or electrical means.

When using the device for universal application on different sized holes and the same therefore is provided with adapters, it is necessary that in such case the cutter be equally capable of adjustment. This may be preferably accomplished for instance as shown in the drawings by providing a slot in the cutter and securing the cutter to the lower part of shank 1 by means of a bolt thus permitting the adjustment of the cutter by loosening the bolt and sliding the cutter outwardly or inwardly as desired so as to adapt the same to any particular size hole. It is requisite that the rotary motion of the cutter be as concentric as possible and I have found it of advantage therefore to insert the cutter into a diametrical slot cut into the lower extremity of the shank as illustrated in Fig. 5.

It is of course understood that the shape or form of the cutting edge of the cutter is not critical. I prefer, however, a cutter with a bevelled cutting edge, that is a cutting edge bevelled off away from the shank. This has the advantage of an increased smoothness in operation as well as the desirable effect of a bevelled cutting and smoothening of the rim of the hole from which the bur has been removed.

Though my device is applicable as aforestated to the removal of burs from practically any type surface I have found the same particularly useful in connection with low pressure gas main blocking for the purpose of making repairs and/or additional connections within the blocked-off area. In order to accomplish this purpose an operator equipped with a gas mask drills a hole through a gas main and then inserts through this hole a stopper consisting as a rule of an inflatable bag inserted through the hole in deflated form and then inflated in the main. The bur formed in drilling the hole through the pipe seriously interferes with the work and frequently lacerates the bag. Previous efforts to remove the bur have failed because it is formed on a curved i. e., concave surface and a rotating cutting tool inside the pipe of the type hitherto used only reaches the outside and lower edges of this surface. The device in accordance with my invention will completely remove the bur.

When using the device in connection with gas mains, it is of course requisite to eliminate as much as possible gas leakage through the device while the same is being used. For this purpose I have found it of advantage as shown in Fig. 2 to use a separate unit comprising an upper portion 10*a* serving with its upper end 10 as seat for the spring 6 and a lower portion 10*b* adapted to be filled with fibrous or other suitable material thus serving when so filled as a packing or gas seal substantially preventing the escape or leakage of gas along the rotating surface of shank 1. This unit is secured in position by a threaded fitting 7 threaded into the lower portion of housing 2 and locked by lock nuts 8. The threaded portion 5 to be inserted in the hole is then preferably carried by the threaded fitting 7.

If desired the separate unit comprising the spring seat and the gas seal may be made part of the fitting so that fitting 7, spring seat 10*a*, gas seal 10*b* and the end piece 5 constitute one removable unit. As a further security against the escape and leakage of gas that may have passed the gas seal, I have found the tubular guide means illustrated in Fig. 3 of particular advantage as these have proven to substantially check any gas that may have passed beyond the gas seal.

The foregoing description is by way of illustration and not of limitation and I am not to be limited to any details but only by the appended claims in which I have endeavored to claim broadly all inherent novelty.

I claim:

1. A device for the removal of burs from metal surfaces comprising a housing having an end adapted to be inserted in a hole from which a bur is to be removed, a shank rotatably mounted in said housing, a cutting tool diametrically carried by one end of said shank and a spring positioned to force said shank and the cutting tool carried thereby toward said housing.

2. In a device for the removal of burs from metal surfaces the combination which comprises a rotatably mounted shank carrying at its lower end a cutting tool, fitting means adjustably carried by the upper end of said shank and a spring surrounding said shank, said spring, when said cutting tool is in operating position, bearing against said fitting means and positioned to force said shank and the cutting tool carried thereby toward said housing.

3. A device for the removal of burs from metal surfaces which comprises a housing, a shank rotatably mounted in and extending with its lower extremity beyond said housing, a cutting tool carried by said shank at its lower end, a spring in said housing and surrounding said shank, and fitting means adjustably carried by the upper end of said shank, said spring, when said cutting tool is in operating position, bearing against said fitting means and positioned to force said shank and the cutting tool carried thereby toward said housing, thereby at all times automatically holding said cutting tool in effective cutting position while said shank is being rotated.

4. A device for the removal of burs from metal surfaces which comprises a housing, a shank rotatably mounted in and extending with its lower extremity beyond said housing, a cutting tool carried by said shank at its lower end, a spring in said housing and surrounding said shank, a head piece adjustably carried by the upper end of said shank, guide means secured to said head piece and slidably extending into said housing, said spring, when said cutting tool is in operating position, bearing against said fitting means and positioned to force said shank and the cutting tool carried thereby toward said housing thereby at all times automatically holding said cutting tool in effective cutting position while said shank is being rotated.

5. A device in accordance with claim 4 in which said guide means are tubular guide means.

6. A device for the removal of burs from metal surfaces which comprises a housing, an end piece carried by said housing, a shank rotatably mounted in said housing and extending with its lower extremity beyond said end piece, a cutting tool carried by said shank at its lower end and having a bevelled cutting edge away from said shank, a spring in said housing resting on a stationary base and surrounding said shank and fitting means adjustably carried by the upper end of said shank, said spring, when said cutting tool is in operating position, bearing against said fitting means thereby at all times automatically holding said cutting tool in effective cutting position while said shank is being rotated.

7. A device for the removal of burs from metal surfaces which comprises a housing, an end piece carried by said housing, a shank rotatably mounted in said housing and extending with its lower extremity beyond said end piece, a cutting tool carried by said shank at its lower end and having a bevelled cutting edge away from said shank, a spring in said housing resting on a stationary base and surrounding said shank, a head piece adjustably carried by the upper end of said shank, guide means secured to said head piece and slidably extending into said housing, said spring, when said cutting tool is in operating position, bearing against said fitting means thereby at all times automatically holding said cutting tool in effective cutting position while said shank is being rotated.

8. A device in accordance with claim 7 in which said guide means are tubular guide means.

9. A device for the removal of burs from metal surfaces which comprises a housing, a shank rotatably mounted in and extending with its lower extremity beyond said housing, a cutting tool carried by said shank at its lower end, a spring in said housing and surrounding said shank, a head piece adjustably carried by the upper end of said shank, tubular guide means secured to said head piece and slidably extending into said housing and a gas seal in said housing and surrounding said shank, said spring, when said cutting tool is in operating position, bearing against said fitting means thereby at all times automatically holding said cutting tool in effective cutting position while said shank is being rotated.

10. A device for the removal of burs from metal surfaces which comprises a housing, a shank rotatably mounted in said housing, a cutting tool carried by said shank at its lower end, a spring in the upper part of said housing and surrounding said shank, a gas seal removably inserted in the lower part of said housing and surrounding said shank, an end piece carried by said gas seal and extending below said housing and fitting means adjustably carried by the upper end of said shank, said shank extending with its lower extremity beyond said end piece, said spring, when said cutting tool is in operating position, bearing against said fitting means thereby at all times automatically holding said cutting tool in effective cutting position while said shank is being rotated.

11. A device for the removal of burs from metal surfaces which comprises a housing, a shank rotatably mounted in said housing, a cutting tool carried by said shank at its lower end, a spring in the upper part of said housing and surrounding said shank, a gas seal removably inserted in the lower part of said housing and surrounding said shank, an end piece carried by said gas seal and extending into said housing, said shank extending with its lower extremity beyond said end piece, said spring, when said cutting tool is in operating position, bearing against said fitting means thereby at all times automatically holding said cutting tool in effective cutting position while said shank is being rotated.

12. A device in accordance with claim 11 in which said guide means are tubular guide means and in which the upper end of said gas seal forms a stationary base for said spring.

13. A device for the removal of burs from metal surfaces which comprises a housing, a shank rotatably mounted in said housing, an adjustable cutting tool carried by said shank at its lower end, a spring in the upper part of said housing and surrounding said shank, a gas seal forming with its upper end a stationary base for said spring, said gas seal being removably inserted in the lower part of said housing and surrounding said shank, an end piece provided with adjustable adapters, said end piece being carried by said gas seal and extending below said housing, a head piece adjustably carried by the upper end of said shank, tubular guide means secured to said head piece and slidably extending into said housing, said shank extending with its lower extremity beyond said end piece, said spring, when said cutting tool is in operating position, bearing against said head piece thereby at all times automatically holding said cutting tool in effective cutting position while said shank is being rotated.

FREDERICK L. GREEN.