Title: COLLET HOLDER FOR A MULTI-JAW CHUCK

Abstract: A collet holder for insertion into a multi-jaw chuck. The collet holder includes a multi-faceted body having a smooth bore extending through for housing a standard collet and a cap nut threadably secured to the body.
COLLET HOLDER FOR A MULTI-JAW CHUCK

Be it known that I, Robert Tanga, residing at 1280 West Peachtree Street, #3206, Atlanta, GA 30309, a citizen of the United States, have invented certain new and useful improvements in a Collet Holder for a Multi-Jaw Chuck, of which the following is a specification.

Cross-Reference And Priority Claim To Related Application


Field of the Invention

The present invention relates generally to lathes and particularly to a collet holder for insertion into a multi-jaw chuck.

Background of the Invention

A standard lathe typically has either a multi-jaw chuck (typically, a 3, 4, or 6 jaw chuck) threaded or cam locked to the spindle for holding a large tool or has a collet holder threaded or cam locked to the spindle for holding a smaller tool with a smooth shank. Chucks and collet holders can be interchanged; however, the chucks can weigh one hundred pounds or more.
Thus, interchanging various chucks or interchanging a chuck with a collet holder takes quite a bit of time and manpower.

Thus, it can be seen that needs exist for an adapter to a multi-jaw chuck that can hold collets without removing the chuck and installing a collet holder directly to the headstock.

**Summary of the Invention**

Briefly described, the present invention comprises a collet holder for insertion directly into a multi-jaw chuck, which collet holder obviates the need for interchanging the chuck with a standard collet holder (which otherwise would be inserted directly into the spindle). The collet holder has a multi-faceted body, which is adapted to be inserted into any of a 3, 4, or 6 jaw chucks.

In one aspect, the present invention comprises a collet holder having a body with a smooth bore extending therethrough for housing a standard collet and a cap nut threadably secured to the body. The body also includes a plurality of push rods that can be engaged by the cap nut to push on a rear plate of the body. The rear plate has a threaded bore for engaging a threaded portion of the collet. Thus, when the cap nut is tightened against the push rods, it pushes the plate rearwardly, which in turn draws the collet into the collet holder and causes the collet to close.

In yet another aspect, the present invention comprises a collet holder that has a body having a smooth bore extending therethrough, with a tapered seat, and a cap nut that, when tightened against the body, causes the collet to be pushed farther into the collet holder, thus seating the collet against the tapered seat and closing the collet.
These and other aspects, features and advantages of the invention will be understood with reference to the drawing figures and detailed description herein, and will be realized by means of the various elements and combinations particularly pointed out in the appended claims.

It is to be understood that both the foregoing general description and the following brief description of the drawings and detailed description of the invention are exemplary and explanatory of preferred embodiments of the invention, and are not restrictive of the invention, as claimed.

10 **Brief Description of the Drawings**

Fig. 1 is a perspective view of a collet holder in accordance with an illustrative form of the present invention;

Fig. 2 is a partially cutaway view of a modified version of the collet holder of Fig. 1;

Fig. 3 is a rear view of the collet holder of Fig. 1;

Fig. 4 is a perspective view of a collet holder in accordance with another illustrative form of the present invention;

Fig. 5 is a partially cutaway view of the collet holder of Fig. 4;

Fig. 6 is a rear view of the collet holder of Fig. 4;
Fig. 7 shows a multi-jaw chuck, which is the environment for the collet holders of Figs. 1 and 4;

Fig. 8 is a rear view of an embodiment of a collet holder;

Fig. 9 is a side view of an embodiment of a collet holder system;

Fig. 10 is a side view of an alternate embodiment of a collet holder system;

Fig. 11 is a view of embodiments of collet holders;

Fig. 12 is a view of alternate embodiments of collet holders;

Fig. 13 is a side view of another alternate embodiment of a collet holder system; and

Fig. 14 is another view of another embodiment of a collet holder.

**Detailed Description of Example Embodiments**

The present invention may be understood more readily by reference to the following
detailed description of the invention taken in conjunction with the accompanying drawing
figures, which form a part of this disclosure. It is to be understood that this invention is not
limited to the specific devices, methods, conditions or parameters described and/or shown
herein, and that the terminology used herein is for the purpose of describing particular
embodiments by way of example only and is not intended to be limiting of the claimed
invention. Also, as used in the specification including the appended claims, the singular forms
"a," "an," and "the" include the plural, and reference to a particular numerical value includes at
least that particular value, unless the context clearly dictates otherwise. Ranges may be
expressed herein as from "about" or "approximately" one particular value and/or to "about" or
"approximately" another particular value. When such a range is expressed, another embodiment
includes from the one particular value and/or to the other particular value. Similarly, when
values are expressed as approximations, by use of the antecedent "about," it will be understood
that the particular value forms another embodiment.

With reference now to Fig. 1, a first exemplary embodiment of a collet holder 10 is
illustrated for insertion into a multi-jaw chuck, such as the multi-jaw chuck 11 shown in Fig. 7.
The collet holder 10 of Fig. 1 has a body or housing 12 and a large nut or cap 14 that is
threadably coupled to the body. The body 12 has a proximal end 16 and a distal end 18. A bore
20 extending through the body 12 receives and houses a (standard) collet 19. Preferably, the
bore 20 is smooth and has a tapered seat 21 at its distal end. At the proximal end 16 of the collet
holder 10 is a plate 22 having a bore 24 extending therethrough, which aligns with the bore 20 of
the body 12. Also preferably, the bore 24 is threaded.
Preferably, the collet 19 is a "5C" collet that has a generally smooth body 26 with a plurality of slits therein. At the proximal end of the collet 19 is a male threaded portion 28 that cooperates with the female threaded portion 22 of the bore 24. At the distal end of the collet 19 is a frusto-conical head portion 30 that flares towards the collet's distal end.

The body 12 is a multi-faceted piece having a plurality of facets (or flat surfaces) 32 and 34 around its outer periphery, as seen more clearly in Fig. 3. The multiple facets 32 and 34 are configured so that the collet holder 10 can be adapted to any of a 3, 4, or 6 jaw chuck. In the depicted embodiment, two sets of facets are shown. The first set of facets (or flat surfaces) 32 is wider than the second set and is configured at about 60° relative to one another for convenient use in a 3 or 6 jaw chuck (hence, when inserted into a 3-jaw chuck, the jaws will contact three of the wide facets, such as facets 32b, 32d, and 32f that are spaced about 120° relative to one another, and when inserted into a 6-jaw chuck, the jaws will contact all six of the wide facets 32a, 32b, 32c, 32d, 32e, and 32f that are spaced about 60° relative to one another). The second set of facets (or flat surfaces) 34 includes narrower facets that are interposed between those of the first set, so as to create four flat facets that are at 90° to one another so that the body can be inserted into a 4-jaw chuck (i.e., the jaws of a 4-jaw chuck will contact two of the narrow facets, such as 34b and 34e, and two of the wide facets such as 32a and 32d). Thus, a single collet holder 10 can be adapted for insertion into 3, 4, and 6 jaw chucks.

The body 12 also includes a plurality, preferably three, of cylindrical openings 36, 38, and 40 therein for receiving a corresponding number of button or mushroom-headed push rods, preferably three push rods, 42, 44, and 46, that surround the bore 20 and that are configured to push on the rear plate 22. Surrounding each push rod 42, 44, and 46 are compression springs, two of which are not shown and spring 52, respectively. The push rods 42, 44, and 46, along with the three springs, are inserted into openings 36, 38, and 40 of the body 12, as seen more
clearly in Fig. 2. It should be noted that Fig. 2 shows a partially cutaway view of a modified version of the collet holder 10. In Fig. 2, two diametrically opposed push rods are shown, whereas in Fig. 1, three push rods equidistantly spaced around the bore 20 are shown. Also, it should be noted any number of push rods, including 2 or 4 push rods, can be used without deviating from the scope of the present invention. The push rods 42, 44, and 46 are secured in place with a plurality of cap screws 54, 56, and 58 that are inserted through openings 60, 62, and 64 in the plate 22.

Preferably, the nut 14 is a spanner nut that has a shoulder 66 with at least one socket 68 therein for engaging a tooth of a spanner wrench. When tightened with a spanner wrench, the shoulder 66 of the nut 14 contacts the button-headed push rods 42, 44, and 46 and exerts a force on the push rods which overcomes the biasing force of the springs and causes the rods to push on the plate 22, which in turn draws the plate and collet 19 rearwardly (toward the proximal end). As the collet 19 is drawn further into the collet holder 10, the frusto-conical head portion 26 of the collet is drawn rearwardly into the tapered seat 21 of the bore, which causes the frusto-conical head portion of the collet to close around the tool therein and securely hold the stock therein. Also preferably, the nut 14 has a bore 70 that is large enough to allow the collet 19 to be inserted therethrough. In other words, and as seen in the exploded view of Fig. 2, the nut 14 can be threadably secured to the body 12, and then the collet 19 can be inserted through the nut and into the body.

Additionally, the rear of the collet holder can be spring-loaded so as to allow the collet holder 10 to be more easily removed from the chuck 11.

In operation, the user inserts the collet holder 10, with the collet 19 therein, into the chuck 11 and tightens the jaws of the chuck against the appropriate facets of the collet holder.
The user loosens the nut 14 some, which opens the collet 19. The user inserts the tool to be used into the collet 19. The user tightens the nut 14 with a spanner wrench, which in turn causes the shoulder 66 of the nut to contact and exert a force on the button headed push rods 42, 44, and 46. This pushes the plate 22 rearwardly (toward the proximal end), which pulls the collet 19 rearwardly and in turn pulls the frusto-conical head portion 30 of the collet into the tapered seat 21, closes the collet around the tool, and grips the tool with sufficient force to perform machining operations. It should be noted that above steps can occur in almost any order (for example, the user can insert the body 12 of the collet holder 10 into the chuck 11, and then insert the collet 19, and then tighten the nut 14).

With reference now to Figs. 4 and 5, a second exemplary embodiment of the collet holder 100 for insertion into a multi-jaw chuck 11 is shown. The collet holder 100 is substantially similar to the collet holder 10, but with the exceptions noted here. The collet holder 100 has a body or housing 102 and a nut or cap 104 that is threadably coupled to the body. The body 102 has a smooth keyed bore 106 extending therein for receiving and housing a collet 19 (a description of which has been provided herein).

As depicted in Figs. 4 and 5, the nut 104 includes an inner bore 110 having a diameter that is slightly smaller than the diameter of the frusto-conical head portion of the collet 19 (but the diameter is also large enough to accommodate the shank of the stock that will be inserted into the collet), which defines a crown portion 108. Within the distal end of the bore 110 is a tapered seat 109. The body 102 can also include a ledge 111, such that the nut 104 can tighten towards and against the ledge 111. Also, unlike the collet holder 10, the collet holder 100 does not have push rods or a threaded rear plate.
As in the first embodiment, the body 102 has a plurality of flat surfaces or facets 112 and 114 around its outer periphery for allowing the collet holder 100 to be inserted any of a 3, 4, or 6 jaw chuck as described herein, as depicted in Fig. 6.

In operation, the user inserts the collet holder 100, holding the collet therein, into the chuck 11 with the nut 104 partially tightened to the body 102. The user loosens the nut 102 and inserts the tool to be used into the collet 19. The nut 104 is tightened against the body such that crown portion 108 tightens against the head of the collet 19 and towards the ledge 111, which in turn pushes the collet rearwardly and forces the collet into the tapered seat 109. As the collet 19 is pushed rearwardly, the frusto-conical head portion 30 is pushed into the tapered seat 109, which closes the collet around the tool and causes the collet to grip the tool with sufficient force to perform machining operations. It should be noted that above steps can occur in almost any order (for example, the user can insert the collet holder 100 into the chuck 11 once it is fully assembled with the collet and stock held therein).

Preferably, the collet holders 10 and 100 are constructed of a durable material, such as a metal or metal alloy.

Notably, the collet holders 10 and 100 can be interchanged between a chuck and a vice. Thus, the collet holders 10 and 100, with the collet and stock therein, can be inserted into a vice and then returned to the jaws of the chuck without any reassembly.

The foregoing description and drawings comprise illustrative embodiments of the present invention. Having thus described exemplary embodiments of the present invention, it should be noted by those skilled in the art that the within disclosures are exemplary only, and that various other alternatives, adaptations, and modifications may be made within the scope of the present
invention. Merely listing or numbering the steps of a method in a certain order does not constitute any limitation on the order of the steps of that method. Many modifications and other embodiments of the invention will come to mind to one skilled in the art to which this invention pertains having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Although specific terms may be employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation. Accordingly, the present invention is not limited to the specific embodiments illustrated herein, but is limited only by the following claims.
What is claimed is

1. A collet holder adapter apparatus for use with a multi-jaw chuck mounted on a lathe to allow the multi-jaw chuck to hold a collet without damaging the collet, the collet holder apparatus comprising:

   a multi-faceted body adapted to be inserted into and held by the jaws of the multi-jaw chuck, the multi-faceted body including a bore for receiving a collet therein, the multi-faceted body having a threaded end for receiving a nut; and

   a nut threaded onto the threaded end of the multi-faceted body for securing the collet in the bore.

2. The collet holder adapter apparatus as claimed in Claim 1 wherein the multi-faceted body comprises a plurality of facets, not all of which are the same size.

3. The collet holder adapter apparatus as claimed in Claim 1 wherein the multi-faceted body comprises 12 facets, some of which are spaced ninety degrees from one another to work with a 4-jaw chuck and some of which are spaced 60 degrees from one another to work with a 3 or 6-jaw chuck.

4. The collet holder adapter apparatus as claimed in Claim 1 wherein the multi-faceted body comprises a tapered seat and the nut directly forces a portion of the collet against the tapered seat to secure the collet and to tighten the collet.
5. The collet holder adapter apparatus as claimed in Claim 1 wherein the multi-faceted body comprises a tapered seat and the nut indirectly forces a portion of the collet against the tapered seat to secure the collet and to tighten the collet.

6. The collet holder adapter apparatus of Claim 5 wherein the nut acts on pushrods, which in turn push on a rigid threaded member secured to the back end of the collet to pull the collet snugly against the tapered seat.

7. The collet holder adapter apparatus of Claim 1 wherein the collet holder with the chuck and stock therein can be interchanged between a chuck and a vice.
Fig. 1

Chuck Release

Collet Threads

Operation
Place collet in box up to 1/2 nut and force collet back out. The 1/2 nut which will ride over the threads of collet locking on place tightly. With socket 70 remove lock and spanner 5/4. Then place pin down and this will spread 1/2 nut releasing grip from collet.
Spring loaded clips will be at end of bore compressed w/ springs to be able to push collect out from back.
Mounts Have Flats
60° Apart 6 Flats
+ 2 Small Flats in
So as To Be Able to
Fit in 3 Jaw 6 Jaw &
Four Jaw Chucks

Back View

Fig. 8
5C Collet Holder

Mounts in Chucks not on Spindle
Eliminates Taking Chucks off

1. Type 1

![Diagram of 5C Collet Holder]

1. Place Collet in Holder
2. Screw in to Threads on Bottom Flats
3. Spin Head until Contact with Rods
4. Tighten against Rods
   Rods Wise Wrench
   Rods Push Plate (Threaded)
   Back Holding Collet and
   Forcing against Tapered Face
   of Collet Holder Body

MOUNTS Have FLATS
60° Apart & Flats
+ 2 Small Flat 90°
Of 60° Flat so as to
Have Square For
4 Jaw Chucks
**5C Collect Holder**

Mount in Chuck, Not on Spindle
Eliminates Taking Down (off) Chuck

**Parts**

- **Body** with milled flats in back to be placed in jaws of chuck, hole drilled through to receive 5C collect with fixed tapered face.
- **Back plate** threaded to receive 5C collect attached to push rods which are spring loaded. For ejecting 5C out after tightening.

**Procedure**

1. Place collect in holder
2. Screw into threads of back plate
3. Spin head until contact with push rods
4. Tighten head against push rod's

**Fig. 10**

**Type 1**

push rods connected to back plate. When 5C collect is screwed into plate, head is screwed to contact push rods which force push rods back with collect connected. Force 5C collect against fixed face of body and squeezing collect while closed.
Model II  TYPE II

Diagram:

Face of (Hood) Forces against (washerd)
Nut - 250 in less
Therm  OD of Collet Major Dia
But + Bone of Collet
Tighten with Spanner

Fig 13

Operated Hood) Insert Collet into Body w/ Fixed

Face

Spins Head Back on Body and Tights until Face of
Fig 13 of Collet and Tights w/ Spanner