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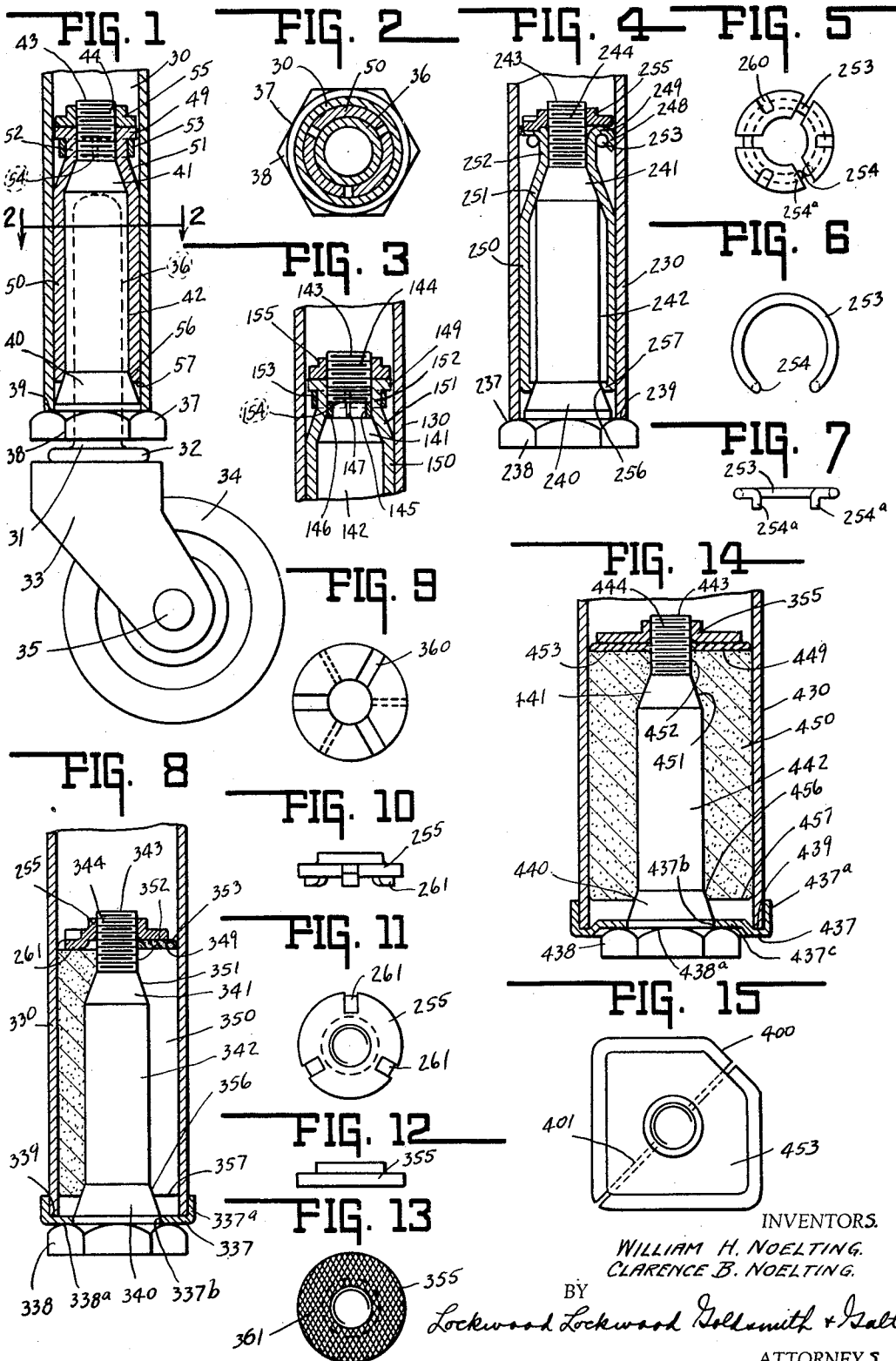
W. H. NOELTING ET AL

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CUSHION EXPANSION SOCKET FOR CASTERS

Filed May 14, 1932

2 Sheets-Sheet 1



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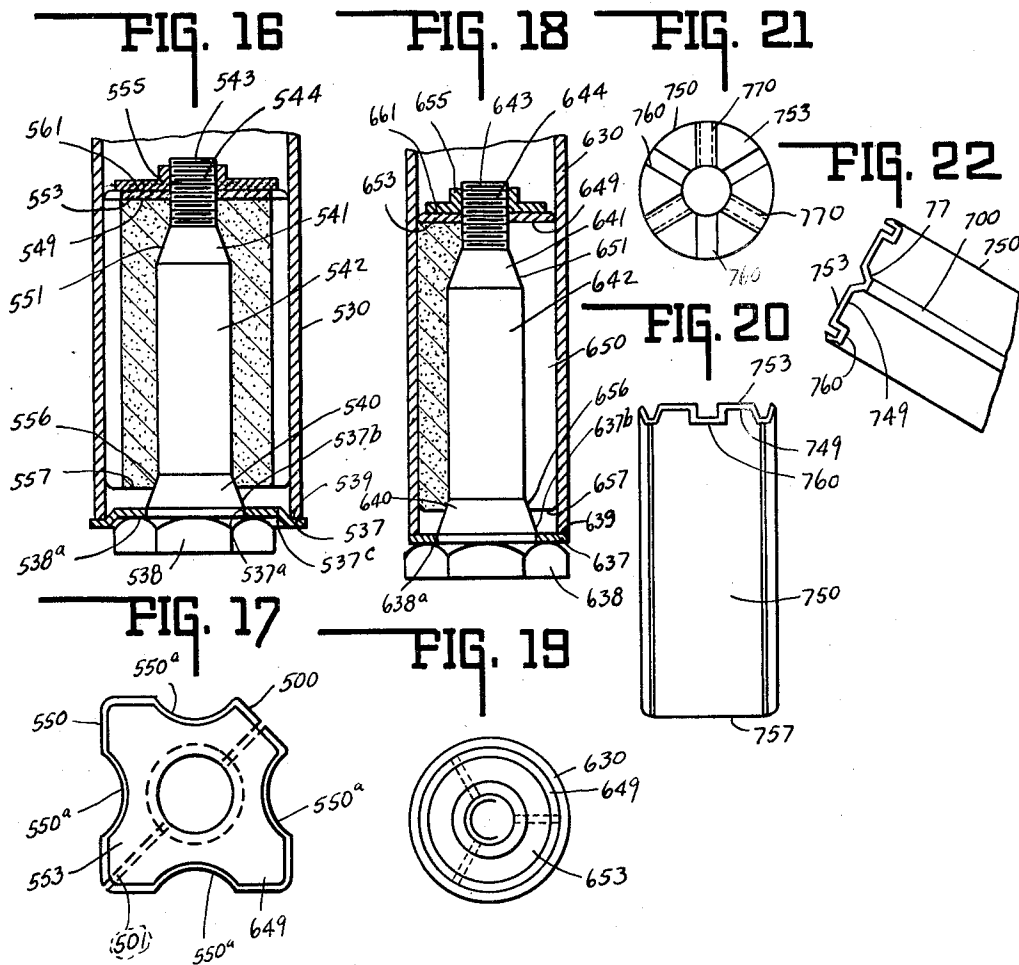
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CUSHION EXPANSION SOCKET FOR
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Application May 14, 1932. Serial No. 611,296

4 Claims. (Cl. 16—38)

This invention relates to a resilient adapter
caster socket, and is an improvement upon the
copending applications Serial No. 362,498, filed
May 13, 1929, entitled "Adjustable adapter frame
for casters", and Serial No. 522,216, filed March
13, 1931, entitled "Adjustable adapter for casters".

The present disclosure shows only the so-called
detachable type of caster and socket, although
it is to be understood that a permanent caster
and socket combination may be employed in
which event the structure thereof would differ
substantially in the same manner from the pres-
ent disclosure as Fig. 1 in application Serial No.
362,498 differs from Fig. 2 thereof, and Fig. 1
differs from Fig. 5 in application Serial No.
522,216.

The transformation consists in extending the
stem-receiving socket from top to bottom so that
the stem may project through the same and be
enlarged laterally and thus be permanently an-
chored to the socket. The terminology employed
in the claims herein contemplates including this
type of permanent combination, as well as the de-
tachably combination conventionally illustrated,
the invention being particularly directed to the
socket per se, whether permanently or detach-
ably associated with a caster.

The chief object of this invention is to provide
a structure which is an improvement upon those
heretofore employed in the art, wherein wedging
cones have been utilized and wherein outwardly
expansible means has been interposed between a
tubular leg and the caster socket center or stem-
supporting member, which resilient means is
operatively associated with the cones.

The chief feature of the present invention con-
sists in a superposed positioning of the two cones,
each directed in the same direction in contra-dis-
tinction to the multiple cone constructions of
the prior art wherein the inclinations of the
cones are oppositely directed.

Another feature of the invention consists in the
formation of the resilient means of a plurality
of elements and so associating the same together
as to prevent their individual separation when
the socket is not mounted in a tubular leg.

One advantage of the present invention is that
in case the caster is ejected upon loosening of
the central member and starts to protrude from
the tubing or leg, the segments instantly contact
or move inwardly, thereby completely freeing
the caster socket from the leg.

The full nature of the invention will be under-
stood from the accompanying drawings and the
following description and claims:

In the drawings, Figure 1 is a central sectional
view through a tubular leg and a socket mounted
therein and associated with a caster, a portion
of the socket being shown in elevation. Fig. 2
is a transverse sectional view taken on the line
2—2 of Fig. 1 and in the direction of the arrows.
Fig. 3 is a view similar to the upper portion of
Fig. 1 of a slightly modified form of the inven-
tion. Fig. 4 is a central sectional view through
a tubular leg and a socket structure slightly mod-
ified from that shown in Fig. 1, part of the
socket being shown in elevation. Fig. 5 is a top
plan view of the tube-engaging members and
associated connecting means thereof. Fig. 6 is
a top plan view of the associated connecting
means. Fig. 7 is a side elevation thereof. Fig.
8 is a central sectional view through a tubular
leg and of a modified form of socket, parts of
the socket being shown in elevation. Fig. 9 is
a top plan view of the tube-engaging members
and the associated connecting means shown in
Fig. 8. Fig. 10 is a side elevation of the nut
illustrated in Figs. 4 and 5. Fig. 11 is a bottom
plan view thereof. Fig. 12 is a side elevation of
a modified form of nut structure. Fig. 13 is a
bottom plan view thereof. Fig. 14 is a central
sectional view through the tubular leg and a
socket structure, parts of the leg being shown
in elevation. Fig. 15 is a top plan view of the
tube-engaging members and the associated con-
necting means. Fig. 16 is a central view, parts
of the socket being shown in elevation, and is
similar to Fig. 14, but of a modified form of
the invention. Fig. 17 is a top plan view of the
segments and associating means. Fig. 18 is a
view similar to Fig. 16 and of another modified
form of the invention, as applied to a cylindri-
cal tubular leg. Fig. 19 is a top plan view of the
segments shown in Fig. 18 and the associating
means. Fig. 20 is a side elevational view of one
form of molded segmental structure in its en-
tirety and with its connecting mechanism ap-
plied thereto and subsequent to mounting on
the socket central member or in its collapsed
position. Fig. 21 is a top plan view of the same
parts, with the segmental structure separated
for socket central member mounting and in its
maximum expanded position, the connection be-
ing applied while in this position. Fig. 22 is a
view similar to Fig. 20 and of a portion of the
same parts, but in the position corresponding to
that shown in Fig. 21.

In Figs. 1 and 2 of the drawings there is illus-
trated a tubular leg 30, and the caster structure
is conventionally illustrated as detachably asso-

ciated therewith. The pintle thereof is indicated by the numeral 31, which is anchored as at 32 to a yoke having depending ears 33 in which is mounted a wheel 34 upon an axle 35. For convenience, the dotted extension of the pintle 31 is herein shown as of the detachable type, although it may be of the permanent combination type, such as specifically set forth with reference to the two before-mentioned co-pending application disclosures. When such a modification is to be employed, the socket stem or central member is to be modified in accordance with the aforesaid modifications specifically referred to in said co-pending applications.

Herein the central socket member is shown provided with a tubular bore 36 that receives the caster pintle, the two being associated together, either as a permanent combination or as a detachable combination, in the manner mentioned. The lower end of the socket stem includes an outwardly directed portion 37, the periphery of which herein is shown formed as a conventional hexagonal nut or head 38. The plate portion 37 in this form directly engages the lower end 39 of the tubular leg 30. Of a lesser diameter than the plate or flange portion 37 and of a lesser diameter than the interior of the tubular leg, including any interior projection thereof, such as the lock joint in lock joint tubing, is an upwardly-extending frusto-conical portion 40. In spaced relation and in superposed relation relative thereto is a similar and similarly-directed frusto-conical portion 41, the intermediate portion having a cylindrical periphery 42. Extending upwardly therefrom is a stem portion 43 which is externally threaded as at 44.

The outwardly-movable members which are associated with the similarly-positioned conical portions and are adapted to engage the interior of the tubular leg, each includes a longitudinal portion 50 which at the upper end is inwardly-directed as at 51 and terminates in an outwardly-directed portion 49. Herein the intermediate portion 52 is relatively elongated and encircling the same is a band or ring 53 split as at 54, and the same is of normal contracting type so that the plurality of said sections or segments, and herein three are illustrated, see Fig. 2, are retained in unitary relation even though the socket be not associated with the tube. Threadedly mounted upon the threaded portion 44 of the upper stem portion 43 of the central socket member or stem is a combination nut and washer 55.

The lower end of each of the tube contacting members is herein shown terminating in an outwardly-tapered portion 56 and a flat portion 57. If desired, the taper may be continued or the taper may be omitted entirely. When omitted, the squared portion 57 must operatively engage the conical portion 40 of the central member. When the exposed hexagonal outlined portion 38 is turned, due to the friction between the exteriors of the portions 50 and the interior of the tubular leg, the nut 55 will remain stationary and the members will be further separated and greater gripping action will be obtained therefrom between segments and the interior of the tube. The employment of superposed cones similarly directed insures substantially complete lateral movement of the entire longitudinal portion 50 of each of the segments. When two oppositely-directed cones are employed, a bowing action is obtained so that only a transverse peripheral line contact is approximated, whereas with the simi-

larly-directed superposed cones, a cylindrical frictional contact is approximated. This eliminates cocking of the socket in the tube, which has been one of the chief complaints against prior structures before mentioned. Another advantage obtained by the use of a plurality of spaced and relatively independent segments is that the lock joint in the tube may be positioned in the gap between two of the segments and thus a structure of this character is universally adaptable to a lock joint tube or a butt-welded tube, as well as other tubes formed without any interior projections.

In Fig. 3 there is illustrated a slightly modified form of the invention shown in Figs. 1 and 2, and in said figure the same or similar parts are indicated by numerals of the 100 series. In this form of the invention, the upwardly-extending portion 144 of the central member or stem of the socket is provided, between the threaded portion 143 and the conical portion 141, with a groove 145 and seated therein is a split ring 146 split at 147. This ring is normally outwardly expandible. The two rings cooperate together to secure the desired segment retention and expanding movement of the segments of the socket.

In Figs. 4 to 7 and Figs. 10 and 11, there is illustrated a further modified form of the invention. In said figures similar or like parts are indicated by numerals of the 200 series. The tube 230 contacts at its lower edge 239 upon the supporting plate surface 237 of the hexagonal outlined flange 238. The stem or central member, integral with the last-mentioned portions, includes the upwardly-directed frusto-conical portion 240, the central portion 242 and the spaced and superposed similarly-directed frusto-conical portion 241, as well as the upper extension 243 exteriorly threaded as of 244. In this form of the invention, each of the segments includes the longitudinal portion 250, upper inwardly-directed portion 251, upwardly-directed portion 252, and outwardly-directed portion 249. Herein one of the outwardly-directed portions is shown downturned, as at 248, and grips a ring 253 split as at 254 and including downturned ends, as at 254a, see Figs. 6 and 7.

Each of the segments at its upper end and in the portion 249 includes a recess 260. The combination nut and washer 255, see Figs. 4, 10, and 11, includes a plurality of downwardly-directed projections 261, and these are adapted to seat in the recesses 260 of the segment members 250, thereby preventing relative rotational or angular displacement between the segment-forming members in the inward or outward movement thereof toward or away from the interior of the tubular leg, respectively. As shown in Figs. 6 and 7, by comparison thereof with Fig. 5, it will be noted that the retaining ring 253 is normally expandible and tends to separate the segment members. The lower end of each of the segment members in the present form includes a laterally-directed portion terminating in a tapered face 256.

With reference to the modification shown in Figs. 1, 3 and 4, it is to be understood that these may be formed of strap metal and may, or may not, be resilient.

In Figs. 8 and 14 of the invention there is illustrated forms wherein the segments are of cushion material, such as composition rubber or the like, although they may be also of a molded composition, such as bakelite, and in that event would not be inherently resilient and in this respect would be comparable to the relatively rigid metal

strap construction of the members 50, 150 or 250 when said members are not formed of resilient metal.

In Figs. 8 and 9 there is illustrated a modified form of the invention of the aforesaid character and employed therein may be the nut illustrated in Figs. 10 and 11 and previously set forth with respect to the modification shown in Fig. 4. The same or similar parts are indicated by numerals of the 300 series in Fig. 8. 330 indicates the tubular leg having the lower end 339 which engages in the present instance a plate 337 that is provided with an up-turned leg mount 337a. The plate 337 is centrally apertured as at 337b to receive the center portion of the stem or socket and the plate rests upon the upper surface 338a of the flange or hexagonal outlined member 338.

The central stem includes the lower upwardly-directed frusto-conical portion 340, the intermediate cylindrical portion 342 and the spaced superposed similarly-directed frusto-conical portion 341. The upper portion of the stem 343 is externally threaded as at 344 and is adapted to threadedly support the nut 255 shown clearly in Figs. 10 and 11, said nut including the indented portions 261. Each of the segments includes a longitudinal body portion 350 which extends from top to bottom and terminates in the upper face 349 and the lower face 357. A partially tapered conical interior surface 356 is adjacent the lower conical portion 340. A similar conical portion is superposed above the same and is indicated by the numeral 351. The upper cylindrical interior is indicated by the numeral 352. Each of the segments 350, see Figs. 8 and 9, is provided with a recess or groove 360. Positioned upon the surface 349 and suitably secured thereto, as by adhesive, vulcanizing, or the like, is a common connector 353 that serves the function of the ring 53, 153 or 253, before mentioned. This connector may be of soft rubber or may be of fabric, such as canvas or the like. The operation of this form of the invention is substantially the same as that previously set forth and it is to be noted that the projecting portions 261 of the nut 255 seat in the recesses or grooves 360 of the segments, and thus angular or rotational displacement of the segments is prevented.

If desired, the recesses 360 may be omitted, and when thus omitted, the nut 355, see Figs. 12 and 13, having its lower face knurled or serrated as at 361, may be substituted therefor and substantially the same action will be obtained therefrom.

In Figs. 14 and 15 a modified form of the invention is illustrated wherein the socket construction is arranged to accommodate so-called square tubing. In this form of the invention 430 indicates a tubular leg having a square or rectangular cross sectional outline. The lower edge 439 thereof is shown engaging a plate 437 terminating in an up-standing leg mount 437a and including a central embossed portion 437c centrally apertured as at 437b. The leg mount plate bears on the upper surface 438a of the flange having a hexagonal periphery 438. The stem includes a cylindrical portion 442, the lower upwardly-directed frusto-conical portion 440 and the upper spaced frusto-conical portion 441, the latter terminating in the upwardly-directed stem portion 443 exteriorly threaded as at 444.

Each of the segments is clearly shown in Fig. 15, and each includes at least one pair of transversely arranged outer walls. As indicated at 400, the segments are relieved at one corner. The gap between the segments is indicated by

the numeral 401. Each segment includes the body portion 450, its upper surface 449, and its lower surface parallel thereto indicated by the numeral 451. Each segment includes a partially conical portion 456 and superposed thereabove is a partially conical surface 451, and therebetween is the partially cylindrical surface 452. Suitably cemented, vulcanized, or otherwise suitably secured to the segments is an associating member, herein shown in the form of a canvas top 453. The nut shown in Figs. 12 and 13 may be utilized therewith and the connection and operation is as before set forth with reference to the other modifications.

In Figs. 16 and 17 there is illustrated a modified form of the invention which is similar to that shown in Figs. 14 and 15, only the socket is shown arranged for mounting in a lock joint tube. In said figures the same parts or similar parts are indicated by numerals of the 500 series. The tube 530 at its lower end 539 bears upon a flange 537 of an upwardly and centrally embossed plate 537c apertured at 537b. The plate is supported upon its under surface upon the upper surface 538a of the flange or hexagonal portion 538 of the central member. Said member includes a pair of spaced and superposed upwardly-directed frusto-conical portions 540 and 541 separated by the cylindrical portion 542. Said central member terminates in the portion 543 externally threaded as at 544 and threadedly mounted thereon is a nut 555 having a lower face 561, said nut and face being identical with that shown in Figs. 12 and 13.

Each of the segments includes a longitudinal portion 550 terminating in a lower face 557 and an upper face 549. Each segment has a partially conical lower surface 556 engaging the conical portion 540 and a spaced upper partially conical surface 551 engaging the conical portion 541. Herein each of the segments is provided with a plurality of longitudinal grooves 550a for lock joint clearance. Each of the segments is substantially triangularly outlined as shown in the modification in Fig. 15, and includes the additional face 500, the gap between the segments being indicated by the numeral 501. The associating means for the segments includes the member 553, which may be cemented, vulcanized, or otherwise suitably secured to the segments.

In Fig. 18 there is illustrated a modified form of the invention which in many respects is similar to that shown in Figs. 14 to 17, inclusive. Herein similar parts are indicated by numerals of the 600 series. The tube 630 has its lower edge 639 bearing on the plate 637 apertured at 637b. The lower end or flange of the central member, as at 638a, engages said plate and supports the load. The outer periphery of the flange portion 638 is formed in a hexagonal outline for tool engagement. The central member includes the lower frusto-conical portion 640, the intermediate cylindrical portion 642 and upper conical portion 641. Said member terminates in the portion 643 externally threaded as at 644. A nut 655, substantially similar to that shown in Figs. 12 and 13, has its upper surface 661 substantially similar to that shown in Fig. 13. The nut bears upon the segment associating member 653. Each of the segments is suitably secured thereto at its upper edge 649. Each of the segments 650 terminates in the lower surface 657 and partially conical portion 656 engaging the conical portion 640 of the central member. Each

segment includes a spaced partially-conical surface 651 which engages the conical portion 641 of the central member.

It will be clearly evident from an examination of Figs. 8, 14, 16 and 18, and a comparison thereof, that the additional plate structure may be of any one of the four forms and any form may be used interchangeably. This representation was intentionally different in the four figures to illustrate variations which are common in the prior art. The terminology "load supporting plate portion" is intended to include not only any one of the forms before mentioned found in Figs. 8, 14, 16 and 18, but also the equivalent thereof, wherein the additional plate is omitted, as is found in Figs. 1 and 4. Since formation of the leg mount upon a load supporting plate has long been known in the art, no claims are directed to this feature, but the aforesaid variations are merely disclosed as a matter of descriptive character.

In Figs. 20 to 22, inclusive, there is illustrated a segmental structure including (herein three) a plurality of segments of molded composition. Each includes a partially cylindrical leg-engaging exterior 750, a top face 749 and a bottom face 757. The interior surface of each segment is similar to that shown in Fig. 18. A connection 753 consists of a canvas plate cemented to the composition, or vulcanized (if desired) thereto if the composition be of rubber. The top surface 749 includes intermediate and side recesses 760 and 770, respectively, similar to recesses 360, see Fig. 9. Side recesses 770 are approximately but one-half that of intermediate recess 760, and side recesses in adjacent sections mate. The canvas is secured thereto when the segments do not abut each other, see Fig. 22. For socket mounting, the segments are separated at 700, see Figs. 21 and 22, and thus the canvas will be under tension and greater frictional contact will be obtained with the interior of the leg when the parts are applied thereto, since the connection does not by reason of the mounting thereof impose any restraint on the expanding or separating action of the segments.

While herein the upper and lower cones are shown as integral with the central member of the socket, they may be separable and rest upon shouldered portions of said central member and such an arrangement is the full equivalent of the present disclosure. Also the central member may be threaded into the nut portion constituting the load-supporting plate.

The invention claimed is:

1. A caster socket for a tubular leg, including in combination a central member having a pintle-receiving bore, a laterally-projecting lower plate portion for sustaining the load by operatively engaging the lower end of the leg and exposed in a plane therebeneath for tool engagement, a pair of similarly-directed spaced frusto-conical portions upon said central member, said central member having an upper externally-threaded end, a plurality of operatively associated independent segments, each including spaced inner surfaces engageable by the conical portions and an outer elongated longitudinal surface for leg interior longitudinal contact, and a clamping nut carried by the member-threaded end and operatively bearing upon the upper ends of said segments, each of said segments including a recess in its upper end and said nut including depending projections seatable in said recesses for pre-

venting relative rotation between said segments and the nut in the rotation of said central member.

2. A caster socket for a tubular leg, including a combination a central member having a pintle-receiving bore, a laterally-projecting lower plate portion for sustaining the load by operatively engaging the lower end of the leg and exposed in a plane therebeneath for tool engagement, a pair of similarly-directed spaced frusto-conical portions upon each central member, said central member having an upper externally-threaded end, a plurality of independent segments, each including spaced inner surfaces engageable by the conical portions and an outer elongated longitudinal surface for leg interior longitudinal contact, a clamping nut carried by the member-threaded end and operatively bearing upon the upper ends of said segments, and means associated with said segments for retaining the same in associated relation when free from the leg, each of said segments including a recess in its upper end and said nut including depending projections seatable in said recesses for preventing relative rotation between said segments and the nut in the rotation of said central member.

3. A caster socket for a tubular leg including a plurality of resilient elongated members substantially circularly arranged, each having a pair of axially spaced similarly inclined inner surfaces the upper of said surfaces being positioned closer to the axis than the lower, a central member having two spaced similarly inclined complementary outer frusto-conical surfaces the lower being of greater diameter than the upper and a threaded end, a nut threaded thereon and exerting axial pressure only upon the upper ends of said elongated members, the frusto conical surfaces exerting outward and upper pressure upon said elongated members, said central member having an axial opening therein for caster stem reception, and an outwardly projecting lower end formed for tool engagement and providing a shoulder operatively supporting the lower end of the tubular leg, the interior of which is engageable by an elongated portion of the outer surfaces of said elongated members substantially at least that equal to the spacing between the two inclined inner surfaces of said members.

4. A caster socket for a tubular leg including resilient elongated means substantially circularly arranged and having a pair of spaced similarly inclined inner surfaces, the upper of said surfaces being positioned closer to the axis than the lower, a central member having two spaced similarly inclined substantially complementary outer frusto-conical surfaces, the lower being of greater diameter than the upper and a threaded upper end, a nut threaded thereon and exerting axial pressure only upon the upper end of said elongated resilient means, said frusto conical surfaces exerting outward and upward pressure upon said resilient means, said central member having an axial opening therein for caster stem reception, and an outwardly projecting lower end formed for tool engagement and providing a shoulder operatively supporting the lower end of the tubular leg, the interior of which is engageable by an elongated portion of the outer surface of said elongated means at least equal to the spacing between the inclined surface thereof.