May 3, 1949. F. J. TRAINOR 2,468,849

DETACHABLE COUPLING

Filed Oct. 15, 1947

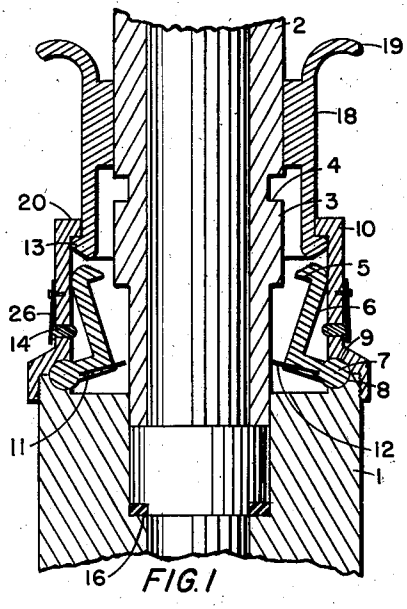


FIG. 1

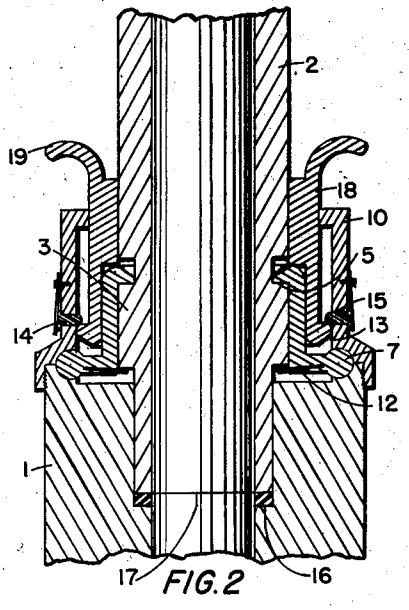


FIG. 2

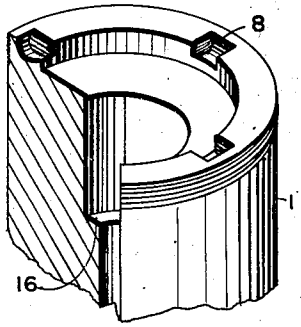


FIG. 6

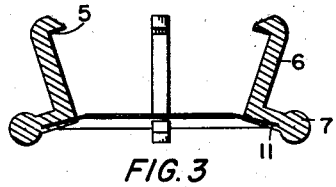


FIG. 3

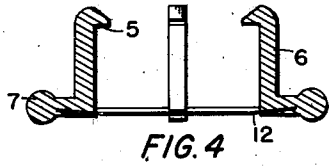


FIG. 4

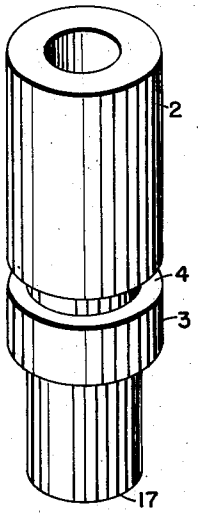


FIG. 5

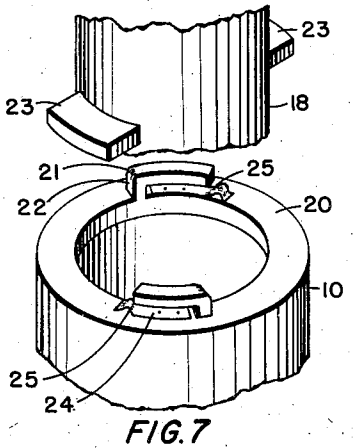


FIG. 7

FOSTER J. TRAINOR Inventor

By Henry Heyman

Attorney

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DETACHABLE COUPLING

Foster J. Trainor, Holly Hill, Fla.

Application October 15, 1947, Serial No. 779,971

17 Claims. (Cl. 285—170)

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My invention relates to a detachable coupling. This application is a continuation in part of application Serial No. 748,291 filed by me on May 15, 1947, application Serial No. 755,034 filed June 17, 1947, and application Serial No. 760,761 filed July 14, 1947.

The object of my invention is to provide a novel mechanism for use in detachably coupling a receptacle with a male unit for applications wherein there may be considerable stress between the parts. An example of such application is the attachment of interchangeable barrels to a breech block for rapid-fire guns where it is necessary to change barrels in a minimum of time.

Another example is the attachment of working tools in a lathe chuck or collet.

Another object is to provide a detachable coupling unit which is simple, and which permits the coupling and uncoupling of a receptacle and plug in a minimum of time.

Still another object is to provide a coupling device which has few parts and is rugged and reliable.

The following is a description of my invention, reference being made to the accompanying drawing in which:

Figure 1 is a vertical cross section of my device showing the receptacle and male matching unit in partially engaged relation.

Figure 2 is a vertical cross section showing the members in fully engaged and locked relation.

Figure 3 is a cross sectional view showing the latching members and snap ring in open position.

Figure 4 is a view similar to that of Figure 3 but showing the latching members in engaged position.

Figure 5 is a longitudinal view of the male or plug unit.

Figure 6 is a prospective view of the upper end of the receptacle unit.

Figure 7 is a view showing a modified form of locking device for preventing the accidental uncoupling of the device.

In the drawing the numeral 1 designates a receptacle unit which may be a breech block of a gun or lathe chuck or collet or any receptacle designed to receive a plug member 2 which may be a gun barrel or lathe tool, etc. The element 2 has a reduced portion extending between the end of the element and shoulder 3. At a distance from 3 on the element 2, I provide a groove for purposes presently to become apparent.

At the upper end of the main body of the receptacle 1, I provide a plurality of arcuate seats 8 in which I rest the fulcrums 7 of latch members 6. The latch members are retained in place by a member 10 arranged to be secured to the upper portion of the receptacle main body 1. On the inner surface of the element 10, I provide a circumferential arcuate recess 9 to cooperate with the arcuate recesses 8 to complete the bearings for the fulcrums 7 of the latch members 6. I have provided the means whereby the latch members are withdrawn and held out of the passageway of the plug element when the same is being telescoped into engagement with the receptacle. To this end I have provided the following structure.

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Referring particularly to Figures 1, 2, 3, and 4, it is seen that a slot 11 is provided in the base portion of each of the latching elements 6 for receiving a resilient snap element 12. In the embodiments shown herein and for purposes of explanation, the receptacle and plug elements are shown as round, although they need not have this geometric configuration. The snap element 12 is in the form of an annular disc which has two conditions of stability which are convex conditions in opposite directions of a plane passing through the outer periphery thereof. It is apparent that the combination of the latching members 6 and the snap ring 12 provides an assembly wherein the latching elements are strongly urged either into latched position or unlatched position.

The snap ring is most easily fabricated from a flat sheet by a punching operation in which the inner periphery of the ring is stretched; or the ring may be punched out flat and the inner periphery of the ring stretched as by peening.

The sub-assembly consisting of the latching elements 6 with the snap ring 12 are assembled in the receptacle unit as shown in Figures 1 and 2.

Referring to Figure 1, it will be noted that the inner portion of the snap ring extends inwardly of the base portion of the latching elements whereby insertion of the plug unit permits the lower shoulder of portion 3 to engage the same. Further urging of the plug member toward the receptacle against the resistance of the snap ring causes the snap ring to pass to a position of dead center in which the snap ring is planar in form. The further engaging of the plug with the receptacle is then assisted by the action of the snap ring which snaps the latching elements 6 inward and downward with the surface 5 of the latching elements 6 engaging the upper shoulder 4 of the plug element 2. The receptacle, the plug, and the latching elements now have the position shown in Figure 2 with the latching elements

firmly engaging the plug, and the snap ring is in lower convex position.

In some applications of the present invention, it is desirable to provide close continuity between the receptacle and male unit. To this end, I provide a cylindrical recess having a base 16 in the receptacle and an extension portion having an end 17 on the male portion. The lengths of these portions are proportioned so that they are either in contiguous relation or admit of a resilient gasket when the male member and receptacle are in engaged relation.

In some cases, particularly in guns, it is desirable to provide means for preventing accidental opening of the latch elements due to recoil or other shock. In such cases I provide a lock sleeve 18. The inner surface of this sleeve is telescopically supported on the plug element 2. A portion of the interior of the lock sleeve is removed to provide an annular recess to accommodate the outer surfaces of the latching elements when in latched position as shown in Figure 2. Provision is made for the manipulation of the locking sleeve into locked or unlocked position by finger grips 19.

To prevent the accidental displacement of the lock sleeve under conditions of vibration or recoil, a plunger 14 is inwardly urged by spring 26 and is slidably supported in a transverse aperture 15 in the element 10 of the receptacle 1. Outwardly extending annular flange 13 is provided at the lower end of the locking sleeve for engagement with the spring-pressed plunger 14.

An alternative form of locking sleeve is contemplated and shown in Figure 7. In this embodiment, I provide a plurality of bent lugs having circumferential portions 21 spaced from the end 20 of the element 10 by longitudinal portions 22 at one end thereof. The lower surfaces of the lugs 21, together with the end of the element 10, provide circumferential slots for the reception of ears 23 which may be formed on the end or intermediate the ends of lock sleeve 18. In this case, also, I provide means to prevent the accidental disengagement of the locked sleeve from locked position in the form of spring elements 24 having upstruck portions 25.

It is therefore seen that I have devised a detachable coupling device which is rugged, and at the same time, simple and easy to use, and which can be readily incorporated in devices of plug and receptacle form.

Having thus described my invention, what I claim is:

1. In a detachable coupling device, a socket member, a plug member, and a snap action gripping device, said socket having an interior surface defining a hollow space, and having a plurality of bearing surfaces positioned tangentially to said hollow space in a plane normal to the longitudinal axis of said socket, a plurality of latch dogs journaled in said bearing surfaces, whereby the latch portion is adapted to swing toward and away from the axis of the socket, said latch dogs having opposed bifurcated portions, a snap ring seated in said bifurcations, and having two convex conditions of stability whereby said latch dogs have two conditions of stability which are open and latch positions.

2. The device of claim 1 wherein the plug member is adapted to telescope into the socket member, said plug member having an extension portion adapted to pass through the latch dogs when in open position, and having a shoulder portion, said shoulder being adapted to abut the inner peripheral portion of the snap ring,

said plug having a groove axially spaced from said shoulder a distance equal substantially to the length of the latch dogs, whereby axial motion of the plug member toward the socket causes axial motion of the inner peripheral portion of the snap ring through a condition of dead center whereby the snap ring causes the latch dogs to spring inwardly to engage said groove.

3. The device of claim 2, including a sleeve member slidably supported on the plug member, and having an internal enlarged lower end portion adapted to slidably engage the external surface of the latch dogs when in latched position to thereby prevent the accidental opening thereof.

4. The device of claim 3 wherein the upper end of said socket member is provided with an inturned flange, and the lower end of said sleeve member is provided with an outwardly directed flange, whereby the sleeve member is limited in its sliding movement.

5. The device of claim 4 wherein said sleeve member is provided with outwardly directed finger grips.

6. The device of claim 5 wherein said socket is provided with spring pressed radially disposed plungers for engagement with the said sleeve outwardly directed flange to retain the same in latch dog engaging position.

7. The device of claim 6 wherein the socket interior surface defines a hollow bore below the latch dog bearing surfaces, slightly larger than said plug extension to provide a guide therefore.

8. The device of claim 7 wherein said hollow bore is terminated by an inwardly directed shoulder, a resilient gasket positioned on said shoulder, to engage with the end of the plug extension portion when in fully engaged position with the socket.

9. In combination, a pair of coupling members and a snap action gripping device, a first of said coupling members having a first hollow section, and a second hollow section, said hollow sections being axially aligned, and said second hollow section having a larger cross section than the first hollow section; at least one bearing recess in the interior wall of the said second section proximate the junction of the said first and second sections, and with the bearing axis normal to a median line through said sections; a latch element having a generally L shape having a first arm and a second arm, said first arm having an end portion adapted to pivotally seat in said first coupling member second section recess, and said latch element having an inturned finger integral with and substantially normal to the free end of the said second arm, whereby said inturned finger portion is capable of swinging toward and away from the median line of the coupling member thereby having a latched and unlatched position; and resilient means for biasing the latch element in either latched or unlatched position; a second coupling member adapted to slidably fit in the first coupling member and having an elongated end portion, a collar portion terminating the end portion and being of a length slightly less than the length of the latch element second arm, whereby said first and said second coupling members are secured in engaged condition, or released by said latch element when said finger portion is in latch position or unlatch position respectively.

10. The device of claim 9 wherein said latch element is provided with a slot extending from a point intermediate the ends of the first arm through the junction of said first and second

arms, whereby said slot lays in a plane which is normal to the median line of the coupling members when said latch element is in a position intermediate the fully latched and unlatched conditions; and a resilient open center dished snap element having a portion thereof supported in said slot.

11. The device of claim 10, in which said resilient open center dished snap element has two conditions of stability which are convex conditions on either side of a plane passing through the outer edges thereof.

12. The device of claim 11 wherein said snap element has a portion extending inwardly of the latch element second arm for engagement with the lower shoulder of the second coupling member collar, whereby an impressed force on the second coupling member causes the snap element to spring downwardly thereby springing the latch finger inwardly to engage the upper shoulder of the second member collar portion.

13. The device of claim 12 wherein a sleeve is slidably supported on the second coupling member and is adapted to slidably engage the outer surface of the second arm of the latch element when in engaged position to prevent the accidental opening thereof.

14. The device of claim 13 wherein the upper end of the first coupling member second section is provided with at least one hook element, and the sleeve is provided with at least one outwardly directed prong for engagement with said hook under first, a telescoping motion and second, a rotary motion to thereby prevent the accidental displacement of said sleeve element.

15. In a detachable coupling device, a first coupling member having a hollow interior, a second coupling member and a plurality of latch members, means in said first coupling member for pivotally supporting said latch members, resilient biasing means for holding said latch members in either fully latched or fully unlatched condition, latch engaging means in said second coupling member to engage said latch when said first and second coupling members are in substantially completely coupling condition.

16. The device of claim 15 wherein said resilient biasing means is an open center convex element having a portion extending inwardly of the hollow interior of said first coupling member for engagement with the lower end of said second coupling member, whereby axial movement of said second coupling member in said first coupling member causes said convex element to spring from a downwardly convex condition to an upwardly convex condition.

17. The device of claim 16 wherein said open center convex element is supported by the latch members, whereby said latch members are outwardly retracted when the convex element is convex upwardly and said latch members are forced axially inward when the convex element is convex downwardly.

FOSTER J. TRAINOR.

No references cited.