Aug. 4, 1959 W. J. KRESKE 2,898,137

RETRACTING FLANGE DEVICE

Filed July 16, 1953

Fig. 1

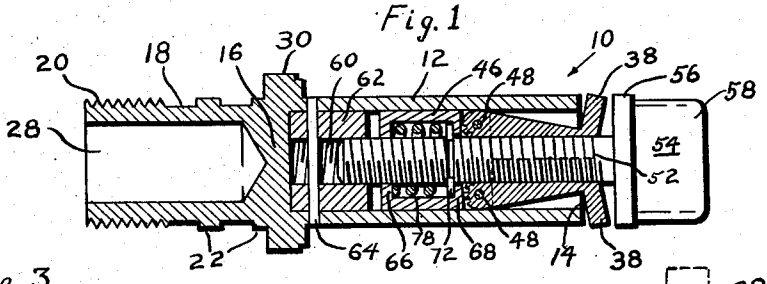
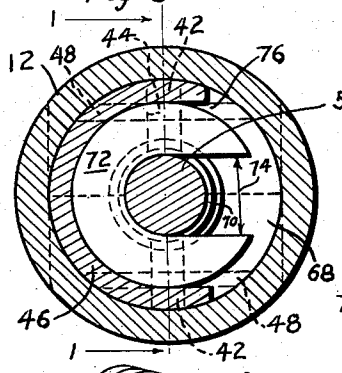


Fig. 3



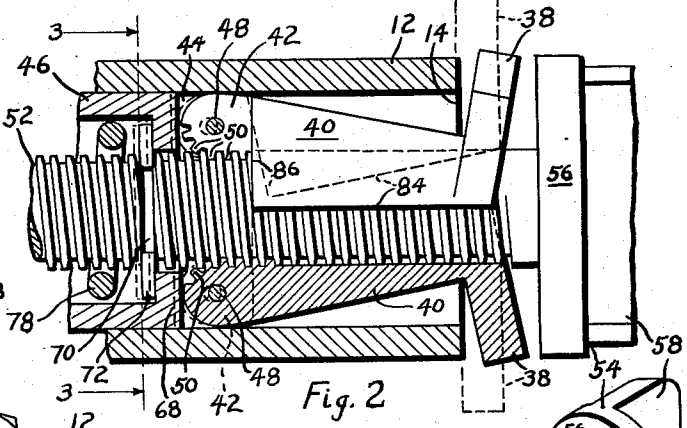


Fig. 2

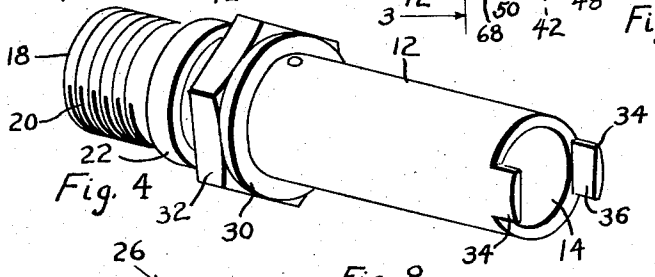


Fig. 4

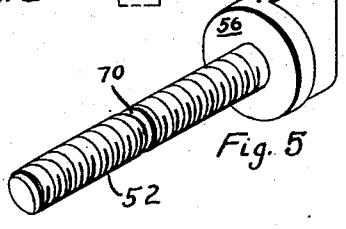


Fig. 5

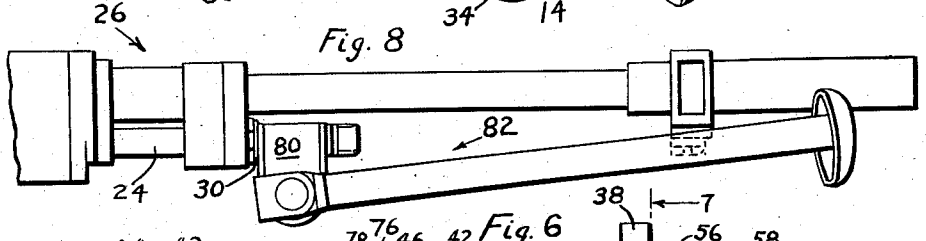


Fig. 8

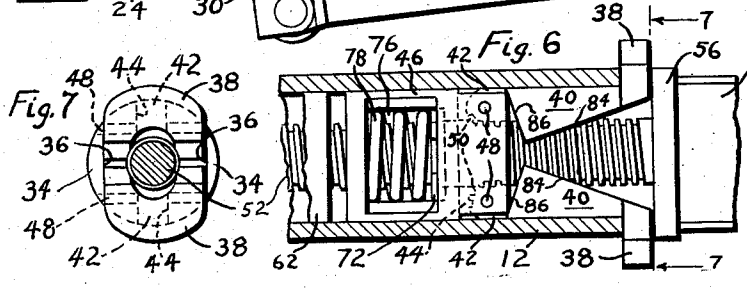


Fig. 7

Fig. 6

INVENTOR

Walter J. Kreske

United States Patent Office

2,898,137

Patented Aug. 4, 1959

2,898,137

RETRACTING FLANGE DEVICE

Walter J. Kreske, Newton Center, Mass.

Application July 16, 1953, Serial No. 368,465

8 Claims. (Cl. 287—52.07)

This invention relates to mechanisms for retaining sleeve type members in place on shafts and the like.

It is often necessary and desirable to provide a device for shafts and the like which will hold in place sleeve type members mounted thereon. Existing fastenings for this purpose, of which a washer and nut arrangement is the most common, are generally inadequate for those instances where the rapid removal of the sleeve type member is desired. Also a common criticism of existing fastening devices is the need for special tools to effect their removal. Such need for special tools entails not only the additional expense of the special tool but also the time and inconvenience required in its procurement for each such removal operation. Another criticism is that the fastening device is generally composed of one or more elements which must be removed from the shaft or the like before the sleeve type member may be removed. Such separable fastening elements, by their removability, make them subject to being lost or mislaid.

Pursuant to the present invention, the above have been overcome in a retracting flange device for holding sleeve type members in place and which also entails other desirable objects, features and advantages. Among these are a device which is hand operable by a simple rotary twist in one direction for the mounting operation and a twist in the opposite direction for the releasing operation. Another is a device which will not release the sleeve type member even when subjected to heavy axial and rotary loads. Still another is a device which permits rotary motion of the mounted member without impairing the secureness with which the member is held in place. Still another is a device which though needing only finger tip pressure for the locking operation, effectively retains mounted members in place against heavy axial and radial loads. Another is a device composed of relatively few components and lends itself to relatively inexpensive manufacture. And another is a device which permits the use of aluminum alloy working components even in locations subject to high temperature conditions.

These and other features, objects and advantages of the invention will become more apparent from the following description taken in connection with the accompanying drawings of a preferred embodiment of the invention and wherein:

Fig. 1 is a cross sectional view of the preferred embodiment taken on line 1—1 of Fig. 3,

Fig. 2 is a cross sectional view of a portion of Fig. 1 in enlarged scale with one of the flanged elements shown in elevation and operating position of the components shown in broken lines to more clearly show construction and operation,

Fig. 3 is an end view taken on line 3—3 of Fig 2,

Fig. 4 is an isometric view of the tubular mounting member of the device shown in Fig. 1 to more clearly show construction thereof,

Fig. 5 is an isometric view of the worm gear with support and operating head,

Fig. 6 is a view partly in cross section and partly in elevation of a portion of the device shown in Fig. 1 with the flanges in retaining or projecting position and supported by the support and operating head,

Fig. 7 is an end view taken on line 7—7 of Fig. 6 to more clearly show the flange and slide construction,

Fig. 8 is a side elevation of a gas operated rifle with the preferred embodiment of the invention fixed to the end of the gas cylinder thereof and having mounted thereon a bipod with sleeve type housing.

Referring to the drawings in more detail, the preferred embodiment is in the form of a gas cylinder plug adapter for mounting a bipod such as that described in my application No. 205,973 filed January 15, 1951, now Patent No. 2,807,904 to the end of the gas cylinder of a gas operated rifle. The gas cylinder plug adapter is designated generally by the numeral 10 (Fig. 1). The adapter 10 has a hollow cylindrical tubular member 12 open at its front end 14. The back end of the tubular member 12 is closed by a wall 16 which is part of a gas cylinder plug 18 extending axially at the back end of the tubular member 12. The gas cylinder plug 18 has a circumferentially threaded portion 20 and gas sealing shoulders or lands 22 of conventional gas cylinder plug design for screwing into the end of and thereby closing a gas cylinder 24 of a gas operated rifle 26 such as a military shoulder rifle known as the T–47 rifle. A cavity or recess 28 is provided axially in the gas cylinder plug to reduce weight of the adapter and provide part of the gas chamber of the gas cylinder 24. Between the gas cylinder plug 18 and the tubular member 12 is a radially disposed flange or shoulder 30 which may be provided with flats 32 about the periphery thereof to form a nut for applying a wrench in screwing the gas cylinder plug 18 into the end of the gas cylinder 24.

The front end 14 of the tubular member 12 has a transverse slot to thereby form axially extending projections or guide members 34 (Figs. 4 and 7) with transversely disposed parallel guide surfaces 36. Slidably carried between the transverse guide surfaces 36 are two oppositely disposed transverse flanges 38. The transverse flanges 38 are each fixed to the end of an arm 40 which extends inwardly into the tubular member 12. The inner end of each arm 40 has a parallel sided projection 42 closely fitted at its parallel sides in a supporting a slot 44 at the front end of a hollow cylindrical intermediate member 46. A pivot pin 48 perpendicular to the transverse guide surfaces 36 extends through each projection 42 and intermediate member 46 at the supporting slot 44. Each of the arms 40 is thereby mounted to pivot at its end so that each flange 38 slides transversely to the tubular member 12 between the guide surfaces 36 to either project above the front end of the tubular member 12 as shown in Fig. 6 or retract below the outside peripheral surface of the tubular member 12 as shown in Figs. 1 and 2.

The parallel sided projections 42 have gear teeth 50 arcuately disposed about the respective pivot pins 48. Extending inwardly of the tubular member 12 and axially thereof is a worm gear or screw 52 in operative engagement with the gear teeth 50 of the opposed arms 40. At its front end, the worm gear 52 has an operating head 54 comprised of a transversely disposed cylindrical support shoulder 56 whose function will be presently described, and an axially disposed gripping web 58 for manually rotating the worm gear 52. The worm gear 52 extends through the hollow intermediate member 46 and is screwed at its inner end into a threaded portion 60 of an anchor element 62 held in place at the inner end of the tubular member 12 as by a transversely disposed rivet pin 64. At either end of the hollow intermediate member 46 there is a radially inwardly projecting shoulder 66 and 68 respectively. Just inwardly of the shoulder 68 is a slot or groove 70 located circumferentially of the worm gear

52. Fitted in the slot is a radially disposed washer or disk 72 which has an opening 74 extending radially. The width of the opening is preferably slightly smaller than the root diameter of the groove 70 about the warm gear 52 so that the disk 72 will snap in place about the groove 70. As seen in Figs. 3 and 6, the side of the hollow intermediate member 46 has an opening 76 to permit insertion of the disk 72 and of a spring 78 located about the worm gear 52 and compressed between the disk 72 and shoulder 66.

In operation, the outside circumferential surface of the tubular member 12 provides a shaft or axle upon which may be mounted a sleeve type member when the transverse flanges 38 are in the retracted position shown in Figs. 1 and 2. In this retracted position the flanges 38 are below the outside peripheral surface of the tubular member 12. Thus, sleeve type bodies to be mounted on the tubular member 12 need only to be slid onto the tubular member 12 from the front end 14 toward the shoulder 30 as has been done with the body or housing 80 of a bipod 82 such as the bipod disclosed in my application No. 205,973, filed January 15, 1951, now Patent No. 2,807,904. After the sleeve type body 80 has been mounted onto the tubular member 12 as explained above, it may be held in place between the shoulder 30 and flanges 38 by bringing the flanges 38 upwardly between the transverse guides 34 until they project above the tubular member 12.

In the present instance the worm gear 52 has a right hand thread and therefore moving the flanges 38 upwardly is achieved by simply rotating the worm gear 52 clockwise by means of the gripping web 58.

Referring particularly to Fig. 1, it will be noted that clockwise rotation of the worm gear 52 causes it to move axially inwardly of the tubular member 12 because of the threads 60 in the anchor element 62. This axial inward motion causes the disk 72 to move forward against the spring 78 through which this forward motion is yieldably transmitted to the hollow intermediate member 46 at the shoulder 66. This forward movement of the intermediate hollow member 46 results in a corresponding forward movement of the pivot pins 48. Because the gear teeth 50 are in engagement with the worm gear 52, the forward movement of the pivot pins 48 causes each of the arms 40 to pivot or expand outwardly in opposed directions about the respective pivot pin 48 and cause each respective transverse flange 38 to project above the tubular member 12 as shown in Fig. 6 and by the broken lines in Fig. 2. Since the angle through which each of the arms 40 pivots about the respective pivot pin 48 is relatively small, the movement of the pivot pin 48 need only be very small to accomplish this pivotal action. Therefore, the flanges 38 will project above the outside peripheral surface of the tubular member 12 long before the transversely disposed cylindrical support shoulder 56 on the worm gear 52 reaches the flanges 38. By continuing to rotate the worm gear 52 clockwise, it will continue to move axially inwardly to further compress the spring 78 until the cylindrical support shoulder 56 is brought up pressurably against the flanges 38 and the ends of the projections 34 as shown in Fig. 6. In the position shown in Fig. 6, the flanges 38 are locked in place to receive axial support from the cylindrical support shoulder 56 and rotary support from the guide projections 34. Thus, axial thrusts caused, as by sleeve type bodies 80 against the flanges 38 are absorbed by the support shoulder 56 and transmited through the worm gear 52, the anchor element 62 and rivet pin 64 to the walls of the tubular member 12. None of the axial thrust will occur at the pivot pins 48. Also, if the body 80 is so dimensioned that it is tightly held between the shoulder 30 and flanges 38, rotary motion of the body 80 about the tubular member 12 will cause rotary turning moments at the flanges 38. However, the flanges 38 being closely fitted between the transverse guiding surfaces 36 will thereby be prevented from rotating with such turning moments. A turning moment on the flanges 38 will be absorbed by the projections 34 without tending to rotate the worm gear 52 and so will have no effect upon the clamping efficiency of the support shoulder 56. Therefore, even a light finger tip tighening on the gripping web 58 is sufficient to withstand relatively heavy axial and rotary forces at the flanges 38 without loosening or impairing the supporting efficiency of the support shoulder 56 nor creating destructive stresses within the internal components of the mechanism.

In those instances where the housing 80 or other body to be mounted on the tubular member 12 are dimensioned for a snug fit between the shoulder 30 and the projecting flanges 38, the small movement at the pivot pins 48 is a desirable feature. The reason is that when the retracted position as shown in Fig. 1, the movement of the flanges 38 is outwardly, increasing the distance between the flanges 38 and shoulder 30. Therefore, as the flanges expand or pivot to their projecting position they will not bind against the housing 80 which is dimensioned to reach out to the end 14 of the tubular member 12. In the event that the housing 80 should extend over the end 14 a small distance, the present device is still applicable in that in such case the final expanding movement of the flanges 38 will be accomplished directly by the support shoulder 56 as it is screwed inwardly against the flanges 38.

It will also be noted that the arms 40 when in the retracted position meet at their edges 84. Also the end edges 86 of the arms 40 in this retracted position preferably abut against the end of the intermediate member 46. As a result, heavy counterclockwise rotary pressure on worm gear 52 will be taken up between the gear teeth 50, the edges 86 and 84 and none of this force will be transmitted to the pivot pins 48. Thus, the pivot pins 48 may be of small diameter with their strength not being a factor of great importance.

By making the tubular member 12 with its gas cylinder plug 18 of such strong and poor heat conducting material as a titanium alloy, the rest of the components, except for the spring 46 which is preferably of spring steel, in the gas cylinder plug adapter 10 may be made of aluminum alloy for conservation of weight. Because gases in the gas cylinder 24 come from exploded cartridges, they are at elevated temperatures causing the temperature of the gas cylinder 24 to rise even above 800° F. This is well above a temperature within which an aluminum laloy can be successfully used. However, because titanium is so poor a heat conductor and because aluminum is so relatively good a heat conductor, a high temperature gradient will exist in the walls of the titanium alloy component between the gas chamber and the aluminum alloy components. The titanium will in effect act as an insulator from the high temperatures in the gas cylinder 24 and permit the use of aluminum alloy not only for the components within the tubular member 12 but also for the body 80 mounted on the tubular member 12. This construction, thereby, effectively achieves a desirable weight saving in mechanical accessories in hand portable weapons such as the shoulder rifle 26. The weight saving is effected primarily by permitting the use of aluminum alloy components where heretofore steel was deemed necessary at such high temperature locations. In fact this weight saving feature is so effective that the entire gas cylinder plug adapter 10 with its whole mechanism weighs less than the conventional cylinder plug alone heretofore used for the single purpose of providing a closure for the end of the gas cylinder 24.

This invention is not limited to the particular construction shown as equivalents will suggest themselves to those skilled in the art. For example, while the present embodiment is in the form of a gas cylinder plug adapter

for a rifle, the invention may also be used on shafts, axles and the like for holding sleeve type bodies thereon.

What is claimed is:

1. The combination of means for mounting a sleeve type body, said mounting means having a hollow tubular portion open at one end, transversely disposed guides fixed to said tubular portion, oppositely disposed elements in the hollow of said tubular portion, a shoulder on each of said elements slidably engaging said guides to move in said transverse direction, means in the hollow of said tubular portion pivotally mounting said elements, means for moving said elements about said pivot means oppositely to each other in said transverse direction, whereby to selectably cause said shoulders to project above said mounting means in retaining relation with said body or retract into releasing relation with said body, and support means fixed to said last mentioned means for clamping said shoulders between said tubular portion and support means when said shoulder elements are in retaining relation with said body.

2. A gas cylinder plug adapter for mounting a sleeve type gun mount housing substantially as described comprising a hollow cylindrical mounting member open at one end, a gas cylinder plug closure at the other end and a circumferentially disposed shoulder therebetween; guide means fixed to said open end for motion transverse to said cylindrical mounting member; expansible retaining elements, each having one end in guided relation to said guide means and extending radially at the open end of said cylindrical mounting member and the other end extending inwardly of said cylindrical mounting member; means in the hollow of said cylindrical member pivotally carrying the other end of each of said retaining elements, means for selectably expanding said retaining elements in said transverse direction about said pivots into retaining position of said housing between said shoulder and retaining elements or retracting said retaining elements into releasing position with respect to said housing; and support means for clamping the radially extending portion of each of said elements between the open end of said hollow cylindrical mounting member and support means when said elements are in said retaining position.

3. In a gas cylinder plug adapter for mounting a sleeve type gun mount housing comprising a hollow cylindrical mounting member open at one end with a gas cylinder plug closure at the other end and a circumferentially disposed shoulder therebetween, guide means fixed to said open end for motion transverse to said cylindrical mounting member, expansible retaining elements each having one end in guided relation with said guide means and extending radially at the open end of said cylindrical mounting member and the other end extending inwardly of said cylindrical member, means pivotally mounting the other end of each of said retaining elements, gear teeth on each of said expansible elements arcuately disposed about the pivotal mounting, worm gear means operatively engaging said gear teeth for selectably expanding said retaining elements in said transverse direction about said pivotal mounting into retaining position of said housing between said shoulder and retaining elements or retracting said retaining elements into releasing position with respect to said housing, and support means for clamping the radially extending portion of each of said retaining elements between said hollow cylindrical mounting member and said support means when said elements are in retaining relation with said housing.

4. A gas cylinder plug adapter for mounting a sleeve type gun mount housing substantially as described comprising a tubular mounting member of circular cross section having an opening at one end, a closure at the other end in the configuration of a gas cylinder plug and a circumferentially disposed shoulder therebetween, a transversely disposed slot at the open end of said tubular member, two oppositely flanged elements extending from said open end inwardly of said tubular member with the flanges thereof being transverse to said tubular member and slidably carried in said slot, means pivotally mounting said flanged elements in said tubular member at a position distal from said open end, gear teeth on each of said flanged elements arcuately disposed about the pivotal mounting, a worm gear extending into said tubular member operatively engaging said gear teeth, a sleeve fixed in the closed end of said tubular mounting member threadably engaging the inner end of said worm gear, a stop member on said worm gear disposed to engage said pivotal mounting means upon movement of said worm gear in the direction of said open end thereby to move said mounting elements in the same direction, yieldable pressure means disposed to continually force said mounting means in the opposite direction, and a support and operating member at the other end of said worm gear for manually rotating said worm gear and supporting the flanges of said flanged elements between said tubular member and support when said flanged elements protrude above the periphery of said tubular member.

5. An adapter as in claim 4 wherein said pressure means is a spring compressed between said stop member and pivotal mounting means.

6. In a device for mounting a sleeve type body, the combination of a tubular member having the hollow portion thereof open at one end, oppositely disposed arms in said tubular member, a transversely projecting element at said open end fixed to one end of each of said arms, guide means confining movement of said projecting elements to said transverse direction, a hollow sleeve in said tubular member at the other ends of said arms, a radially inwardly projecting shoulder at each end of said hollow sleeve and the shoulder nearest said arms having a transversely disposed slot supportably straddling said other end of each of said arms, a pivot pin perpendicular to said slot pivotally mounting each of said arms, gear teeth on each of said arms arcuately disposed about the respective pivot pin, a worm gear extending into said tubular member between said arms and through said hollow sleeve in operating engagement with said gear teeth and having a groove about its periphery positioned in the hollow of said hollow sleeve near said slotted shoulder, a threaded member screwed onto the inner end of said worm gear and anchored to said tubular member, a disk element projecting radially from said groove, a coil spring about said worm gear in the hollow of said sleeve and compressed between said disk element and other shoulder of said sleeve, and a transversely disposed support and operating member at the other end of said worm gear for manually rotating said worm gear and supporting the projecting elements between said tubular member and support when the transverse projection of each of said projecting elements protrudes above said tubular member.

7. A device comprising a hollow housing open at one end, oppositely disposed projections on said housing at said end, a bushing comprised of at least two elements in the hollow of said housing, a flange on each of said bushing elements between said projections, a threaded member anchored in the hollow of said housing farthest from said open end, an intermediate element in the hollow of said housing between said threaded member and bushing, means pivotally mounting said bushing to said intermediate member, teeth on each of said bushing elements arcuately disposed about said pivot means, a screw engaging said arcuately disposed teeth and threaded member in said housing, an operating head on the end of said screw adjacent the flanges of said bushing, stop means on said screw restricting relative movement of said screw toward said open end with respect to said intermediate element, and resilient pressure means disposed to yieldably cause said relative movement.

8. A retracting flange device comprising a hollow housing open at one end, oppositely disposed projections on said housing at said end, a split bushing comprised of at least two axially disposed elements in the hollow of said

housing, a flange on each of said bushing elements between said propections, a threaded member anchored in the hollow of said housing farthest from said open end, an intermediate element in the hollow of said housing between said threaded member and said bushing, said bushing elements being pivotally carried by said intermediate element, teeth on said bushing elements arcuately disposed about said respective pivots, a screw engaged in said arcuately disposed teeth and threaded member in said housing, a flange and operating head on the end of said screw adjacent the flanges of said bushing elements, stop means on said screw restricting relative movement of said screw toward said open end with respect to the intermediate element and a spring compressed between said stop means and intermediate member yieldably causing said relative movement.

References Cited in the file of this patent

UNITED STATES PATENTS

861,939	Benet et al.	July 30, 1907
1,333,632	Robinson	Mar. 16, 1920
1,678,710	Selvig	July 31, 1928
1,713,277	Goldberg et al.	May 14, 1929
2,116,735	Stevens	May 10, 1938
2,142,582	Wright	Jan. 3, 1939
2,420,267	Sefreid	May 6, 1947
2,436,349	Adams	Feb. 17, 1948

FOREIGN PATENTS

530,079	Great Britain	Dec. 4, 1940