





# **PICTORIAL HANDBOOK OF TECHNICAL DEVICES**

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# **Pictorial Handbook of Technical Devices**

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## **I MACHINE TECHNOLOGY**

## I MACHINE TECHNOLOGY

### A—Machine Elements

**I—SPRINGS**—Elements to give sizable deflection under load. Used to store energy, alter vibratory characteristics, reduce shockloads, restore energy, or measure force (scales).

**a—Helical compression** spring, plain.

**b—Helical compression** spring, squared and ground ends.

**c—Helical tension** spring with full round hook.

**d**—Same as “c”, except threaded plug to fit spring.

**e**—Same as “c”, except coned end with swivel hook.

**f—Volute spring**, wound in form of paraboloid.

**g—Conical spring**, wound in form of triangle.

**h—Single volute band** spring, telescoping, saves space. Compression at rapidly increasing spring rate.

**j—Torsion** spring, resists torque.

**k—Double volute** spring, for extension or compression. Used in mattresses, seats etc.

**l—Flat spiral** spring for clocksprings etc.

**m—Torsion** spring of ribbon stock.

**n—Torsion wire** spring, resists torque.

**o—Leaf spring** with link suspension.

**p—Ribbon torsion** spring. Spring action depends on material.

**q—Belleville spring**.

**r—Slotted washer spring**.

**s—Ribbon torsion** spring.

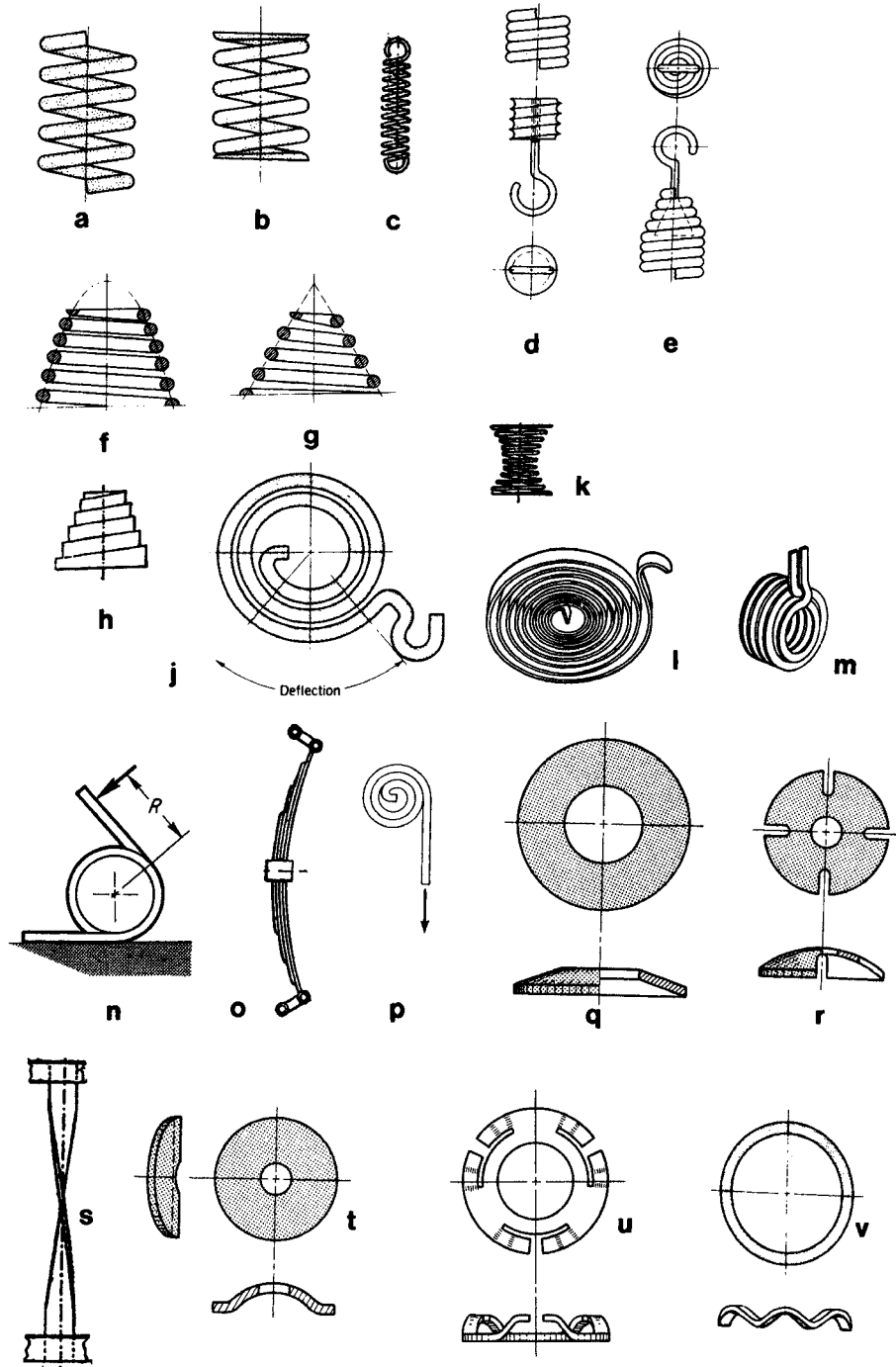
**t—Curved washer** spring.

**u—Finger washer** spring.

**v—Wave washer** spring.



SPRINGS



## I MACHINE TECHNOLOGY

### A—Machine Elements

#### I—SPRINGS (Cont)

**w**—**Split ring** spring, used on drafting instruments, tools etc.

**x**—**Air cushion** or spring, piston type, like dashpot.

**y**—**Sear** spring types, as used on guns.

**z**—**Flat** spring.

**aa**—**Flat spiral** spring.

**ab**—**Compound curved washer** spring.

**ac**—**Compression** spring used for tension load.

**ad**—**Hair** spring, for precise repeatable torque.

**ae**—**Neg'ator** spring. A constant force or torque spring, regardless of deflection. (Hunter Spring)

**af**—**Motor Spring**. Delivers constant torque. Principle: Wound spring, when released recurls to preset curvature. (Hunter Spring)

**ag**—**Neg'ator** Clamp. Provides constant pressure for widely adjustable opening. (Hunter Spring)

**ah**—**Torsion Bar** spring, as used on automobiles.

**aj**—**Flex'ator** spring. Load substantially constant over working range.

**ak**—**Concentric** springs for higher capacity. Note the left and right helix to avoid jamming.

**al**—**Rolamite**. Wilkes Rolamite can be designed with any desired force-deflection characteristic.

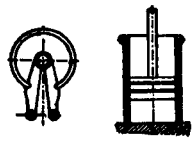
**am**—**Spindle** shaped compression spring.

**ap**—**Liquid** spring, compression.

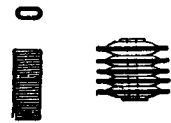
**ar**—**Liquid** spring, tension.

**as**—**Liquid** spring, double acting. Liquid springs are not shock absorbers, but act in a similar way.

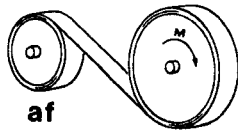
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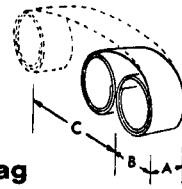
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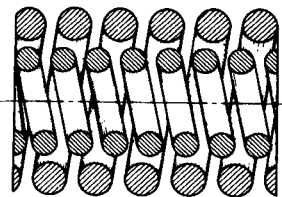


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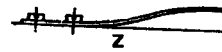


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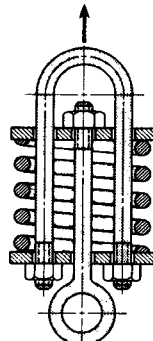
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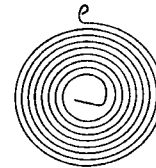
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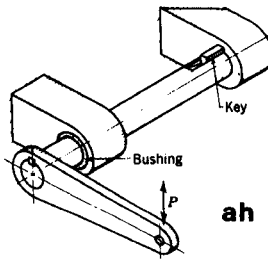
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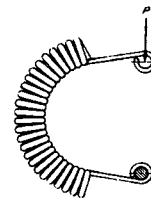
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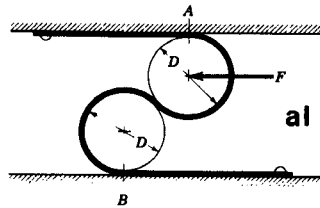
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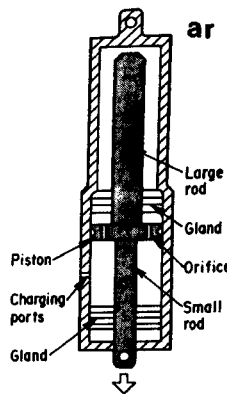
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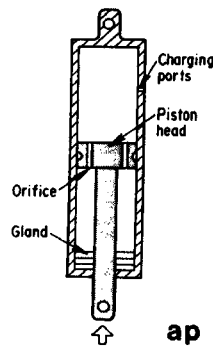
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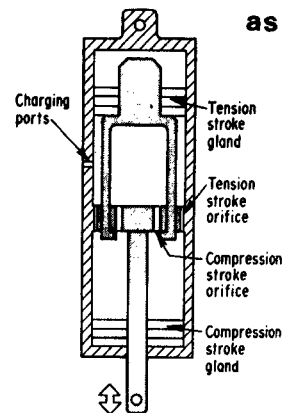
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## I MACHINE TECHNOLOGY

### A--Machine Elements

**2--CLUTCHES AND BRAKES**—Clutches are elements used to connect and disconnect shafts. The following four major classifications may be used: positive clutches, friction clutches, fluid clutches (hydraulic or pneumatic) and electromagnetic clutches. Brakes connect a moving member to a stationary frame.

**a--Spiral-jaw** clutch. Used for positive, unidirectional drive.

**b--Square-jaw** clutch. This unit can transmit torque in either direction.

**c--Conical** clutch. Was used for cars.

**d--Friction** clutch face with V-grooves.

**e--Spring friction** clutch.

**f--Adjustable friction** clutch with double grip bearings.

**g--Cone friction** clutch.

**h--Automotive type single plate** clutch. Driven disc has friction material on both sides, and transmits torque through splined shaft. Flywheel and pressure plate are connected to engine crankshaft. (Borg-Warner Corp. Rockford Clutch Div.)

**j--Double toggle-joint friction** clutch.

**k--One-way** clutches. They run free in one direction, and grip instantaneously in the other direction. Also called overrunning or freewheeling clutches.

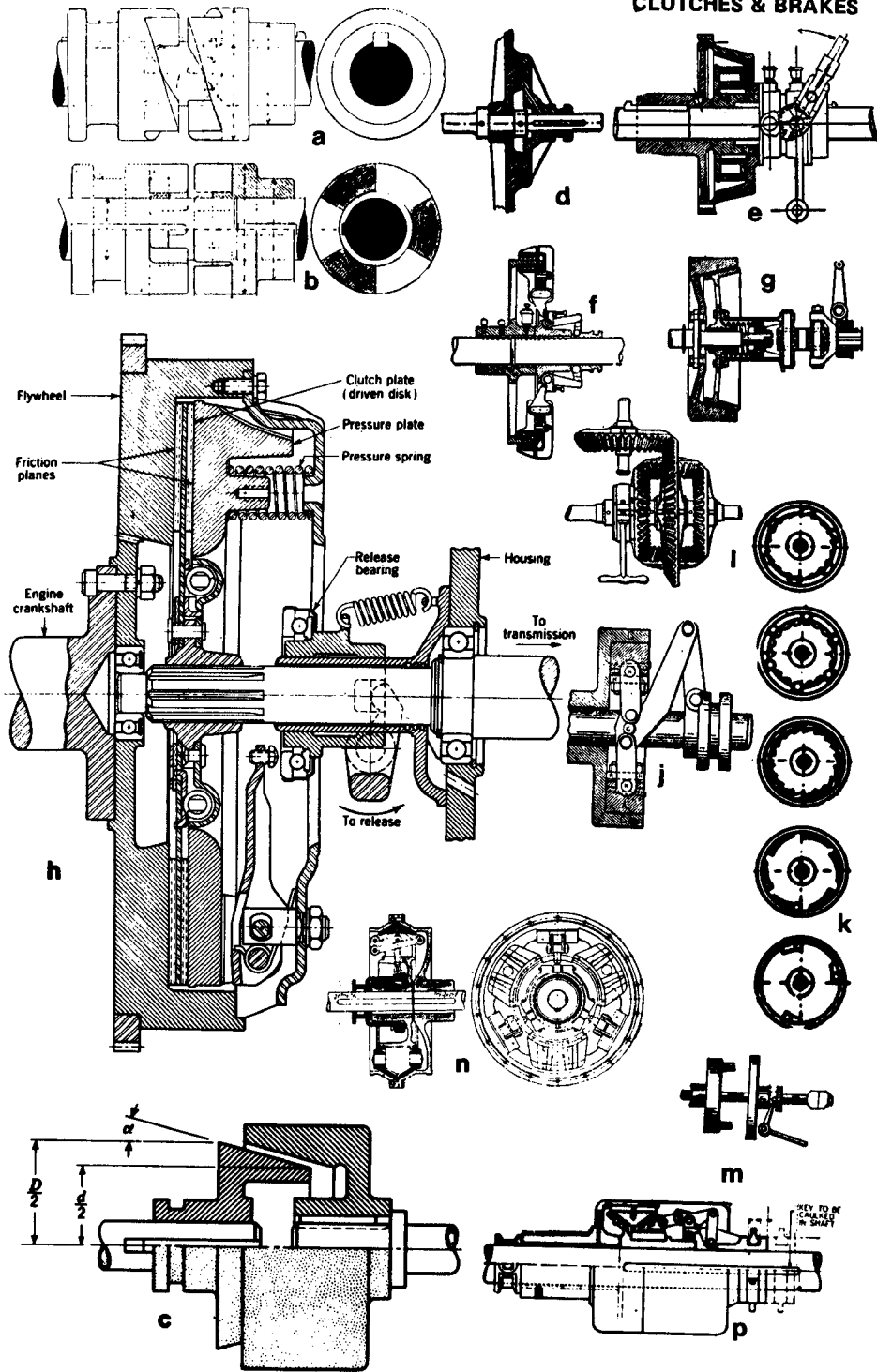
**l--Friction clutch bevel gear.**

**m--Pin** clutch. Bell crank operates splined disc. Pins engage holes in disc.

**n--Friction** clutch of German design.

**p--Twin Cone Friction** clutch.

# CLUTCHES & BRAKES



## I MACHINE TECHNOLOGY

### A—Machine Elements

#### 2—CLUTCHES AND BRAKES (Cont)

**r—Maxitorq multiple-disc clutch.** Designed for wet or dry operation. If sleeve moves to left, wedge depresses lever which in turn presses the plates together. Position of adjusting ring determines plate pressure. (Carlyle Johnson Machine Company)

**s—Fawick Airflex clutch.** Clutch actuated by compressed air. The actuating tube is part of the driving member, and carries the friction shoes. When compressed air expands tube, shoes clutch driven member. Torque is a function of the air pressure. (Fawick Airflex Division, Eaton, Yale and Towne Inc.)

**t—Fawick clutch, standardized for punch presses.** To save power for short-time peak loads, the clutch is incorporated into flywheel. Air cylinder, timing switch etc. are supplied as standard unit.

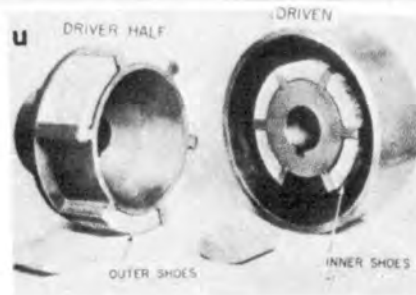
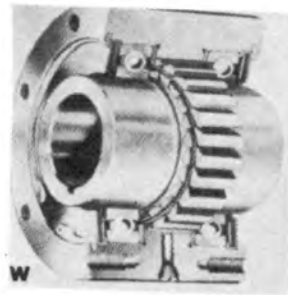
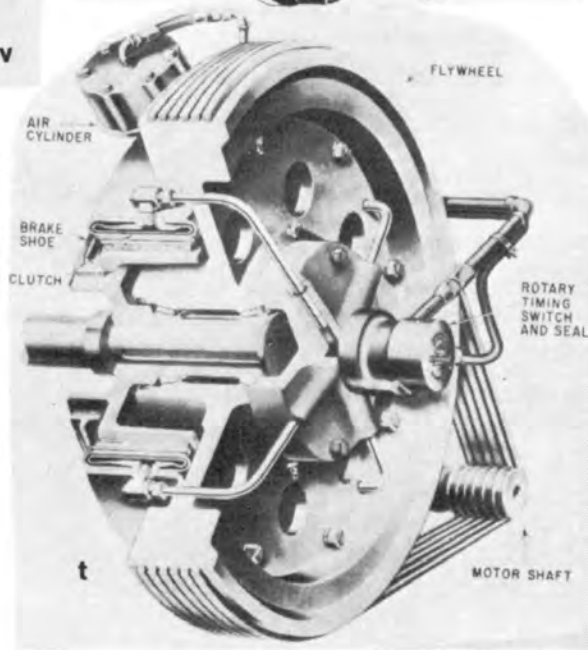
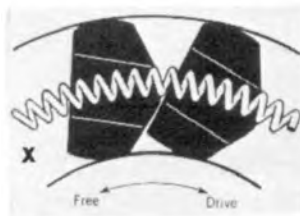
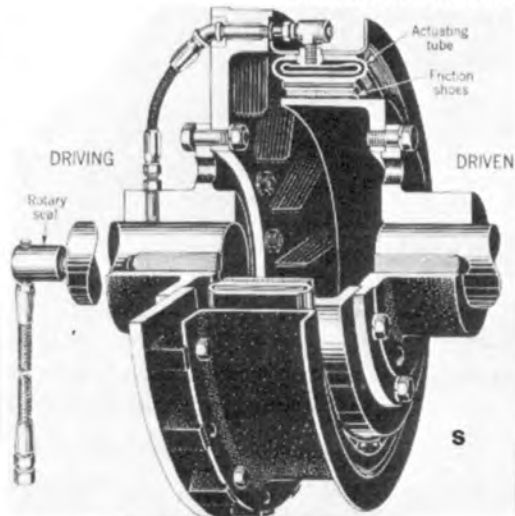
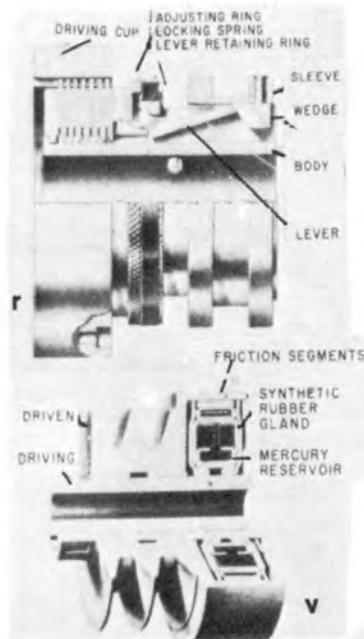
**u—Centrifugal clutch.** For smooth load pick up. Clutch engages through centrifugal force so motor can start easily. Note, that as driven member comes up to speed, the total torque capacity increases, since the shoes in the driven half engage the driver section. (Formsprag Company)

**v—Mercury centrifugal clutch.** As driving member of clutch increases speed, centrifugal force drives mercury out of reservoir, forcing shoes against drum with integral pulley. (Automatic Steel Products, Inc.)

**w,x—Formsprag overrunning clutch.** Specially shaped wedges “x” are held in contact with inner and outer race by garter spring. In the drive direction, wedges (sprags) lock the races. Freewheeling, sprags tilt and sliding action occurs. (Formsprag Company)

**y—Caliper disc brake.** Wheel disc rotates, caliper is on non-rotating member. Actuated, caliper presses shoes against disc. (Aviation Products Division, The Goodyear Tire and Rubber Company)

# CLUTCHES & BRAKES



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