Jan. 25, 1955 D. G. EHRICH 2,700,548

TOOLHOLDER

Filed May 18, 1953

Fig. 1.

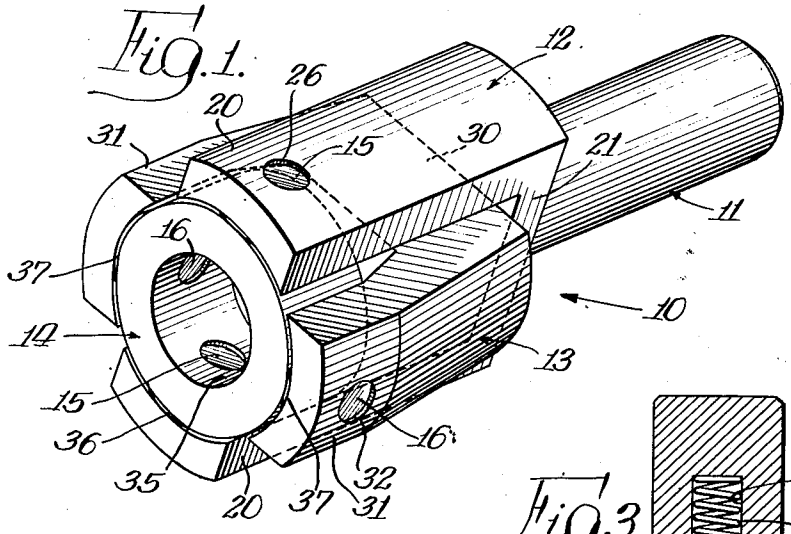


Fig. 2.

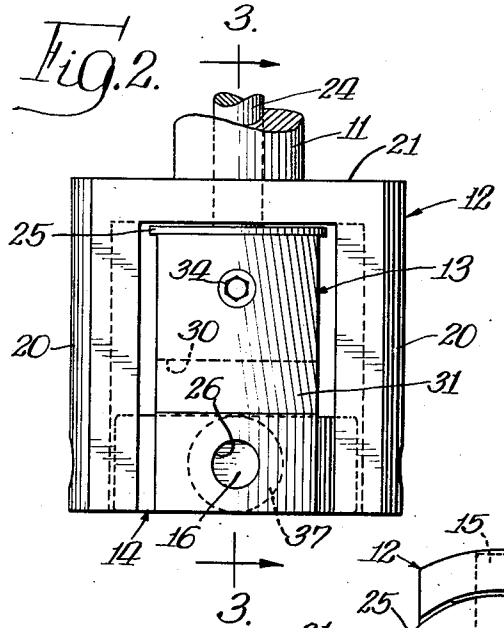


Fig. 3.

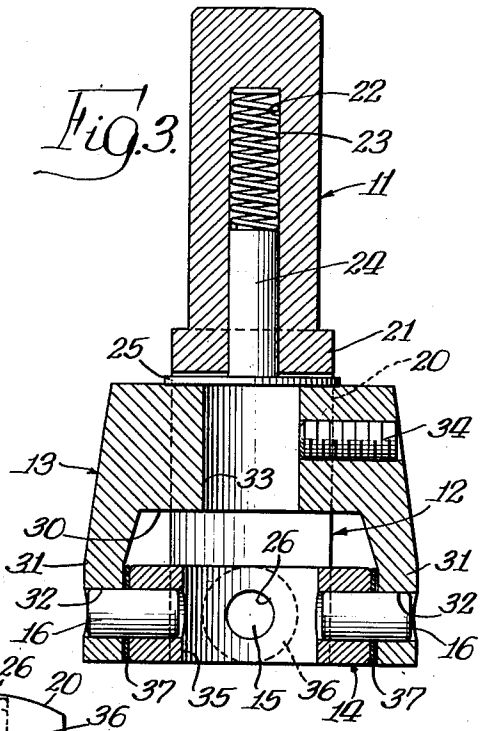
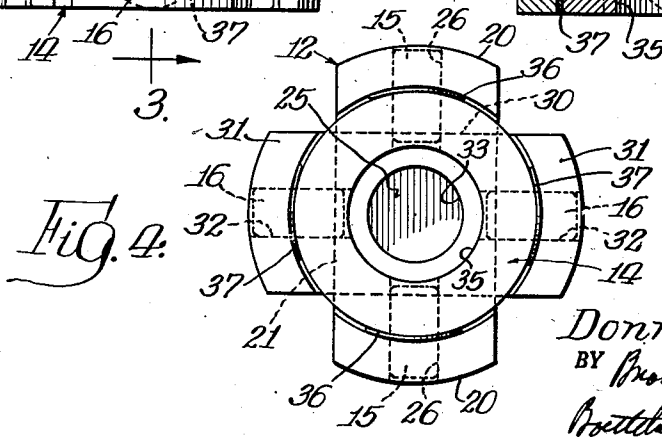


Fig. 4.



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TOOLHOLDER

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3 Claims. (Cl. 279—16)

My present invention relates to improvements in tool holders and more specifically to a new and improved holder of the "floating" class especially adapted to support reaming tools, bits and the like.

Of primary importance in reaming bored, drilled or otherwise formed openings, for example in a metal object, is the disassociation of the reaming tool from any drilling function. That is to say, it is desirable that the reaming tool itself should not act to change the axis of the bore or opening into which the same is operated. As a consequence a holder for such a reaming tool desirably must permit "free floating" action of the tool. With this principle in mind, it will be understood that the major function of a reaming tool is to press or smooth out the side walls of the bore or otherwise formed opening to eliminate the marks and burs left by the boring or drilling tool or to increase the opening's diameter or shape slightly. In general such reaming operation is preferably accomplished by having the reaming tool follow the course or axis of a previously formed opening.

With such features in mind, I have devised a new and improved reaming tool holder of simplified construction and arrangement of its various elemental portions to permit free floating action and movement of the reaming tool in a translatory manner along two transversely related axes and in a pivotal manner about the same two axes; such movements of the tool along or about the axes of permissable movement being distinct and capable of independent or simultaneous execution.

The main object of my present invention is to provide a new and improved reaming tool holder capable of permitting free floating action to the reaming tool as the same follows the course of a previously formed opening.

Another object of my invention is to provide a new and improved reaming tool holder having its elemental portions arranged in a manner to permit limited rectilinear translatory motion of the reaming tool along two transversely related axes and pivotal movement of the reaming tool about the same two axes.

A still further object of my invention is to provide a new and improved reaming tool holder which is capable of permitting the reaming tool to float freely and follow the course of a bored, drilled, or otherwise executed opening by providing translatory and rocking action of the tool about transverse axes as the same follows the course of such opening; such permissable movement of the reaming tool being free, but restrained between limits.

The above and further objects, features and advantages of my present improved tool holder will be recognized by those familiar with the art from the following description of its features and details of constructions and especially with reference to the accompanying drawings illustrating a preferred embodiment of its concepts.

In the drawings:

Figure 1 is a perspective representation showing the assembled relationship of the various elements of my new and improved tool holder;

Figure 2 is a side elevational view, with parts thereof broken away, of the improved tool holder illustrated in Figure 1;

Figure 3 is a longitudinal cross-sectional view of the tool holder illustrated in Figures 1 and 2, taken substantially along the vantage line 3, 3 of Figure 2; and

Figure 4 is a plan view of my improved tool holder taken from the bottom or underneath side thereof.

With reference now to the drawings, it will be observed from Figure 1 in particular that the improved tool holder

10 of my invention comprises a shank portion 11, an outside yoke portion 12, an inside yoke portion 13, a tool retaining collar assembly 14 and trunnion means 15 and 16. Such elemental portions are constructed and interrelated in assembly in a manner to accomplish the desired objectives outlined hereinbefore, as will now be described.

The shank portion 11 comprises, as illustrated, a substantially cylindrical or tapered metal member, preferably solid and of a design familiar with conventional practice for attachment or insertion in the driving spindle of a boring or reaming machine, drill press, or the jaws of a suitable clutch means familiarly employed in machine tools of the class on which reaming operations are performed.

Associated integrally with shank 11 and formed of a rigid material is the outside yoke portion 12. As will be recognized, portion 12 comprises a pair of spaced arm members 20, 20 formed with a transverse radius of curvature so that such essentially comprise segmental sections of a cylinder, or the like. Such arm members 20 are connected transversely at their upper ends by an integral upper wall portion 21. Wall portion 21 is provided with a central cylindrical opening 22 aligned coaxially with a bored continuation thereof coaxially in shank member 11. Mounted within bore 22 of the shank member and platform portion 21 are a compression spring 23 and a pin member 24. The lower end of the pin member 24 is rigidly attached to a brass or like suitable materialed bearing disc 25, the purpose of which will be amplified later herein. Adjacent the lower end of each of the arm portions 20 is formed a trunnion opening 26; such trunnion openings of the two arms 20 being coaxial and registeringly aligned for the reception of trunnion means 15, comprising removable pins.

The inside yoke 13 is constructed very similar to the outside yoke 12 with the exception that the same does not have rigid association with the shank member 11. In greater particular, inside yoke 13 has an upper wall portion 30 from which are depended a pair of separated arm portions 31, 31. Such arm portions are formed adjacent their lower ends, for a distance suitable for receiving the retaining collar member 14, with a cylindrical curvature as was employed in the arm portions of outside yoke 12. It will be recognized from Figure 2, for instance, that the inside and outside diameters, measured across the arms of the inside yoke, are identical to corresponding diametrical measurements of outside yoke 12. The inside yoke 13 is thus arranged for mounting between the arm portion 20, 20 of outside yoke 12, but aligned transversely thereto. The inside yoke 13, like outside yoke 12, is provided, adjacent the lower ends of its arm portions 31, 31, with trunnion receiving openings 32, 32 for trunnion means or pins 16. Such relations and features of inside yoke 13 may best be understood by reference to Figure 3.

Formed centrally of the upper wall 30 of inside yoke 13, is a cylindrical or tapered bore 33 for receiving the shank end of a suitable reaming tool or the like. Such bore 33 is for obvious reasons aligned coaxially of shank member 11 whereby the assembly will operate with a minimum of vibration. Set screw means 34 are also employed to lock the shank portion of the reaming tool (not shown) securely with the inside yoke member 13.

It will now be recognized that the inside and outside yoke members are arranged in assembly so that the trunnion openings 26 and 32 thereof are aligned transversely to define rectangularly or transversely related coplanar axes for the trunnion means 15 and 16. Additionally, disposed within the lower interior and between the lower ends of arm portions 31, 31 of the inside yoke and 20, 20 of the outside yoke, is the tool retaining collar member 14, as best illustrated in Figures 1 and 3 of the drawings. The collar member 14 comprises an annulus of metal having openings through its side walls for receiving the trunnion means 15 and 16. In assembly collar 14 is disposed between the arm portions of the inside and outside yoke members so that the trunnion receiving openings therethrough will align registeringly with the trunnion receiving openings 26 and 32 associated respectively with the outside and inside yoke members.

Collar member 14 also includes a coaxial cylindrical bore numbered generally 35. Bore 35 receives or permits

passage of the shank portion of a suitable reaming tool (not illustrated) so that the same may be attached to yoke **13** by means of bore **33** and screw means **34**.

Having thus described the major elements of my tool holder, their assembly and operational relation will now be set forth. In the assembly of the outside and inside yoke elements **12** and **13**, respectively, the inside yoke member is placed between the arm portions **20**, **20** of the outside yoke so that the upper wall **30** of the inside yoke bears against the bottom face of bearing disc **25**. Trunnion pins **15** are then inserted through trunnion receiving openings **26** and concave-convex disc spring members **36** are placed between the inside face of yoke arms **20** and the exterior cylindrical surface of collar member **14**; the trunnion pins **15** then being driven home with a press fit in collar **14** so as to attach such collar to the arm portions **20**, **20** of the outside yoke member. Likewise disc springs **37**, similar in all respects to disc springs **36**, are placed intermediate the adjacent faces of collar member **14** and the arm portions **31** of the inside yoke member **13**; trunnion pins **16** then being thrust through openings **32** to tie collar member **14** to the arms of the inside yoke **13**. In this regard it will be appreciated that the external or outside dimension of collar member **14** is slightly less than the diametrical limits between the inside faces of yoke arms **20**, **20** and **31**, **31**. The disc spring members **36** and **37** are arranged to take up the slack or gap between the collar member **14** and the adjacent yoke arm faces, but permit the collar **14** to resiliently compress such springs and translate along the axes defined by trunnion members **15** and **16** relative to the yoke arms; the trunnion openings in the yoke arms being such as to permit free sliding movement of the trunnion pins therein. It will likewise be realized that the inside yoke member **13** is free to pivot about trunnion members **16** and the axis defined thereby while the inside yoke **13** and collar member **14** may pivot about trunnion pins **15** and the axis defined by the latter. Resilient resistance to such rocking actuation of inside yoke **13** about the two transversly related axes defined by pins **15** and **16**, is provided by the compressible spring **23**, pin **24** and bearing disc **25**; the latter of which is in bearing relation with the upper face of wall portion **30** on the inside yoke **13**.

It will therefore be recognized from the above description of the several elemental portions and their operational association, that the tool retaining collar **14** and inside yoke member **13** are free to translate rectilinearly along the axis defined by pins **15** and likewise to rock or pivot about such pins relative to the outside yoke member **12**. Additionally yoke **13** can translate relative to collar **14** along pins **16** and pivot relative collar **14** and yoke **12** about the same such pin members. This combination of translatory and rocking action gives complete freedom of movement to a reaming tool held by my holder and permits the same to follow the course of a bored, drilled or otherwise perfected opening in operation. This combination of movements find particular utility in locating, centering and aligning of the tool in the opening to be reamed. The resistance of the several spring means to such movements, however, serves to prevent excessive freedom of the reaming tool during its operation. As a result of this combination, the cutting edge of the reamer always follows the plane of float of the holder, and thus parallels the side walls, of the opening in which it works.

Further it will be understood and appreciated that while I have herein shown and described one form in which the features and concepts of my invention may appear, various changes, modifications and substitutions of equivalents may be resorted to therein without departing from the spirit and scope of my invention. Consequently, I do not wish to be limited to the specific embodiment of my invention herein illustrated and described except as may appear in the following appended claims.

I claim:

1. A tool holder, comprising, a shank portion, an outside yoke member dependent integrally from said shank portion and having separated arms bearing transverse curvature, an inside yoke member, likewise having spaced arms bearing transverse curvature, disposed intermediate the arms of said outside yoke member, an annular collar member pivotally supported between the arms of said two yoke members on two transversely related axes and pin means defining said two axes and connecting said collar member to the arms of said two yoke members, said collar member being moveable pivotally and rectilinearly with said inside yoke member relative to said outside yoke member about one of said two axes and said inside yoke member being pivotally moveable about the other of said axes.

2. A tool holder, comprising, a shank, an outside yoke member formed integrally with said shank and depending therefrom, separated arm portions on said outside yoke member, each bearing a transverse radius of curvature, an inside yoke member having spaced arms bearing a radius of transverse curvature like the arm portions of said outside yoke member, an annular collar member disposed intermediate the arms of said two yoke members, trunnion pin means pivotally connecting said collar member to the arm portions of each of said yoke members and defining a pair of transversely related axes, disc spring means mounted intermediate said collar member and said arm portions and disposed about said trunnion pins, said inside yoke member and said collar being pivotally moveable about one of said axes relative to outside yoke, said inside yoke member being pivotable and rectilinearly moveable about the other of said axes and relative to said collar and outside yoke member, and said collar member being rectilinearly moveable along said one axis relative to said outside yoke member.

3. A tool holder, comprising, a shank member, an outside yoke member formed integrally with said shank member and having spaced arm portions depending therefrom, each of said arm portions bearing a like radius of transverse curvature, an inside yoke member, having spaced arm portions bearing a like radius of transverse curvature with said outside yoke arm portions, and disposed intermediate the arm portions of said outside yoke, a collar means mounted intermediate the adjacent ends of said arm portions of both of said yokes, trunnion pin means, defining transverse axes, pivotally connecting said collar member to the arm portions of each of said yokes, disc spring means disposed intermediate said collar member and said arm portions of both of said yokes, and spring means in said shank portion bearing against said inside yoke, said inside yoke and collar being pivotally moveable together about one of said two axes, said inside yoke being pivotally moveable about the other of said two axes, said spring means which bears against said inside yoke serving to limit such pivotal movement thereof, and said collar member being rectilinearly moveable along said one of said two axes relative said outside yoke while said inside yoke is rectilinearly moveable along said other of said two axes and relative said collar, the said disc spring means serving to resiliently resist such rectilinear motion of said collar and inside yoke means.

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