Dec. 17, 1957 R. J. PREST 2,816,341

CONNECTOR

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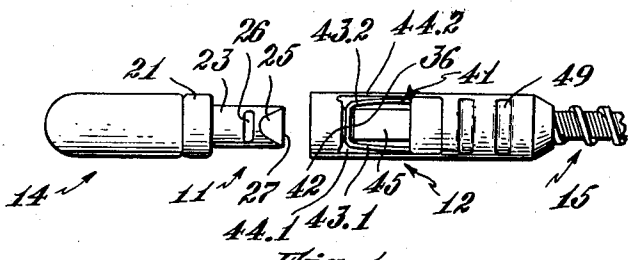

Fig. 1

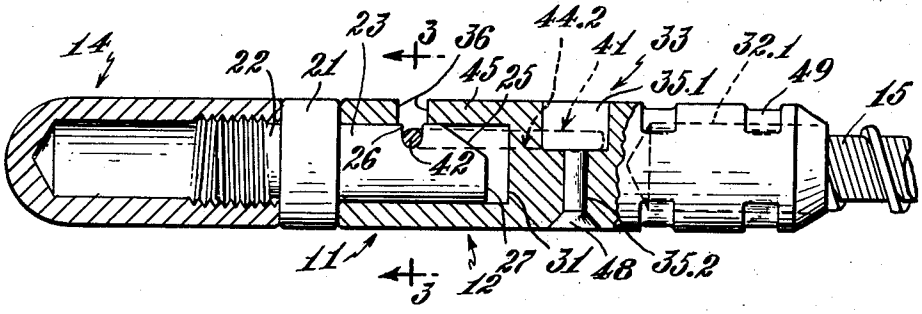

Fig. 2

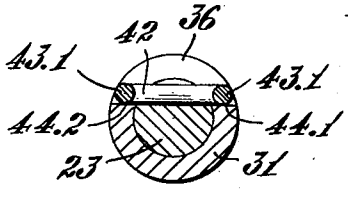

Fig. 3

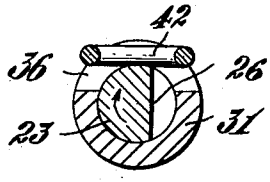

Fig. 4

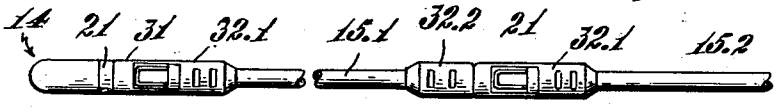

Fig. 5

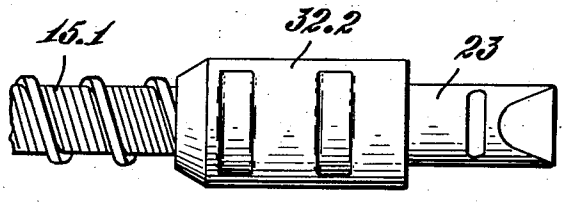

Fig. 6

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CONNECTOR

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4 Claims. (Cl. 24—221)

The present invention relates to mechanical connectors for detachably fastening two parts to each other.

Some of the principal objects of the invention are to provide a connector which can be handled and operated without actually touching it, merely by manipulating the members to be attached to each other; to provide such a connector which definitely indicates the accomplished connection with an easily recognizable and characteristic response; and to provide a connector which permits attachment and detachment by relative movement of the parts to be connected, of non-critical extent, requiring little force, and of distinct character for attachment and detachment, respectively, which makes the operation independent of contact with the connector proper and of direct visual observation. Another important object is to provide a connector for attachment of a container with radioactive material to means for carrying and handling such material from a distance, such as for connecting capsules to flexible cables, or for interconnecting such cables.

The following summary indicates the nature and substance of the invention in some of its principal aspects for attaining the above objects.

A connector according to the invention comprises a receptacle member and a plug member; the receptacle member has an axial recess of circular cross-section, a transverse slot which reaches into the recess, and furthermore fastened thereto a spring member with a transverse portion that yieldingly moves in the slot; the plug member has a stud portion that substantially fits the above-mentioned recess and that has at the outer free end of the stud portion an inclined face or cam portion and therebehind a notch transverse to the stud portion, which notch can be aligned with the slot of the receptacle member. Insertion of the stud portion of the plug member into the recess of the receptacle member, with the transverse portion of the spring aligned with the notch of the plug member, first causes the cam means to lift the spring and then to engage the spring in the notch; relative rotation of the engaged members lifts the spring from the notch and permits separation of the receptacle and plug members.

In a preferred embodiment, the cross-sections of the receptacle recess and of the plug stud are cylindrical, and the spring is U-shaped with the intermediate portion fitting the slot of the receptacle and the notch of the stud and with the ends parallel to the axis of the receptacle; the cam means can be an oblique face cutting off part of the plug and intersecting the transverse cut-off end face of the plug.

In another important embodiment, either member, usually the plug member, is fastened to a capsule for receiving radio-active material, by means of a threaded

portion opposite and coaxial with the recess of the receptacle member or the stud of the plug member, which thread fits an inside thread of the capsule and thus constitutes a closure for the latter; the other member, usually the receptacle member, is connected to a carrying and manipulating element such as a cable. Instead of fastening the capsule to one of the members and a manipulating member to the other, both members can be fastened to manipulating means such as rods or flexible cables.

These and other objects and aspects of novelty of the invention, in addition to those contained in the above summary, will appear from the herein presented description of a typical embodiment thereof and of several examples of its mode of operation and practical possibilities illustrating its novel characteristics. These refer to a drawing in which

Fig. 1 is a side elevation of the receptacle and plug members, separated from each other and with a capsule attached to the latter and a flexible wire cable attached to the former;

Fig. 2 is an axial cross-section, with the stud in elevation, through the two members as shown in Fig. 1, but in engaged position;

Fig. 3 is a cross-section on line 3—3 of Fig. 2;

Fig. 4 is a cross-section corresponding to Fig. 3 but with the plug member rotated such as to lift the spring of the receptacle member and to permit separation of the two members;

Fig. 5 illustrates the use of the device according to the invention for attaching a capsule to a carrier as well as for the purpose of connecting two manipulating and carrying members; and

Fig. 6 shows the plug member according to Figs. 1 and 2, but with a manipulating cable attached thereto instead of the capsule.

In Figs. 1 to 4, the plug member is indicated at **11** and the receptacle member at **12**. A capsule **14** is shown as attached to the plug member **11**, and a flexible cable **15** is shown as attached to the receptacle member **12**, for carrying and manipulating the capsule **14** with the plug **11** after attachment to the receptacle **12**.

In the embodiment shown in Figs. 1 and 2, the plug member **11** has a flange or collar **21** from which extend on one side a threaded stud **22**, and on the other side a cylindrical plug stud **23**. The plug stud **23** has an oblique face **25** constituting a cam means and therebehind a notch **26** transverse to the plug axis and parallel to the plane of the face **25**. The transverse cut-off face of the stud portion is indicated at **27**.

The receptacle member **12** has an axial, cylindrical recess **31** which fits the stud **23** of the plug member, and on the other side a recess **32.1** for attaching a manipulating means such as the cable **15**. The intermediate portion **33** of the receptacle member has machined therein into a generally speaking rectangular recess or box **35.1** for the spring to be described below, which recess continues into a counter sunk bore **35.2**.

The spring **41** is generally speaking U-shaped with a transverse or intermediate portion **42** which is parallel to slots **26** and **36**. Its substantially parallel end portions **43.1** and **43.2** reach into the chamber **35.1** and rest normally on two longitudinal ledges **44.1** and **44.2** which are machined on either side of the central portion **45**, as indicated in Figs. 1 and 3. The spring is fastened to the middle portion **33** of the receptacle member **12** by means of an insert **48** which, after staking, is turned to the body diameter, as indicated in Fig. 2.

In the embodiment shown in Figs. 1 and 2, the cable **15** is fastened to the receptacle member **12** by inserting its end into the above-mentioned recess **32** and by crimping or swaging, as indicated at **49**.

For connecting the two members, the stud **23** is inserted into the recess portion **31** and pushed slightly thereinto. If the cam face **25** happens to be aligned with the transverse portion of the spring **41**, the latter will be lifted into the slot **36** of the receptacle, until it clicks down into the notch **26** of the stud of the plug member, thus securely connecting the two members. If recess and plug are not aligned, a slight rotation, while maintaining the slight inward push will accomplish this alignment and the above-described engagement of the spring **41** and the plug notch **26**.

For disengaging the two members, it is merely necessary to rotate the plug member about 90°, which, as indicated in Fig. 4, lifts the spring from the stud notch **26** into the recess slot **36** and thereupon permits easy separation of the two members by way of a slight pull on one or the other or both. Thus, for attaching the two members to each other it is merely necessary to insert the stud into the receptacle recess with slight pressure and rotation until a click is felt or heard which indicates secure connection by means of the transverse spring portion retained in the transverse notch of the stud portion of the plug member; for detaching the two members it is merely necessary to rotate them relatively a slight amount, whereupon the plug lifts the spring from its slot and permits the stud portion to slide out of the recess of the receptacle member. The resistance against rotation, exerted by the pressure of spring head **42** against notch **26**, is sufficient to maintain secure attachment during normal operation, whereas detachment is initiated by a definite torque. The connector will securely transmit axial thrust in either direction which is sufficient for normal operation where the manipulation involves mainly such axial forces, whereas relative torques are not exerted during such normal operation and are only used for connecting and disconnecting as above described.

It will be evident that the connection and disconnection of the two members involves very little skill or force; the insertion of the stud merely requires its initial placing into the recess, whereas the subsequent movements are positively determined, which is also true of the detaching operation. This feature makes the device according to the invention especially suitable when remote handling is required, such as in the case of radioactive material being contained within the capsule **14**.

Figs. 5 and 6 illustrate the use of the device according to the invention for attaching a capsule **14**, as well as for connecting a supporting or manipulating element such as a wire rope **15.1** to another such element **15.2**. Fig. 5 clearly indicates the respective components with reference to the Figs. 1 to 3, so that this embodiment needs no further detailed explanation. Fig. 6 indicates the modification of the plug member for purpose of Fig. 5, a crimping or swaging portion **32.2** being attached to the plug **23** instead of the screw stud **22** shown in Fig. 2.

It will be evident that the connector according to the invention is applicable to the joining of devices other than those described above by way of a specific embodiment, but that it is especially suitable for the joining of elongate members of the general nature of those herein described by way of example.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. A connector comprising a receptacle member having an axial recess of circular cross-section and a transverse slot reaching into said recess, and fastened thereto a spring member having a transverse portion yieldingly movable in said slot about a transverse pivot axis which is located

in a plane that is substantially parallel to the axis of the receptacle member and also contains the transverse portion in locking position; and a plug member having a stud portion substantially fitting said recess of the receptacle member and having at its free end cam means and behind said cam means a transverse notch substantially fitting said transverse portion of said spring member, whereby insertion of the plug member into the receptacle member, with said transverse portion of the spring aligned with the notch of the stud portion, causes the cam means first to lift the spring into the slot of the receptacle member, and then to engage the spring in the notch of the stud portion essentially without bending stress of the spring member, whereas relative rotation of the two members lifts the spring from the notch and permits separation of the members.

2. A connector comprising an elongate receptacle member having at one end an axial recess of circular cross-section and a transverse slot reaching into said recess, and fastened thereto a spring member having a transverse portion yieldingly movable in said slot; an elongate plug member having at one end a stud portion substantially fitting said recess of the receptacle member, cam means at the free end of the stud portion, and behind said cam means, a transverse notch substantially fitting said transverse portion of said spring member; and at the other end of each of said members, means substantially coaxial with said recess and said stud portion, respectively, torque transmitting means for fastening the respective member each to a device to be connected; whereby insertion of the plug member into the receptacle member, with the aid of said devices to be connected, with said transverse portion of the spring aligned with the notch of the stud portion, causes the cam means first to lift the spring into the slot of the receptacle member, and then to engage the spring in the notch of the stud portion, whereas relative rotation of the two members with the aid of the torque transmitting fastening means lifts the spring from the notch and permits separation of the devices by pulling thereon.

3. A connector comprising a receptacle member having at one end a substantially cylindrical bore, and a transverse slot cutting into said bore, and on said receptacle member a U-shaped spring member whose ends point away from said slot and are attached to the receptacle member, and whose intermediate transverse portion is yieldingly movable in said slot about a transverse pivot axis which is located in a plane that is substantially parallel to the axis of the receptacle member and also contains the transverse portion in locking position; and a plug member having a substantially cylindrical stud portion fitting said recess and having at its free end an oblique face and behind said face a transverse notch substantially fitting said transverse portion of said spring member whose bottom is substantially parallel to said oblique face and which can be aligned with said slot upon insertion of the stud into the recess; whereby insertion of the plug member into the receptacle member, with said transverse portion of the spring aligned with the notch of the stud portion, causes the oblique face first to lift the spring into the slot of the receptacle member, and then to engage the spring in the notch of the stud portion essentially without bending stress of the spring member, whereas relative rotation of the two members lifts the spring from the notch and permits separation of the members.

4. A connector comprising a receptacle member having at one end a substantially cylindrical bore, and a transverse slot cutting into said bore, on said receptacle member a U-shaped spring member whose ends point away from said slot and are attached to the receptacle member, and whose intermediate transverse portion is yieldingly movable in said slot, and at the other end of the receptacle member torque transmitting means for fastening a device to be connected; a plug member having at

one end a substantially cylindrical stud portion fitting said recess of the receptacle member, having at the free end of the stud portion an oblique face and behind said face a transverse notch substantially fitting said transverse portion of said spring member, and having at the other end of the stud portion torque transmitting means for fastening a device to be connected; whereby insertion of the plug member into the receptacle member, with said transverse portion of the spring aligned with the transverse notch of the stud portion, causes the oblique face first to lift the spring into the slot of the receptacle member, and then to engage the spring in the notch of the

stud portion to connect the two devices, whereas relative rotation of the two devices lifts the spring from the notch and permits separation of the devices by pulling thereon.

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