

**Couplings - Types of couplings**

**Objectives :** At the end of this lesson you shall be able to

- state the types of couplings
- state the purpose of couplings.

**Introduction**

Power is transmitted from one end to the other commonly by means of shafts

If the distance between the two ends is large (say 8- 10 m), it would be inconvenient and expensive to have one such long length of shaft both from manufacturing and transport point of views.

Hence, it is recommended to connect a number of pieces by means of suitable couplings to transmit power from one end to the other.

**Types**

Shaft couplings may be broadly classified as:

- 1 Rigid or fast coupling
- 2 muff coupling
- 3 Flange coupling
- 4 Flexible coupling
- 5 Pin bush coupling
- 6 Chain coupling
- 7 Gear coupling
- 8 Spider coupling
- 9 Tyre coupling
- 10 Grid coupling
- 11 Old ham coupling
- 12 Fluid coupling
- 13 Universal coupling

**1 Rigid or fast coupling**

This type of couplings provide rigid connection between the two shafts without permitting any relative motion between them.

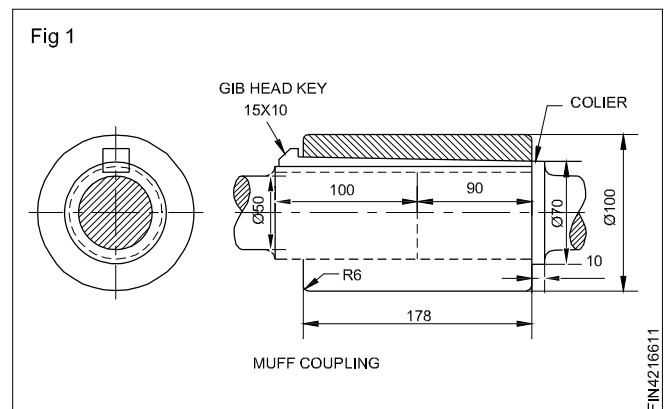
The important types of rigid couplings are

- unprotected type flanged coupling
- protected type flanged coupling
- Solid or forged flanged coupling
- Muff couplings
- Compression coupling

**2 Muff coupling**

In muff or sleeve coupling shown in fig 1, the ends of the two shafts to be coupled butt against each other and a cast iron muff or sleeve envelops them.

A gib - headed sunk key is provided to hold the sleeve and the shafts together, thus forming a rigid coupling.

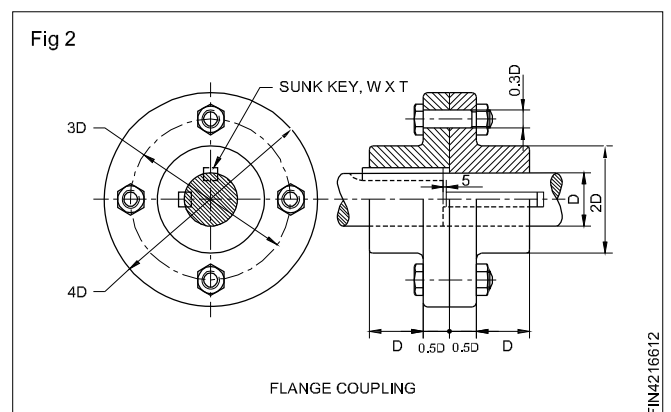


**3 Flanged coupling**

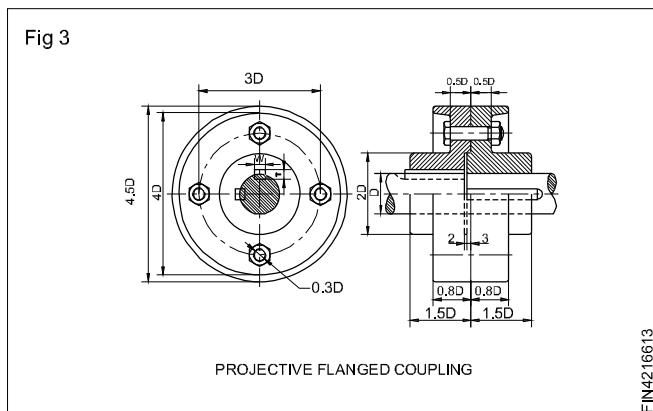
These are the standard forms of couplings, most extensively used. In a flanged coupling, flanges are either fitted or provided at the ends of shafts. The flanges are fastened together by means of a number of bolts and nuts. The number and size of the bolts depend upon the power to be transmitted and hence, the shaft diameter.

**3.1. Flanged coupling with detachable flanges**

In this, two flanges are keyed, one at the end of each shaft, by means of sunk keys (Fig 2) For ensuring correct alignment. a cylindrical projection may be provided on one flange which fits into the corresponding recess in the other.

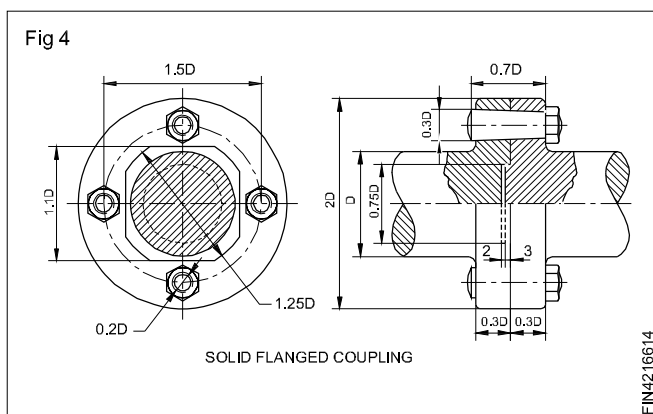


In the design shown in figure, the bolt heads and nuts are exposed and liable to cause injury to the workman. Hence, as a protection, the bolt heads and nuts may be covered by providing an annular projection on each flange. A flanged coupling, using these flanges is called a protected flanged coupling (Fig 3).



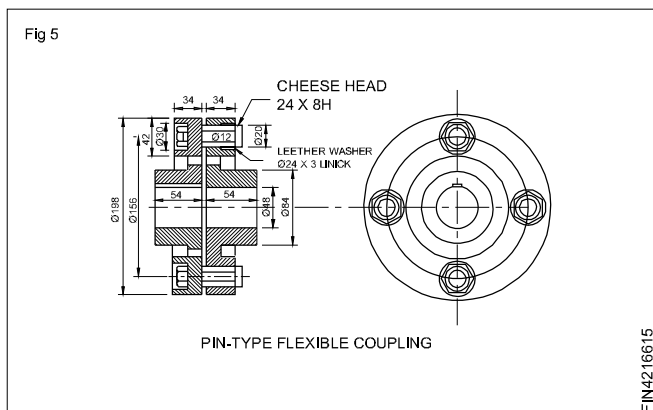
### 3.2. Solid flanged coupling

Couplings for marine or automotive propeller shafts demand greater strength and reliability. For these applications, flanges are forged integral with the shafts. The flanges are joined together by means of a number of headless taper bolts (Fig 4)



### 4 Flexible Coupling

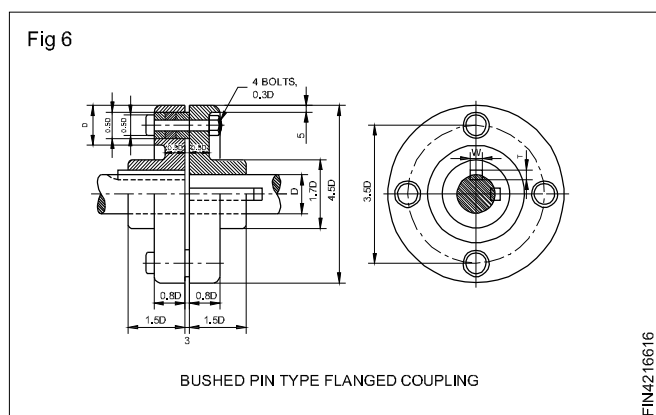
- Flexible couplings are used where slight relative movement is required or the axis of shafts run slightly out of line.



- Here the motion from one half of the coupling to the other half is imparted with the help of driving pins rigidly bolted to one flange and loosely fitting corresponding holes in the other.
- Brass bush and rubber covering is provided on the driving pins for absorbing shocks and as insulators.

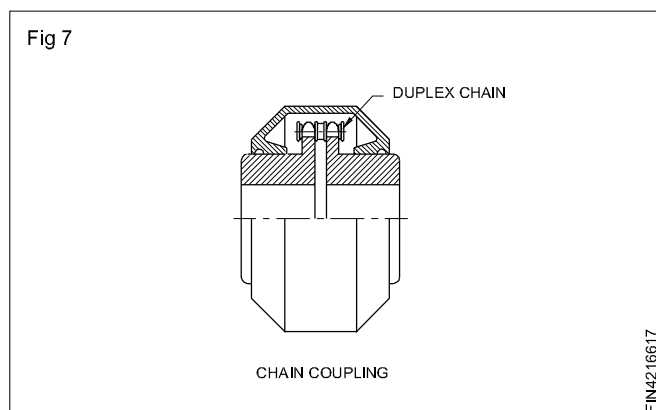
### 5 Bushed Pin type Flanged Coupling (Fig 6)

It is the modified version of a protected flanged coupling. In this, bolts are replaced by bushed pins. The smaller ends of the pins are rigidly fastened by nuts to one of the flanges, while the enlarged ends are covered with flexible material like leather or rubber bushes, in the other flange. The flexible medium takes care of mis - alignment, if any, and acts as a shock absorber. These couplings are used to connect prime mover or an electric motor and a centrifugal pump.



### 6 Chain Coupling (Fig 7)

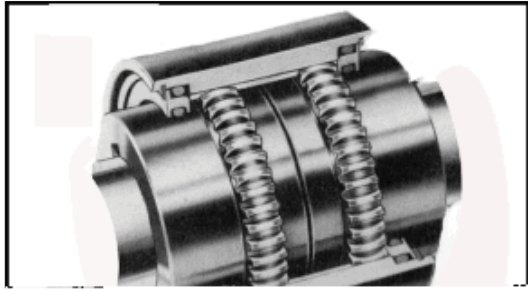
Flanges replaced a sprocket on each shaft. The coupling is by a duplex chain wrapped over both adjacent coupling.



### 7 Gear Coupling (Fig 8)

Both coupling halves have a raised rim machined as an external gear. The sleeve which couples the two shafts comprises two halves bolted together, each half having a machine internal gear. This coupling requires lubrication. The coupling is capable of high speeds and high power capacity.

Fig 8

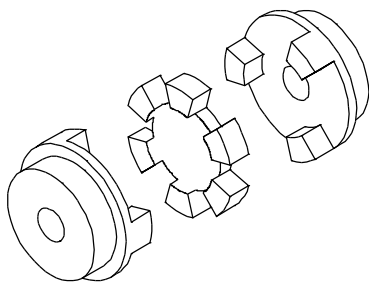


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### 8 Spider (Fig 9)

Both half of the couplings have three shaped lugs. When the coupling halves are fitted together the lugs on one half fit inside the spaces between the lugs on the other side. A rubber insert with six legs fits within the spaces between the lugs. The drive is by the lugs transmitting the torque through the rubber spider spacer. This coupling is only used for low power drives.

Fig 9

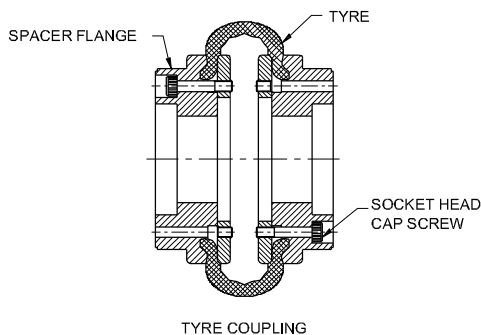


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### 9 Tyre Coupling (Fig 10)

Tyre coupling device is used to reduce vibration in engines and also reduces the torque oscillation. It is available in different versions such as F or H type. And customers can find tyre coupling in various dimensions and in taper lock fitting models. It is applicable in compressors, pumps, blowers. etc.,

Fig 10

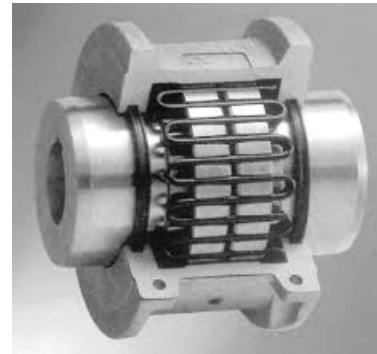


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### 10 Grid Coupling (Fig 11)

Metal coupling that provides positive protection against the damaging effects of shock loads and vibration. Both Grid couplings are an excellent choice where torsional flexibility /vibration damping are primary concerns.

Fig 11



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- Easy to assemble/replace
- Part -for - part interchangeable with industry standard grid coupling designs.
- Coupling sizes 2020 through 2140 in - stock in a range of standard bore sizes.
- Shot - peened tapered grid flex element for long llife.

#### Typical Applications:

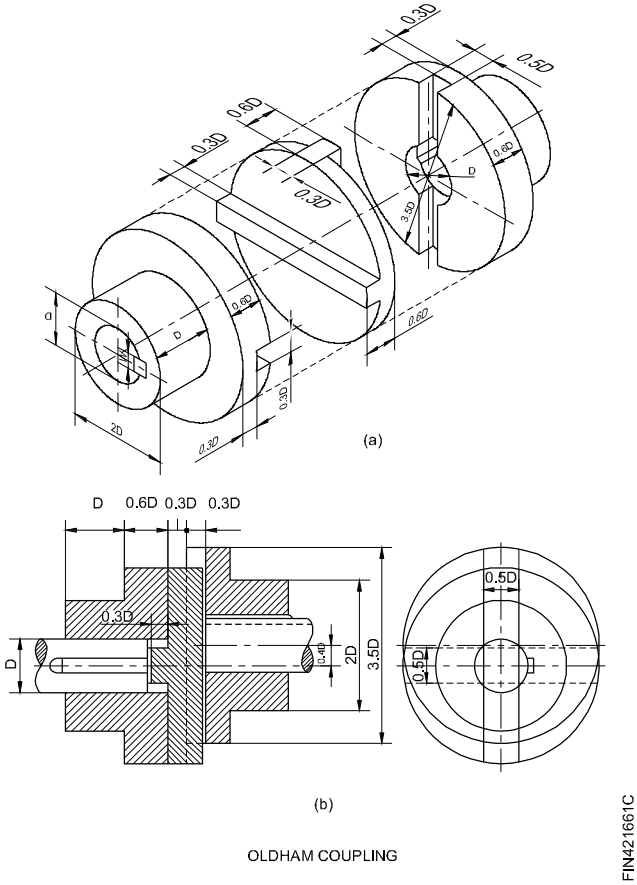
- Pumps
- Gear Boxes
- Electric Motors
- Fans/Blowers
- Conveyors
- Compressors

### 11 Oldham Coupling (Fig12)

It is used to connect two parallel shafts whose axes are at a small distance apart. Two flanges, each having a rectangular slot, are keyed, one on each shaft. The two flanges are positioned such that, the slot in one is at right angle to the slot in the other.

To make the coupling, a circular disc with two rectangular projections on either side and at right angle to each other, is placed between the two flanges. During motion, the central disc, while turning, slides in the slots of the flanges. Power transmission takes place between the shafts, because of the positive connection between the flanges and the central disc.

Fig 12

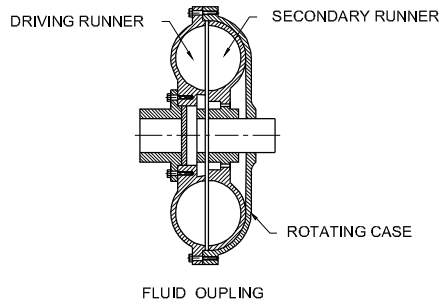


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### 12 Fluid Coupling (Fig 13)

Based on both coupling halves having vanes within a housing (case) containing viscous fluid which rotates with the driving shaft. The rotation is transmitted from one side (Driving) to the other (secondary) via the viscous fluid. The coupling provides a soft start.

Fig 13



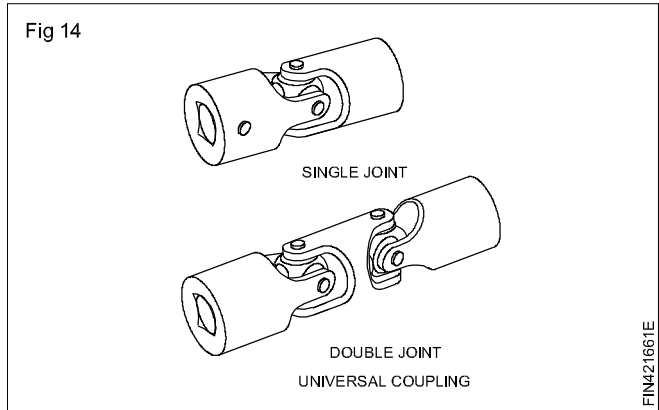
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### 13 Universal Coupling (Fig 14)

Coupling which allows large angle between drive halves (20-30°). Generally based on a yoke mounted on each shaft. Between to yokes in mounted a trunnion cross.

Needle bearings are used at the bearing points between the cross and the yokes. These type or units are used in pairs on carden shafts. Uses widely on rear wheel drive vehicle propshafts.

Fig 14

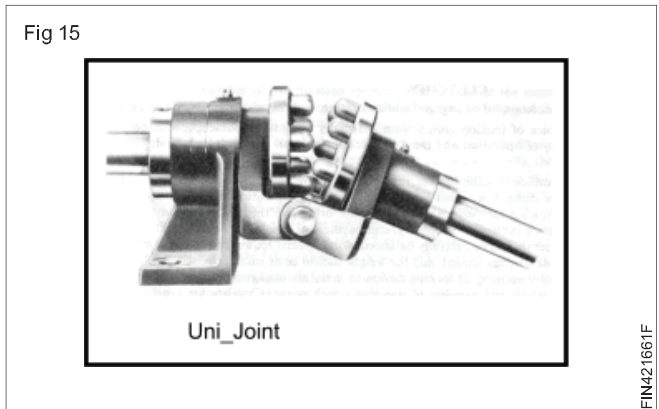


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### 14 Universal Coupling - Uni - Joint (Fig 15)

The other name of universal coupling is hook coupling. Simplest type of coupling which allows large angle between drive halves. Each side of coupling includes protruding pins. The halves of the coupling are fastened in a pivoting assembly. At all angles up to about 40° the pins interlock with each other and rotation on one half forces the other half to rotate. Low power use only. Not smooth. Not reliable. Really only suitable for remote manual operations.

Fig 15



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