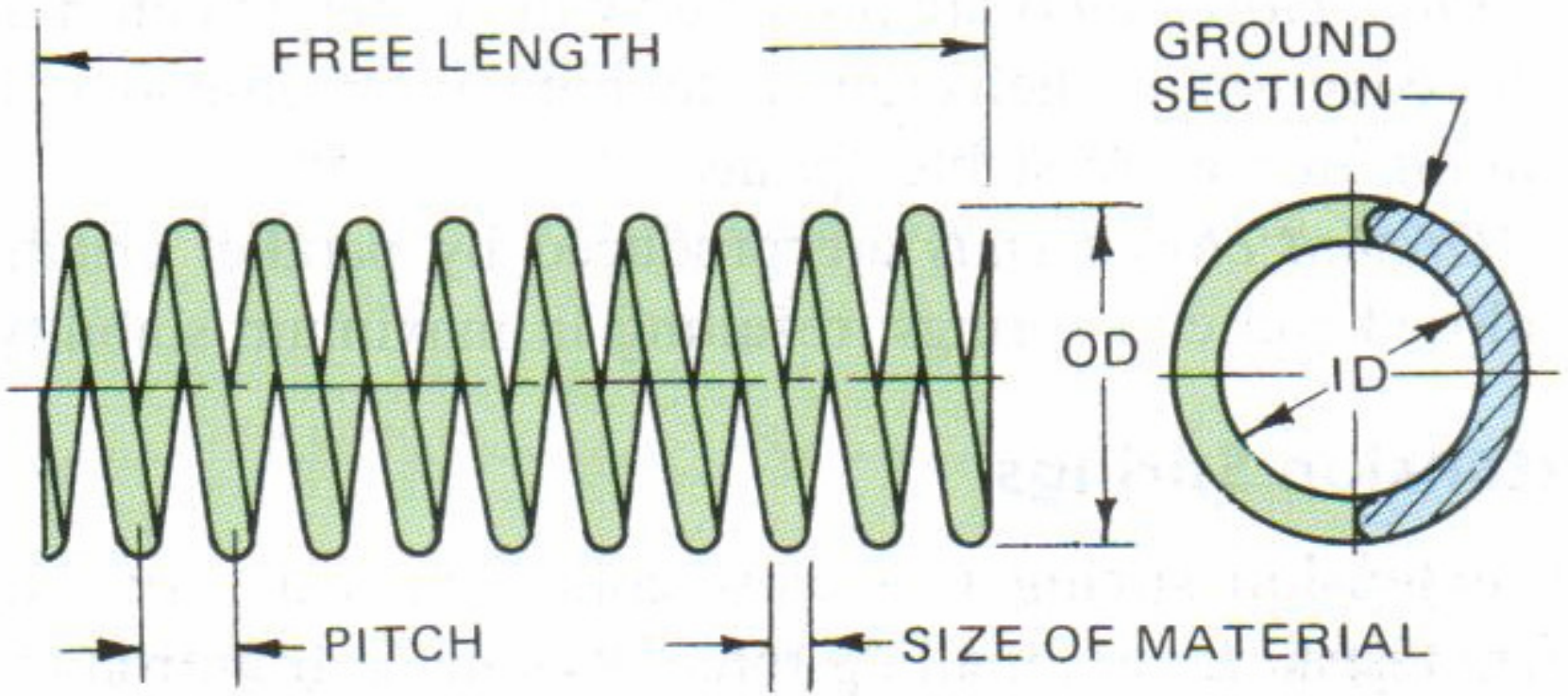
SPRINGS (Yaylar)

A *spring* can be defined as an elastic body designed to store energy when deflected. Springs are classified according to their geometric form: helical or flat.



Spring nomenclature.

Types of Springs

The type or name of a spring is determined by characteristics such as function, shape of material, application, or design.

Compression Springs

A **compression spring** is an open-coiled helical spring that offers resistance to a compressive force

Extension Springs

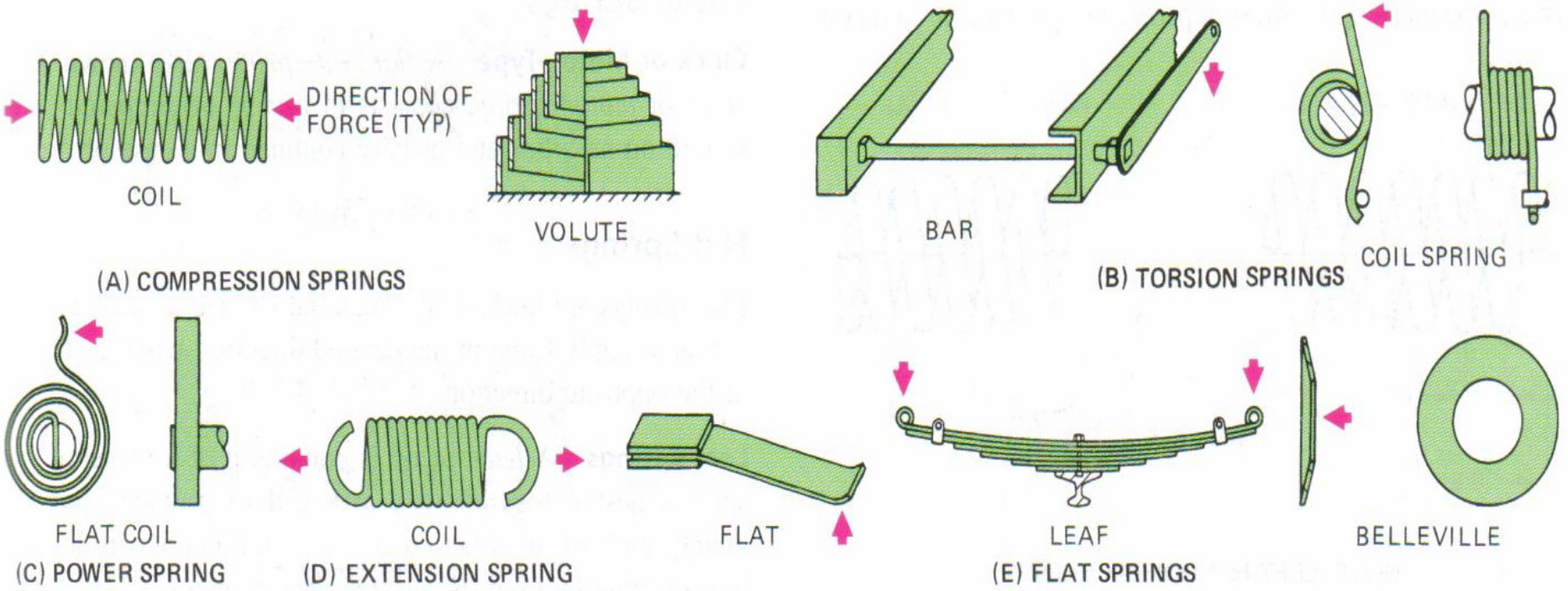
An **extension spring** is a close-coiled, helical spring that offers resistance to a pulling force. It is made from round or square wire

Torsion Springs

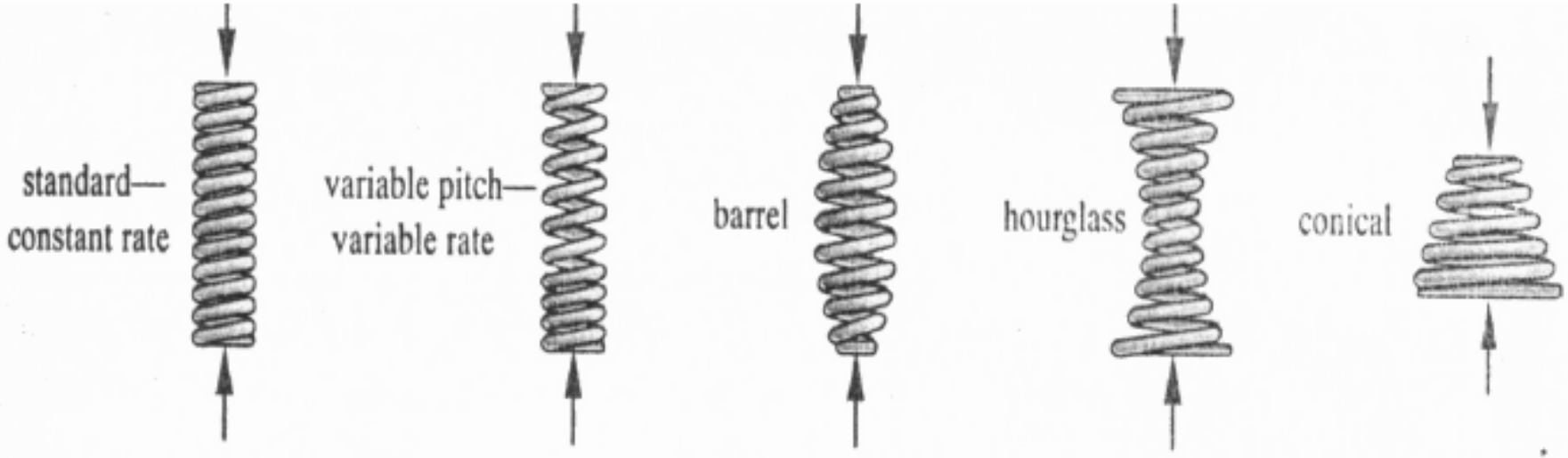
Springs exerting pressure along a path that is a circular arc, or in other words, providing a torque (turning action), are called **torsion springs**, motor springs, power springs, and so on. The term *torsion spring* is usually applied to a helical spring of round, square, or rectangular wire, loaded by torque.

Belleville Springs *Belleville springs* are washer-shaped, made in the form of a short, truncated cone.

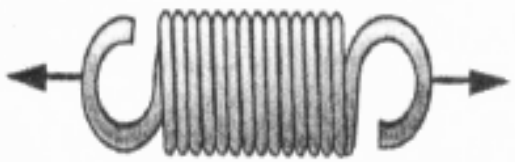
Belleville washers may be assembled in series to accommodate greater deflections, in parallel to resist greater forces, or in combination of series and parallel,



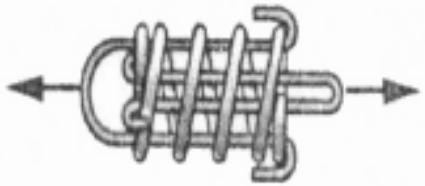
Types of springs.



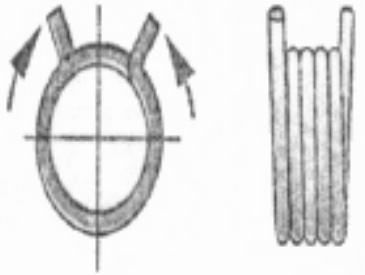
(a) Helical compression springs. *Push*—wide load and deflection range—round or rectangular wire. Standard has constant coil diameter, pitch, and rate. Barrel, hourglass, and variable-pitch springs are used to minimize resonant surging and vibration. Conical springs can be made with minimum solid height and with constant or increasing rate.



(b) Helical extension springs. *Pull*—wide load and deflection range—round or rectangular wire, constant rate.

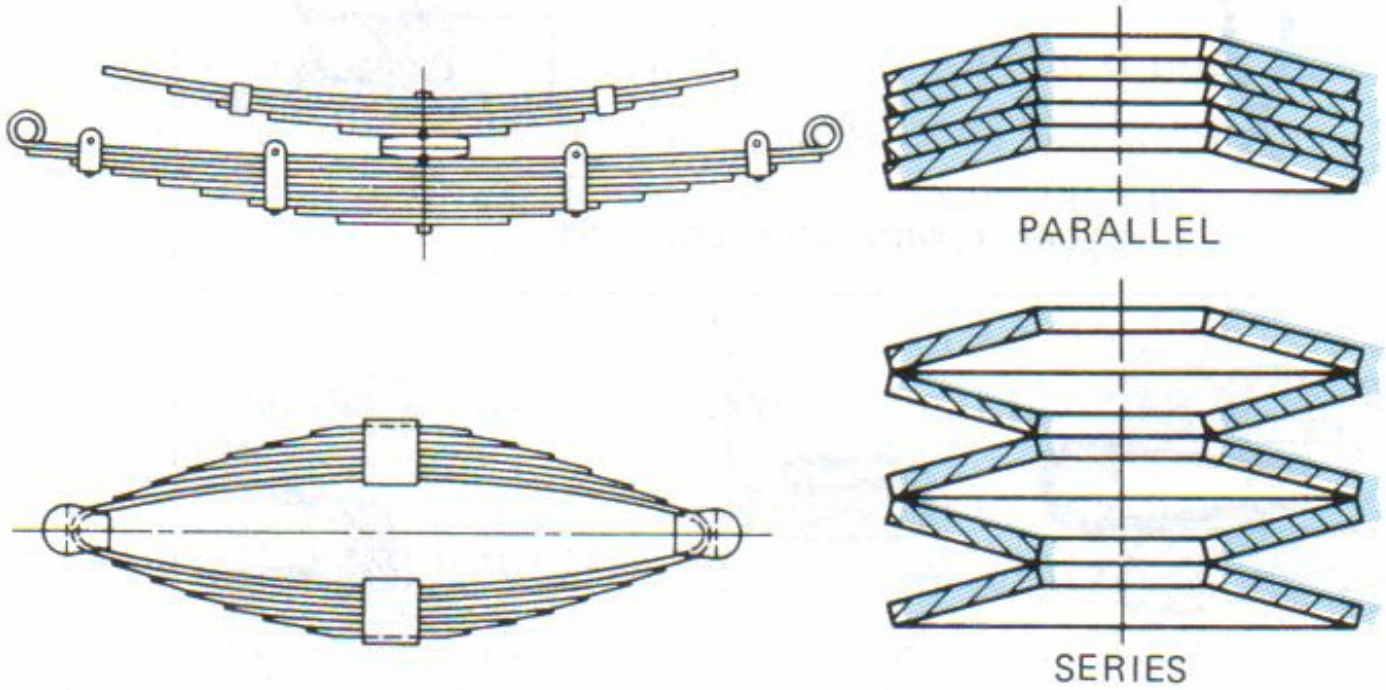


(c) Drawbar springs. *Pull*—uses compression spring and drawbars to provide extension pull with fail-safe, positive stop.



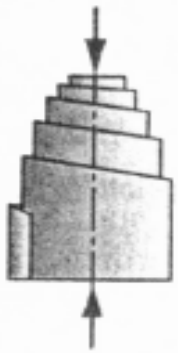
(d) Torsion springs. *Twist*—round or rectangular wire—constant rate.

(e) Spring washers. *Push*—Belleville has high loads and low deflections—choice of rates (constant, increasing, or decreasing). Wave has light loads, low deflection, uses limited radial space. Slotted has higher deflections than Belleville. Finger is used for axial loading of bearings. Curved is used to absorb axial end play.

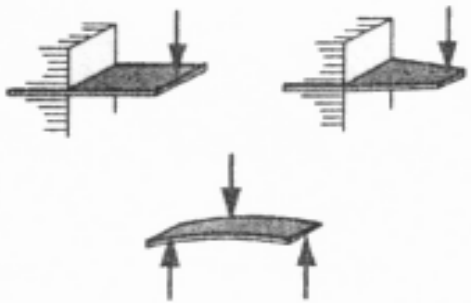


(A) LEAF SPRING

(B) BELLEVILLE SPRING

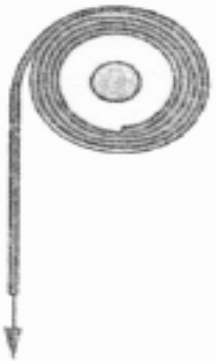


(f) Volute spring. *Push*—may have an inherently high friction damping.

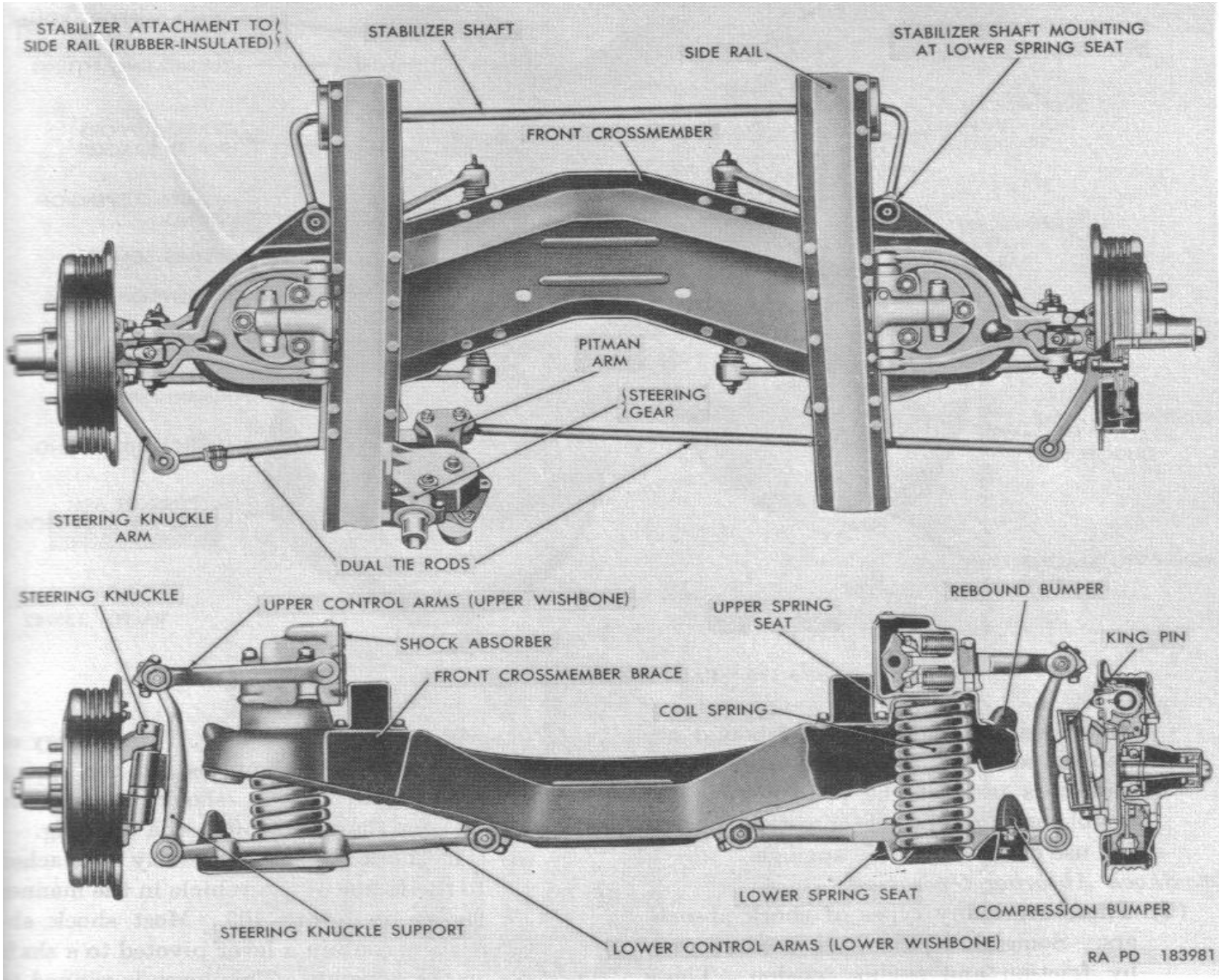


(g) Beam springs. *Push* or *Pull*—wide load but low deflection range—rectangular or shaped cantilever, or simply supported.

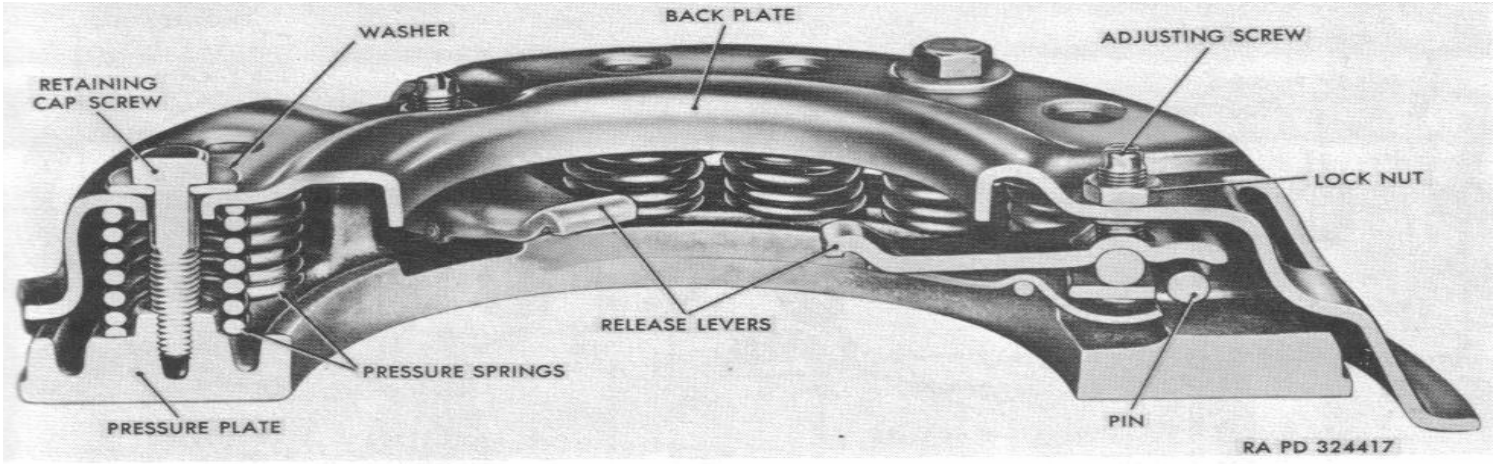
(h) Power or motor springs. *Twist*—exerts torque over many turns. Shown in, and removed from, retainer.



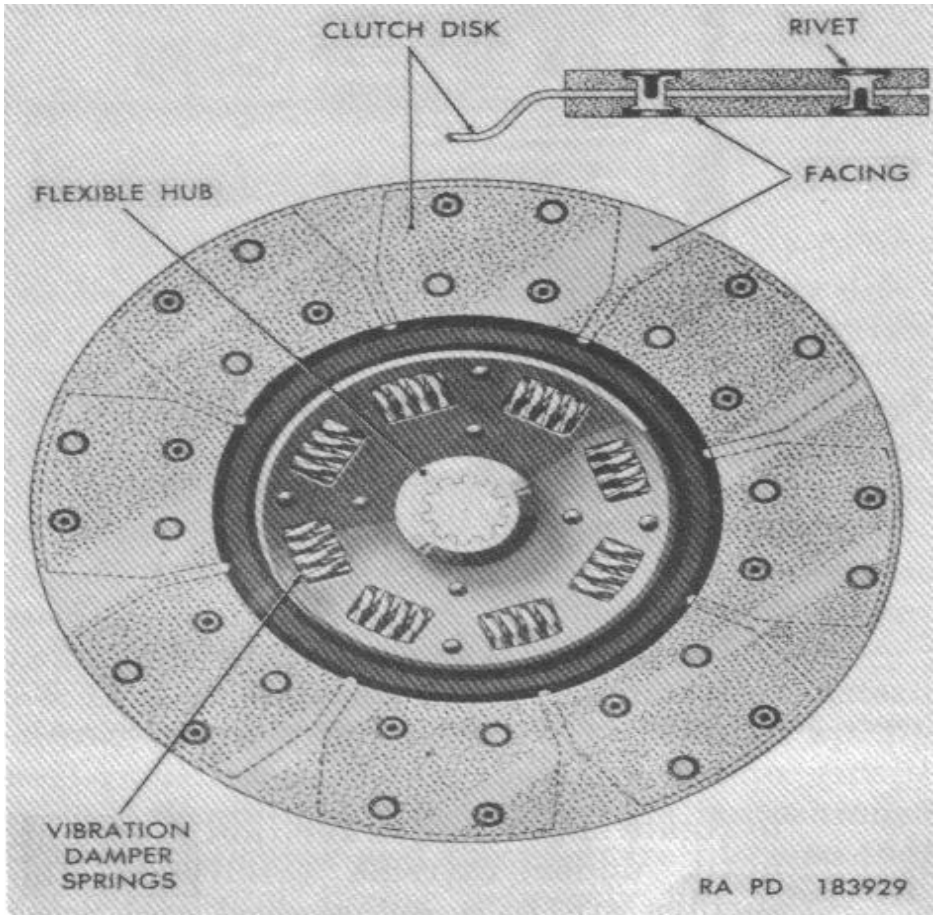
(i) Constant Force. *Pull*—long deflection at low or zero rate.

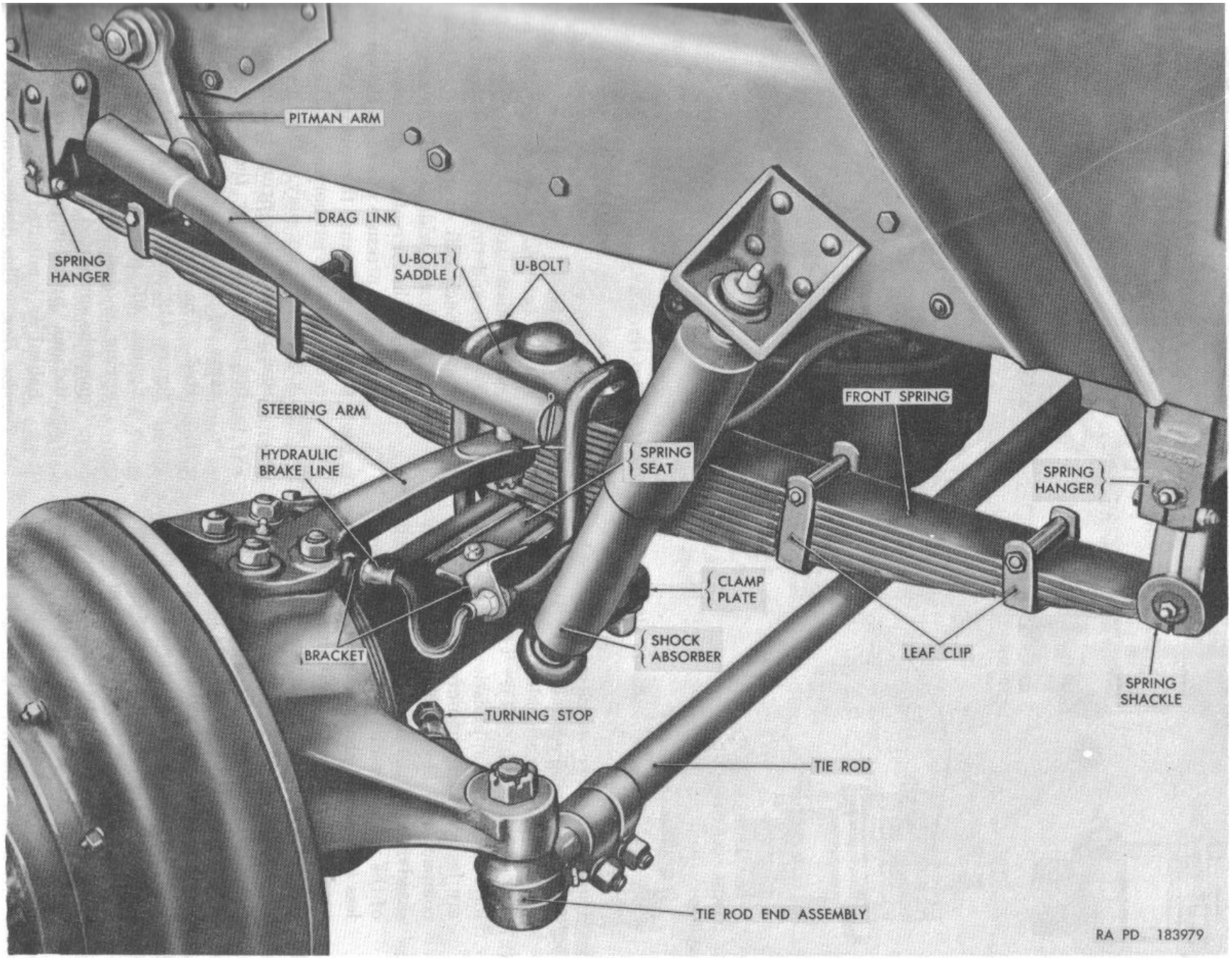


Front-axle coil spring suspension.

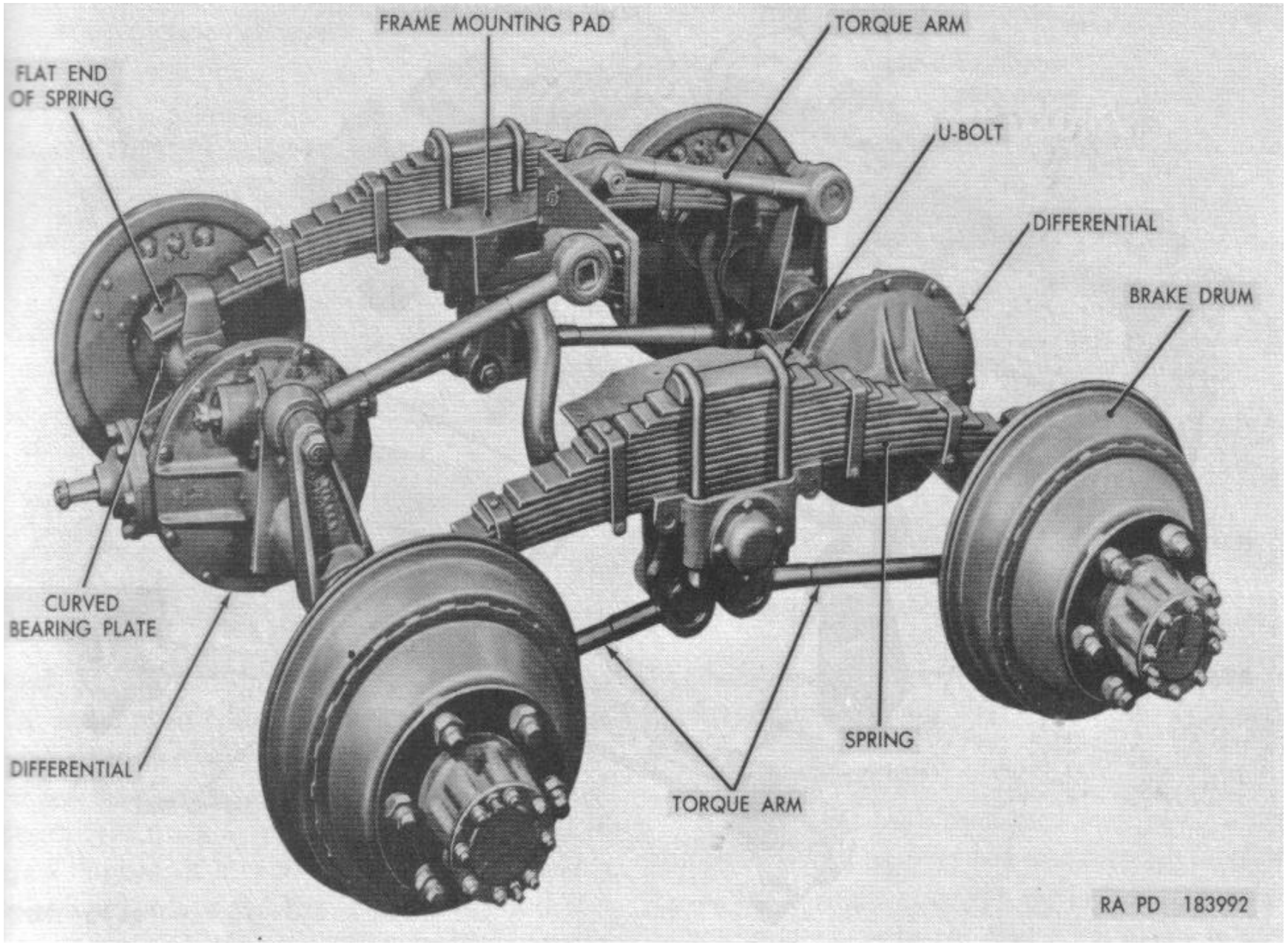


Helical pressure spring disk-type clutch.

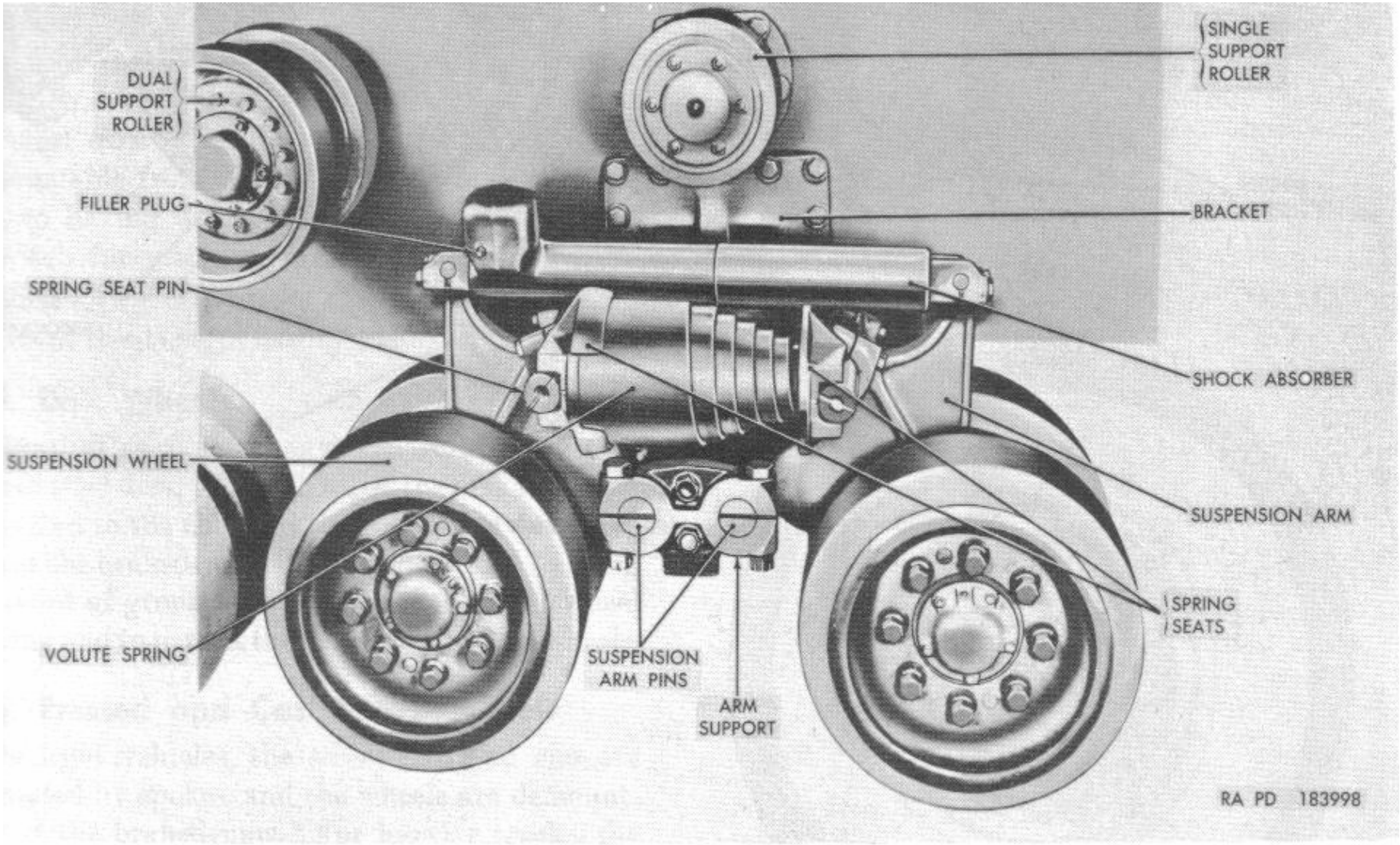




Front axle leaf spring and shock absorber.



Variable-load spring arrangement.



Horizontal suspension unit.

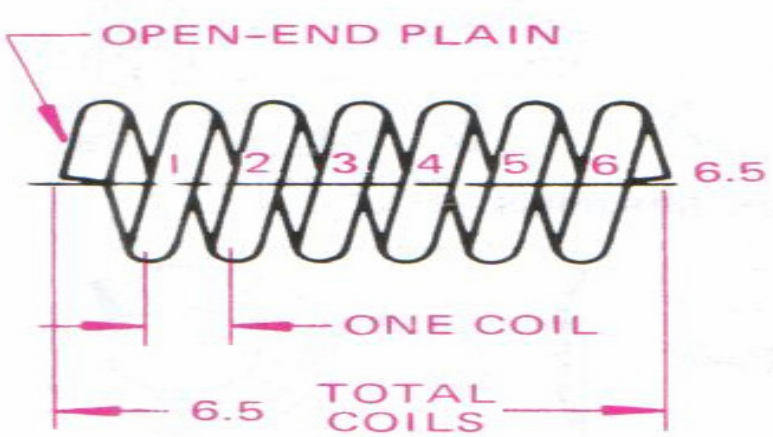
Compression Spring Ends the ends commonly used on compression springs.

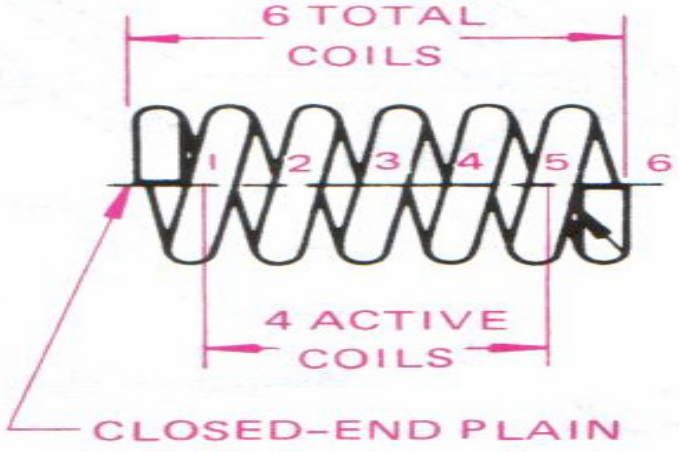
Plain open ends are produced by straight cutoff with no reduction of helix angle The spring should be guided on a rod or in a hole to operate satisfactorily.

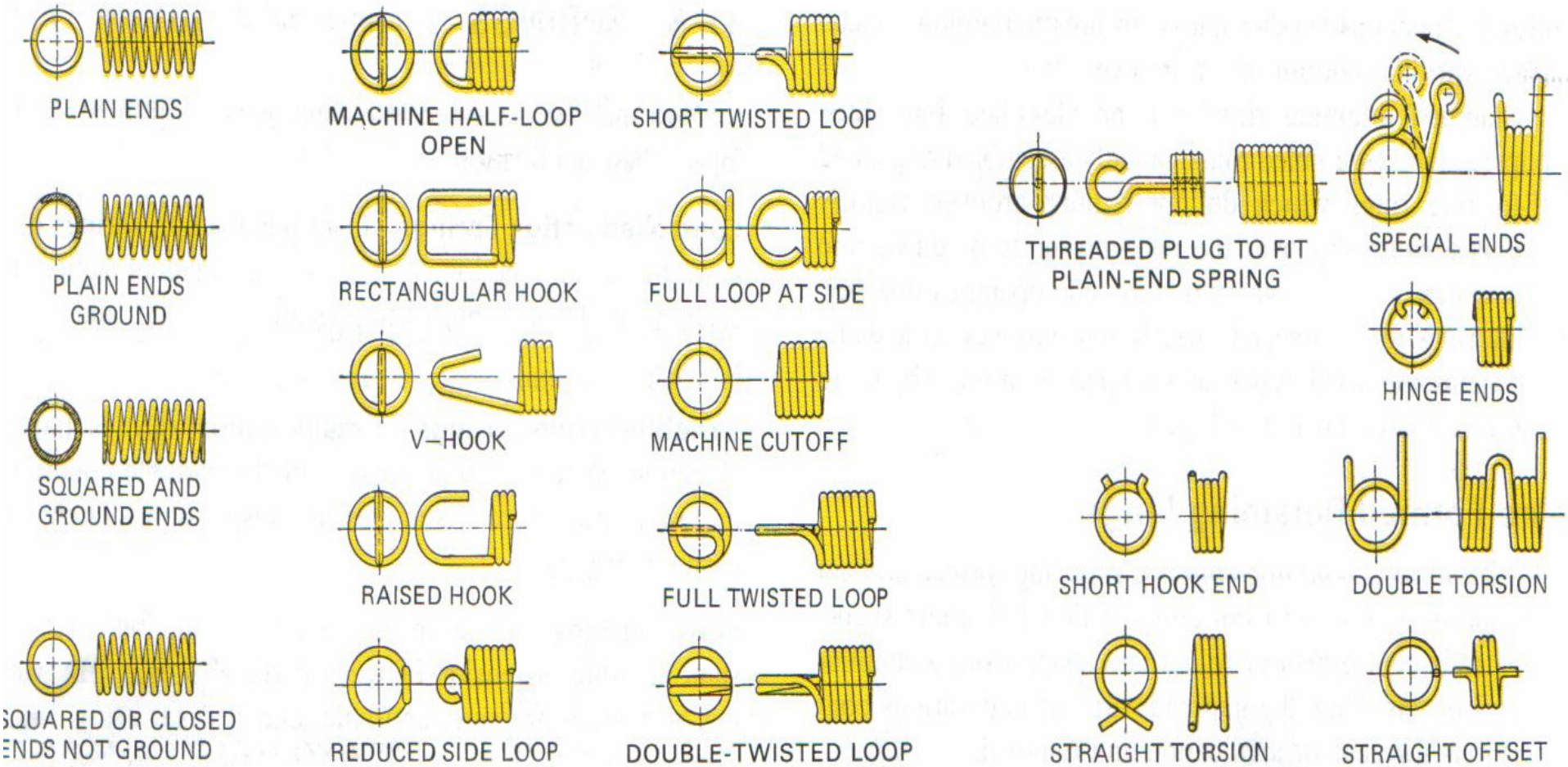
Ground open ends are produced by parallel grinding of open-end coil springs. Advantages of this type of end are improved stability and a larger number of total coils.

Plain closed ends are produced with a straight cutoff and with reduction of helix angle to obtain closed-end coils, resulting in a more stable spring.

Ground closed ends are produced by parallel grinding of closed-end coil springs, resulting in maximum stability.

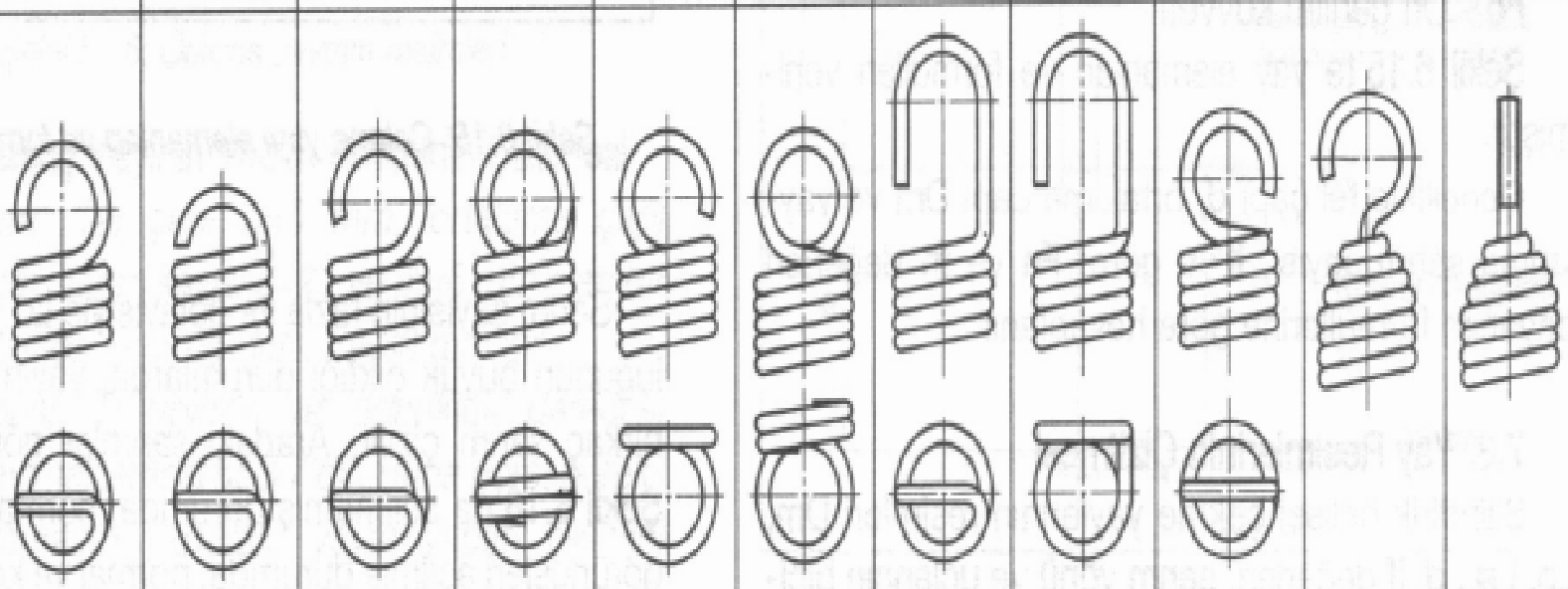


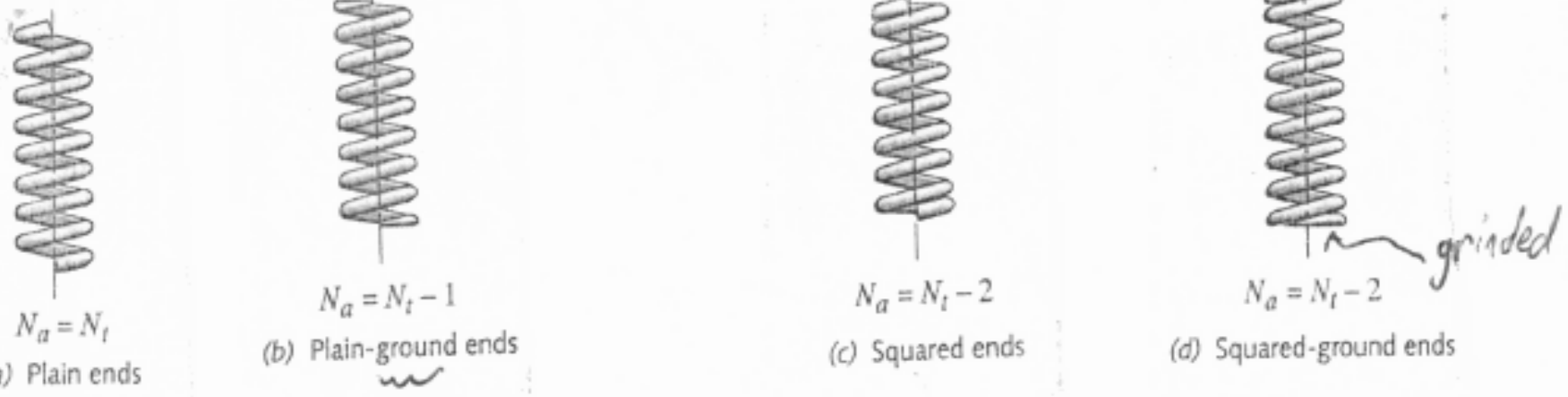




End styles for helical springs.

YAYLARIN BAŞ ŞEKİLLERİ, TİPLERİ VE LH DEĞERLERİ TS 1442

Tip	T I	T II	T III	T IV	T V	T VI	T VII	TVIII	T IX	T X	TXI
LH	0,8.Di	0,5.Di	0,9.Di	0,9.Di	1.Di	1.Di	0,8.Di	0,8.Di	1,1.Di	1,1.Di	
Şekil											



if $d_{wire} > 0.5$

open ended

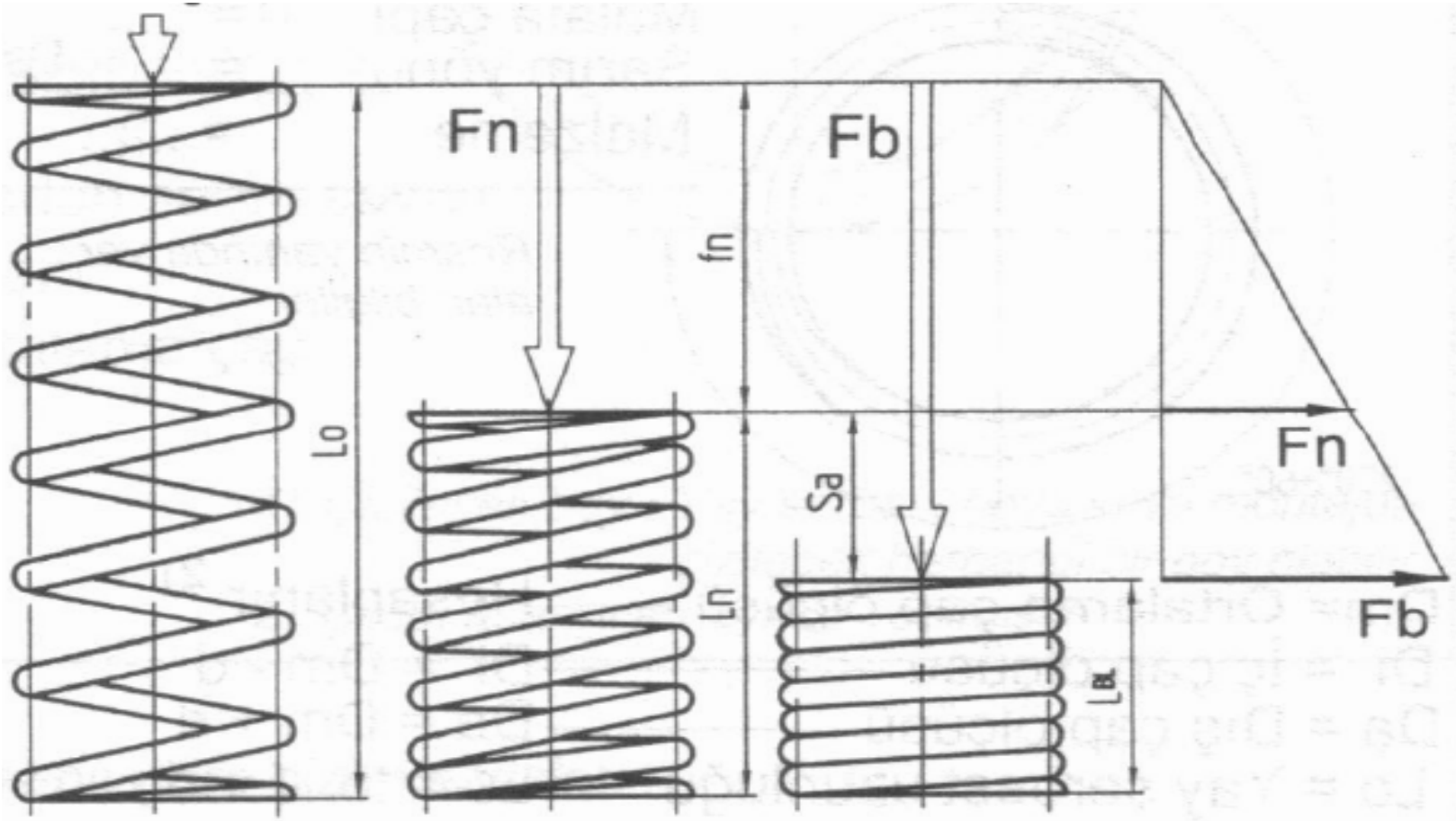
closed ends

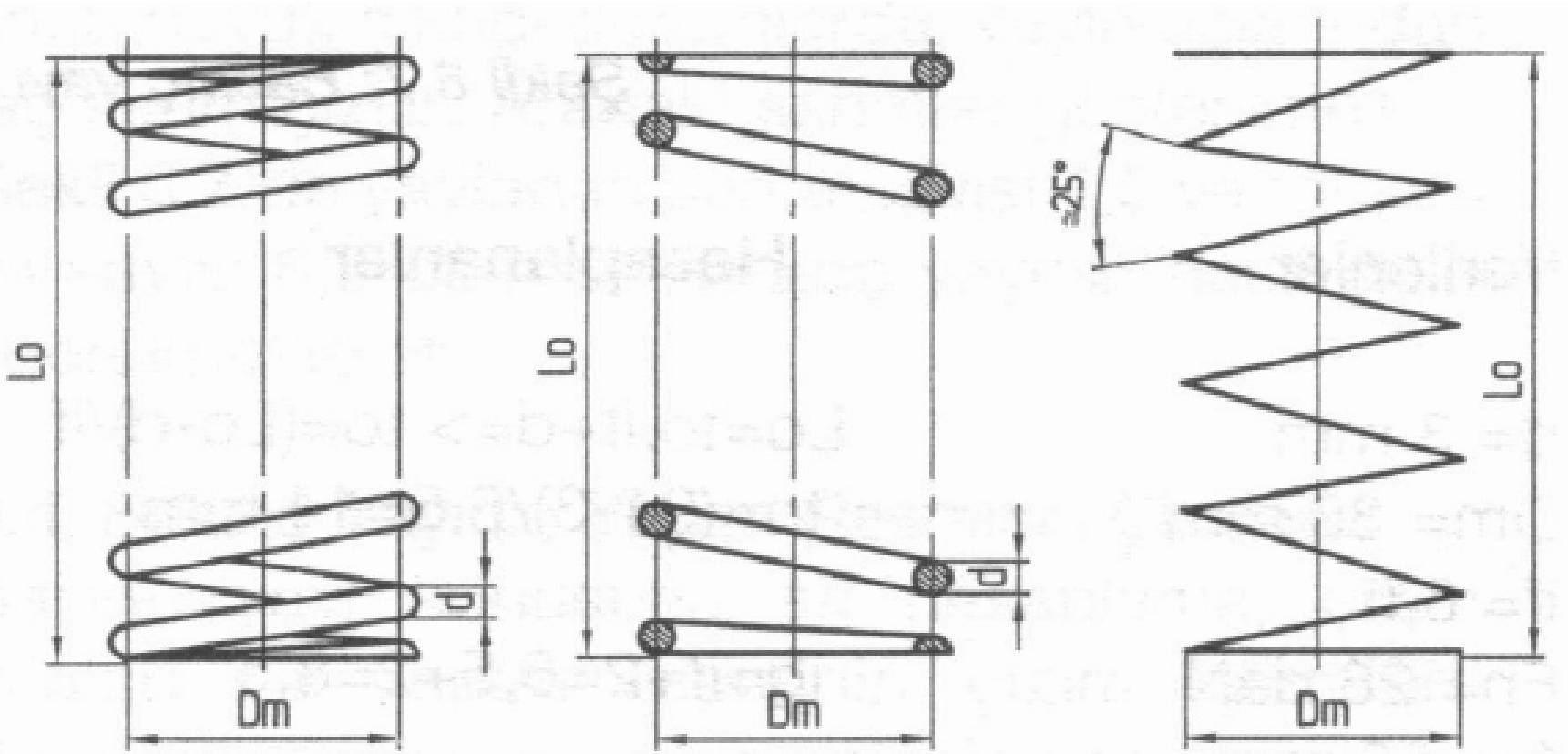
N_a: # of active coils

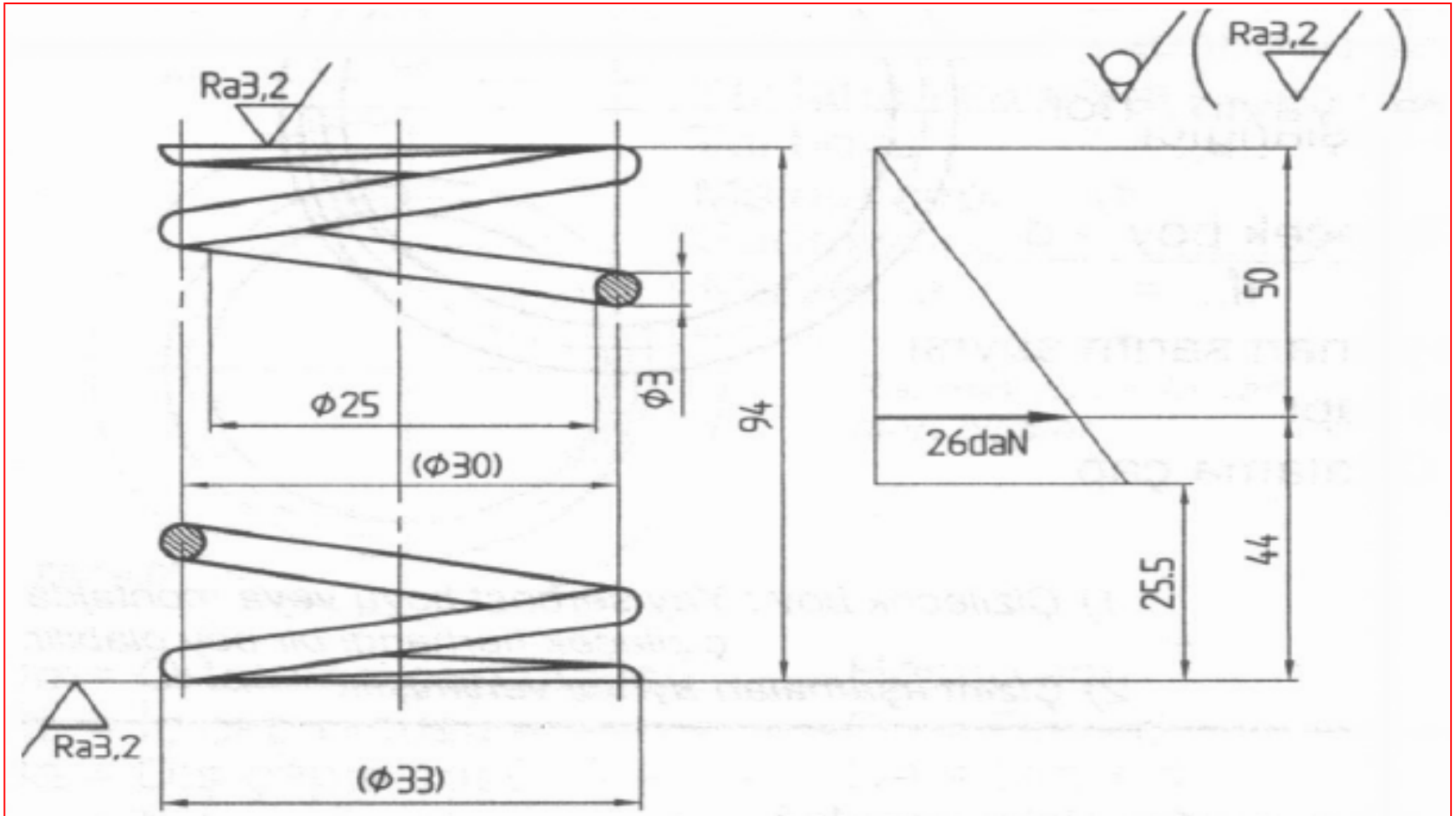
N_t: # of total coils

Four Styles of End-Coil Treatments for Helical Compression Springs

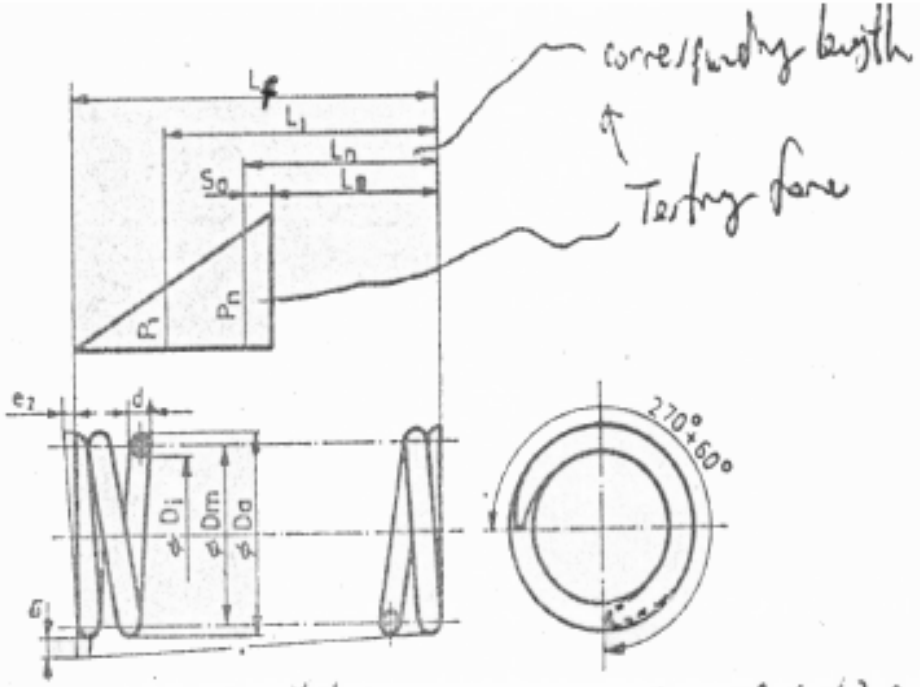
Spring Force Diagram

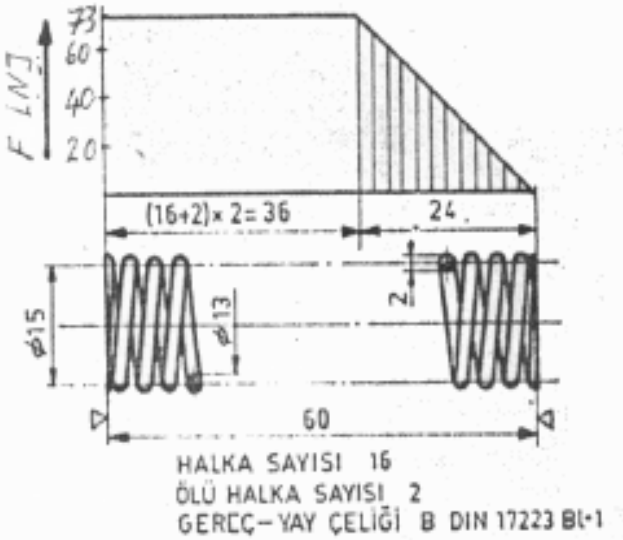



Lo
d
Dm
Lo
d
Dm
≈25°
Lo
Dm



Number of coils	= 8,5
Num. Of active coil	= 6,5
Wire length	= 800 mm
Rod diameter	= Ø21.6
Material	= 55Si7





coil pitch

$L_f = n * p + d_{wire}$

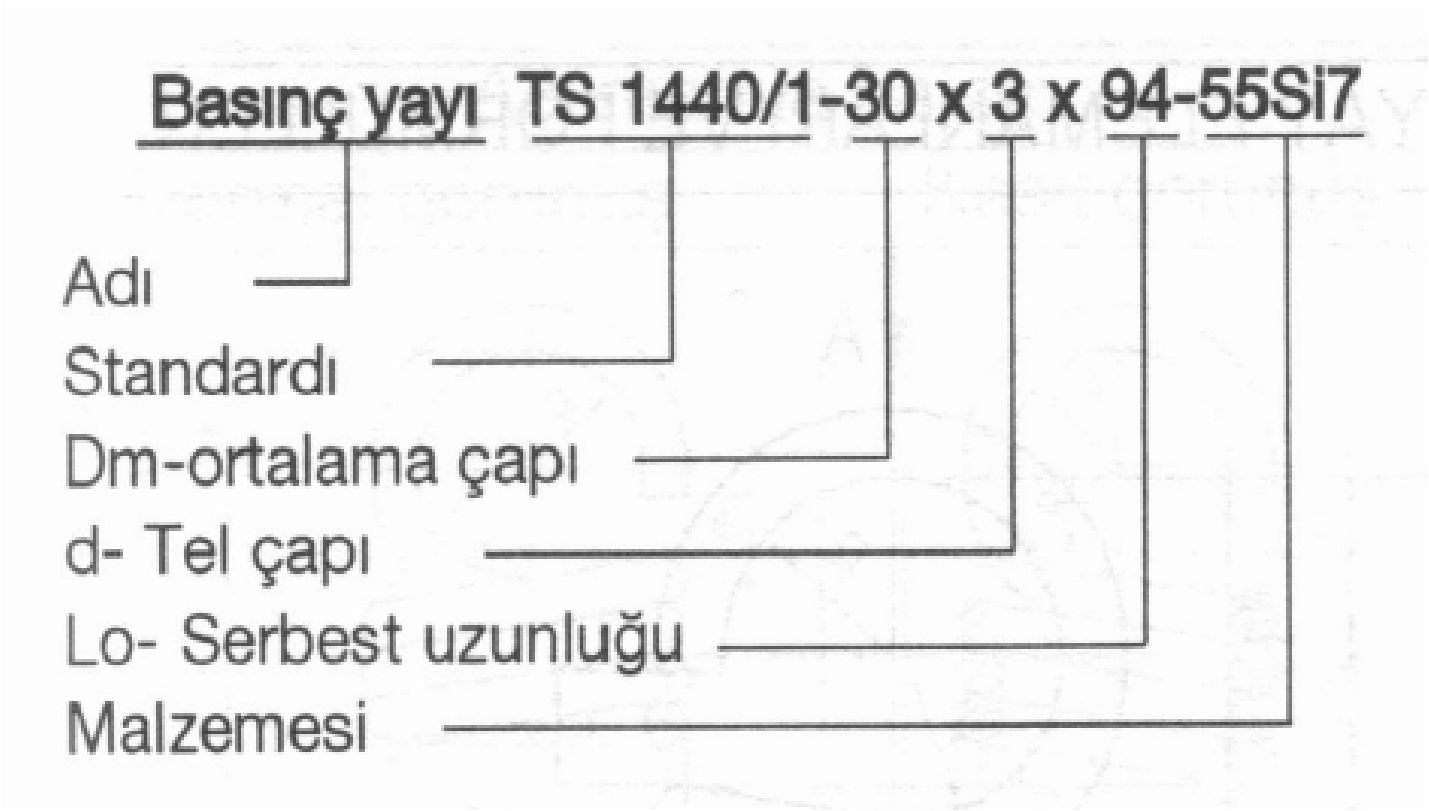
Free length

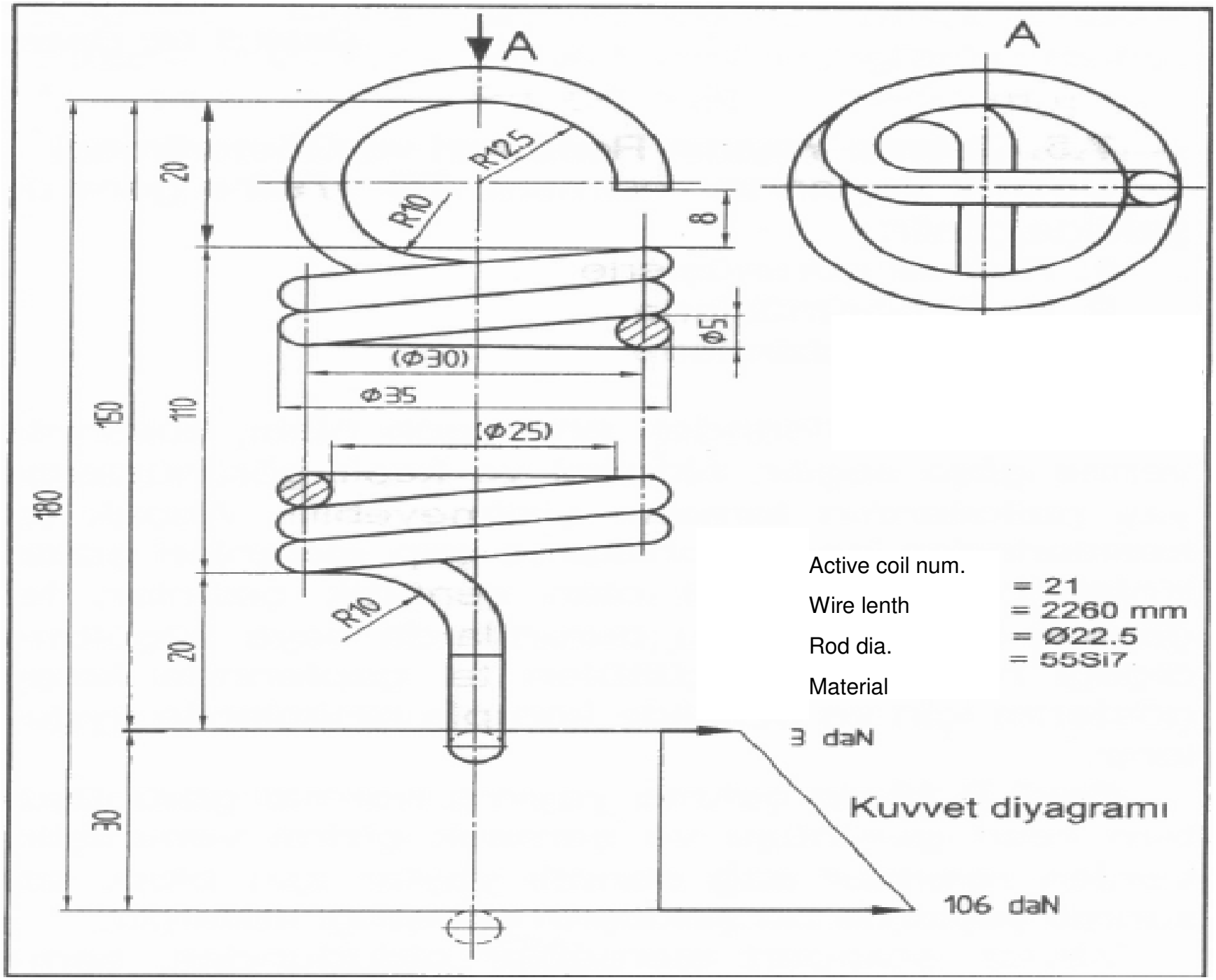
Working (Detail) Drawing of Compression Springs

Compression spring representation on a title block : eg. Basınç yayı 2.5 x 20 x 82 DIN 2096

d_w — coil mean dia. — L_f

Compression spring designation note in accordance with Turkish Standards




A
A
R125
R10
8
20
150
180
110
20
30
Ø5
(Ø30)
Ø35
(Ø25)
R10
Active coil num. = 21
Wire lenth = 2260 mm
Rod dia. = Ø22.5
Material = 55Si7
3 daN
Kuvvet diyagramı
106 daN

Tension spring designation note in accordance with Turkish Standards