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L. A. BLACKBURN
CONNECTOR

2,544,484

Filed July 2, 1945

FIG. 1.

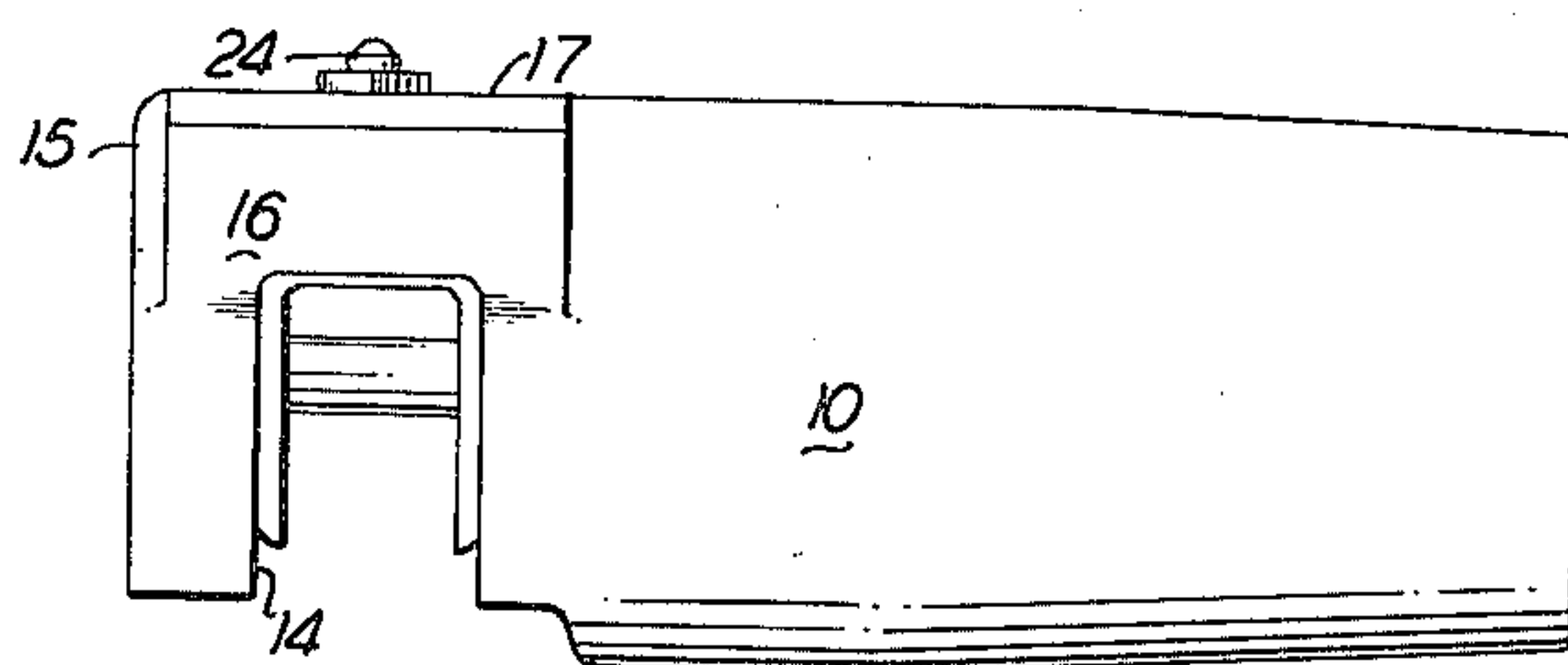


FIG. 2.

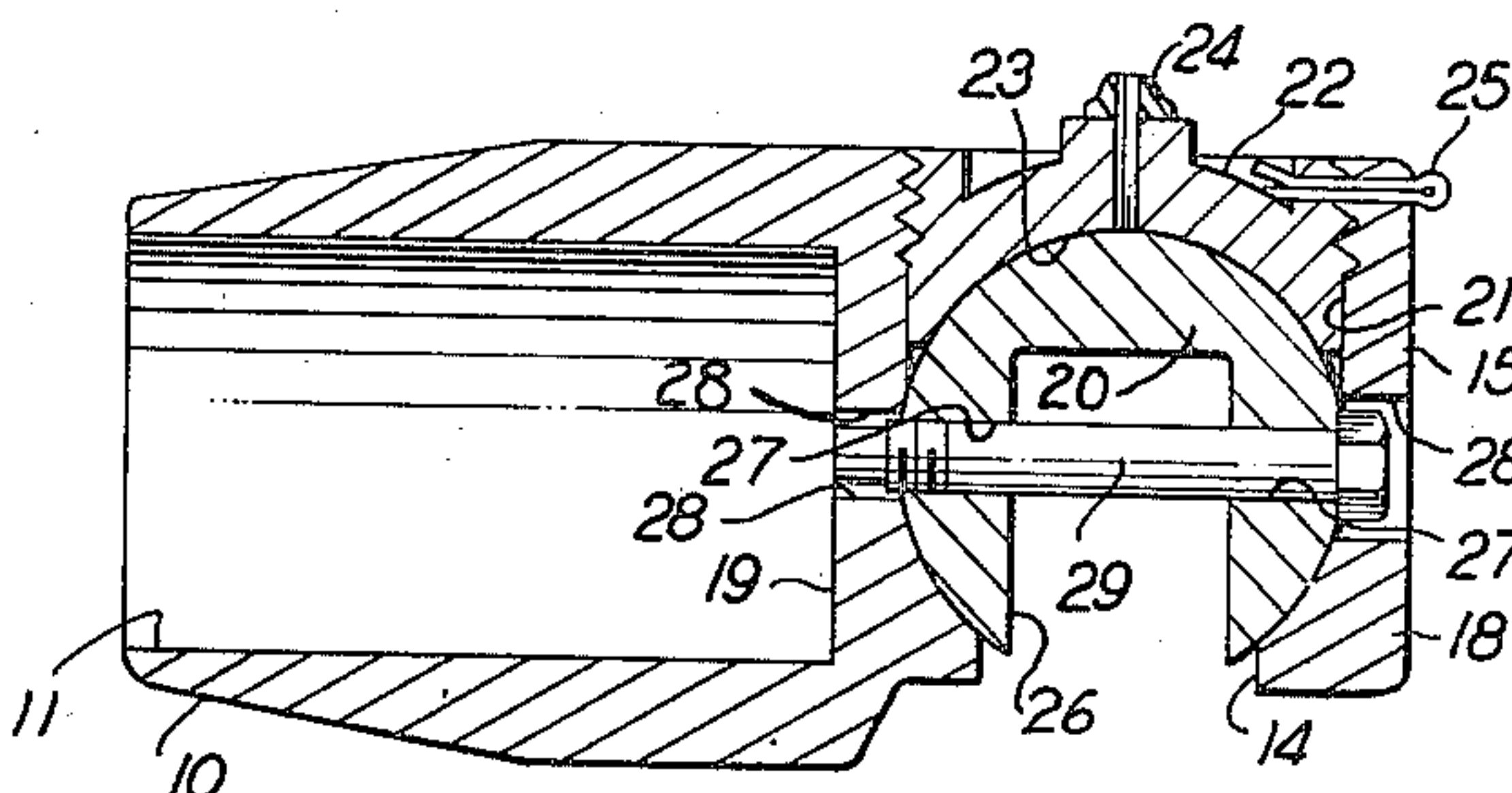
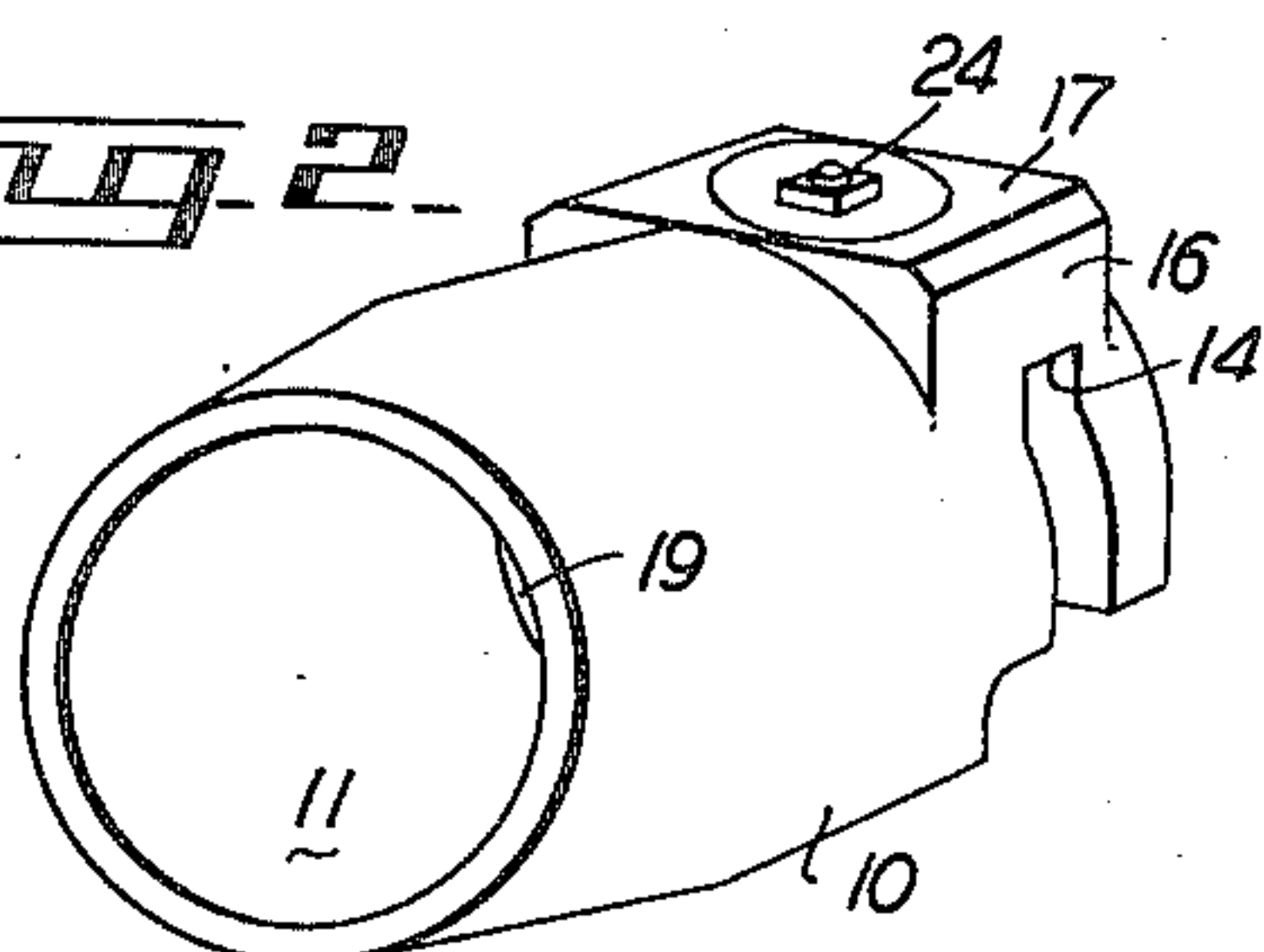


FIG. 3.

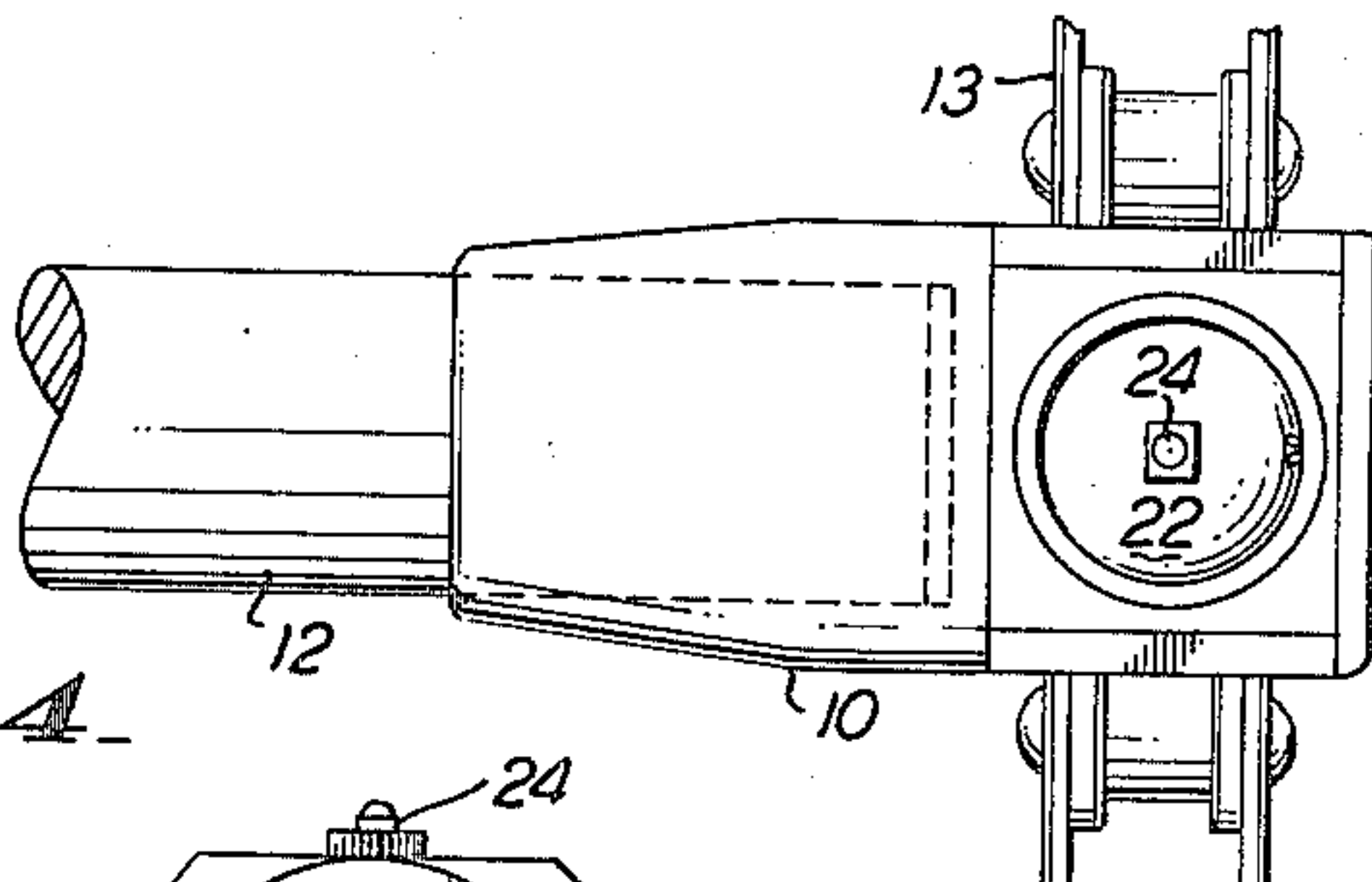
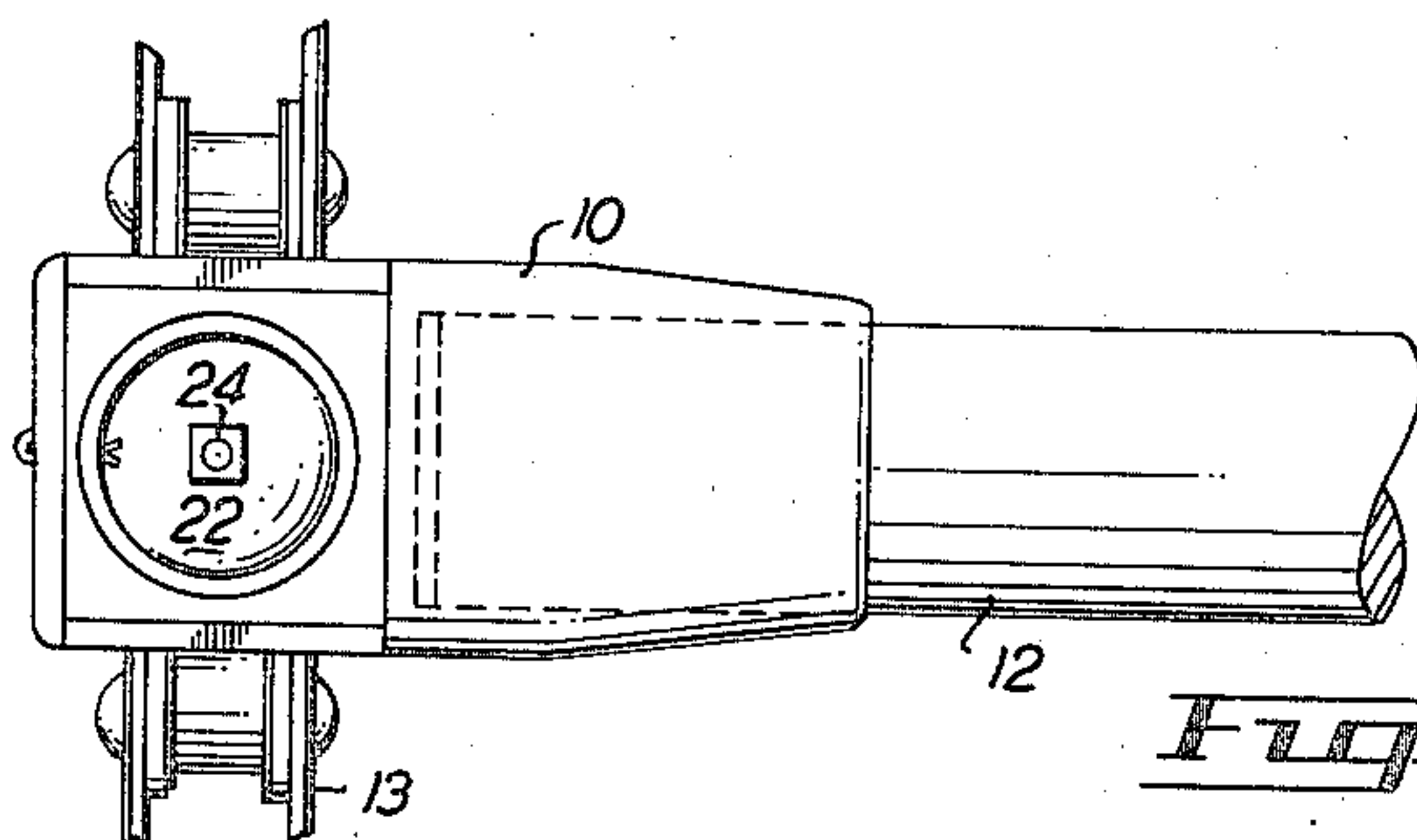


FIG. 4.

FIG. 7.

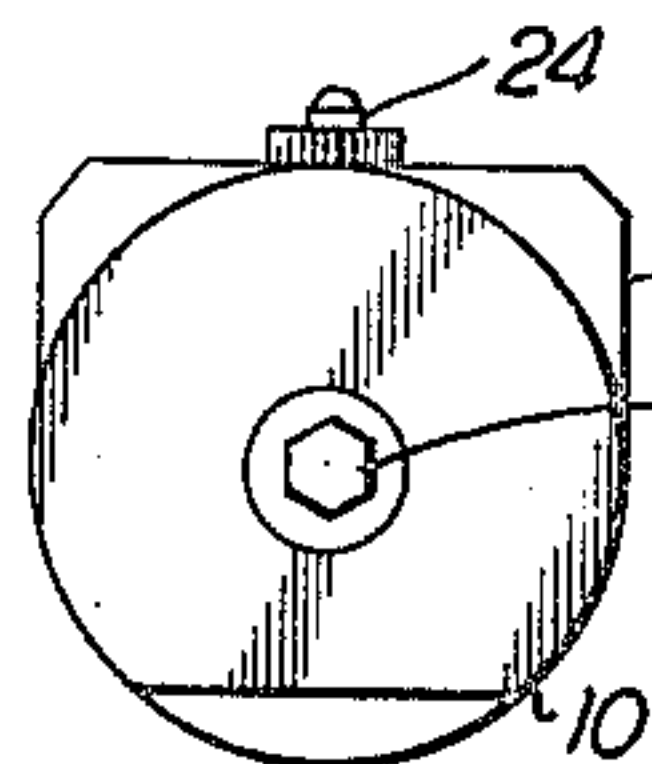
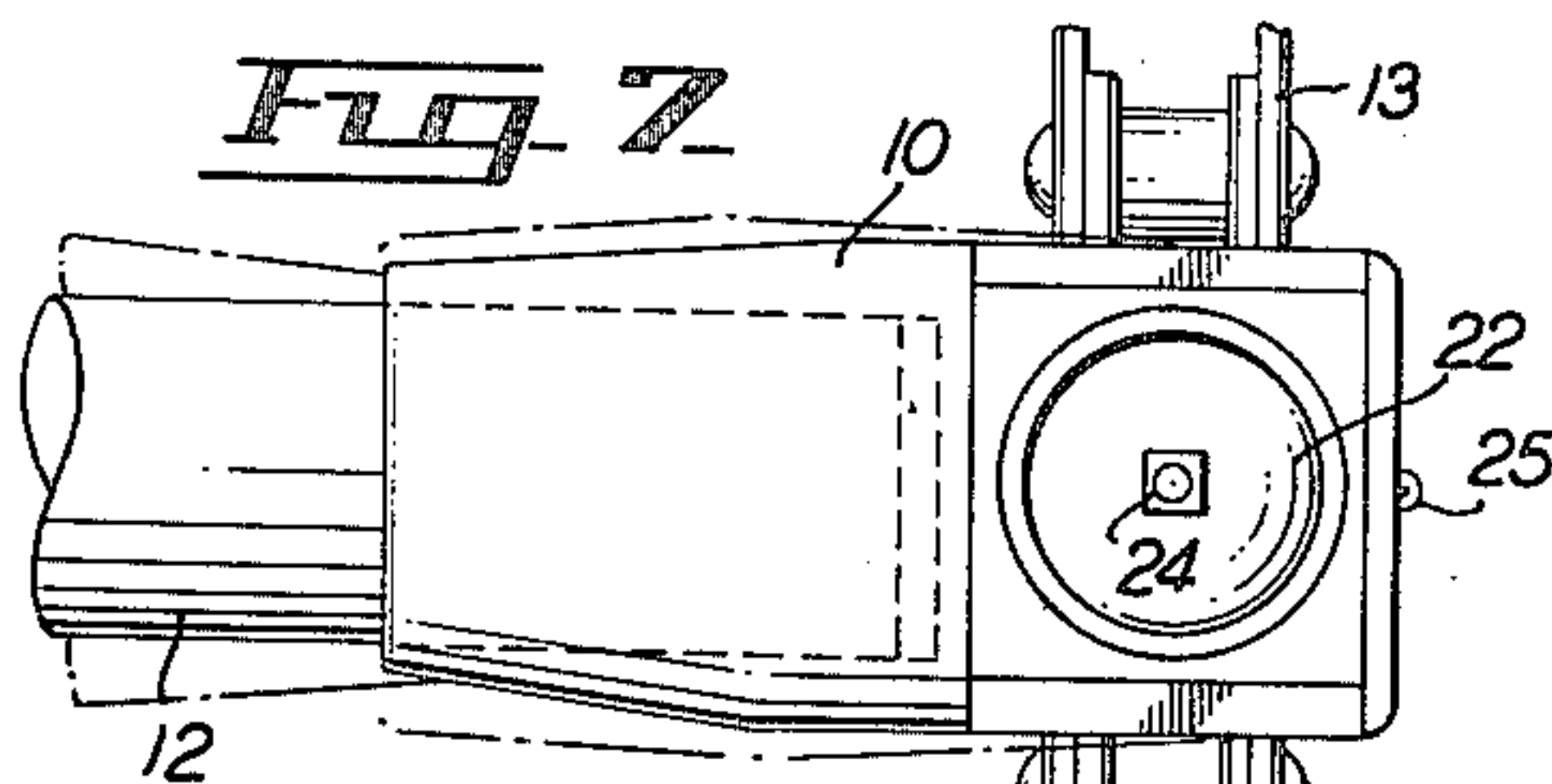


FIG. 5.

FIG. 6.

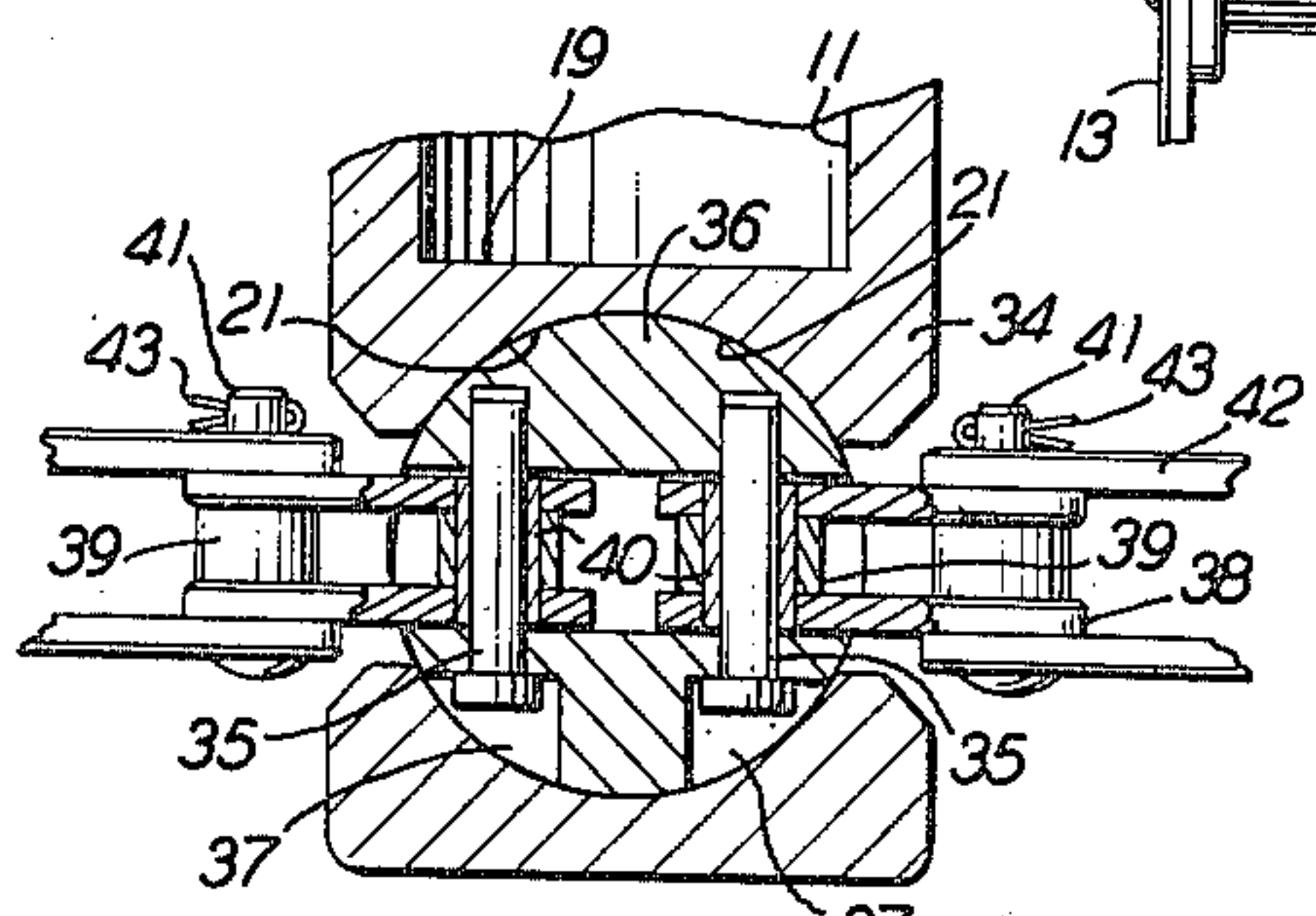
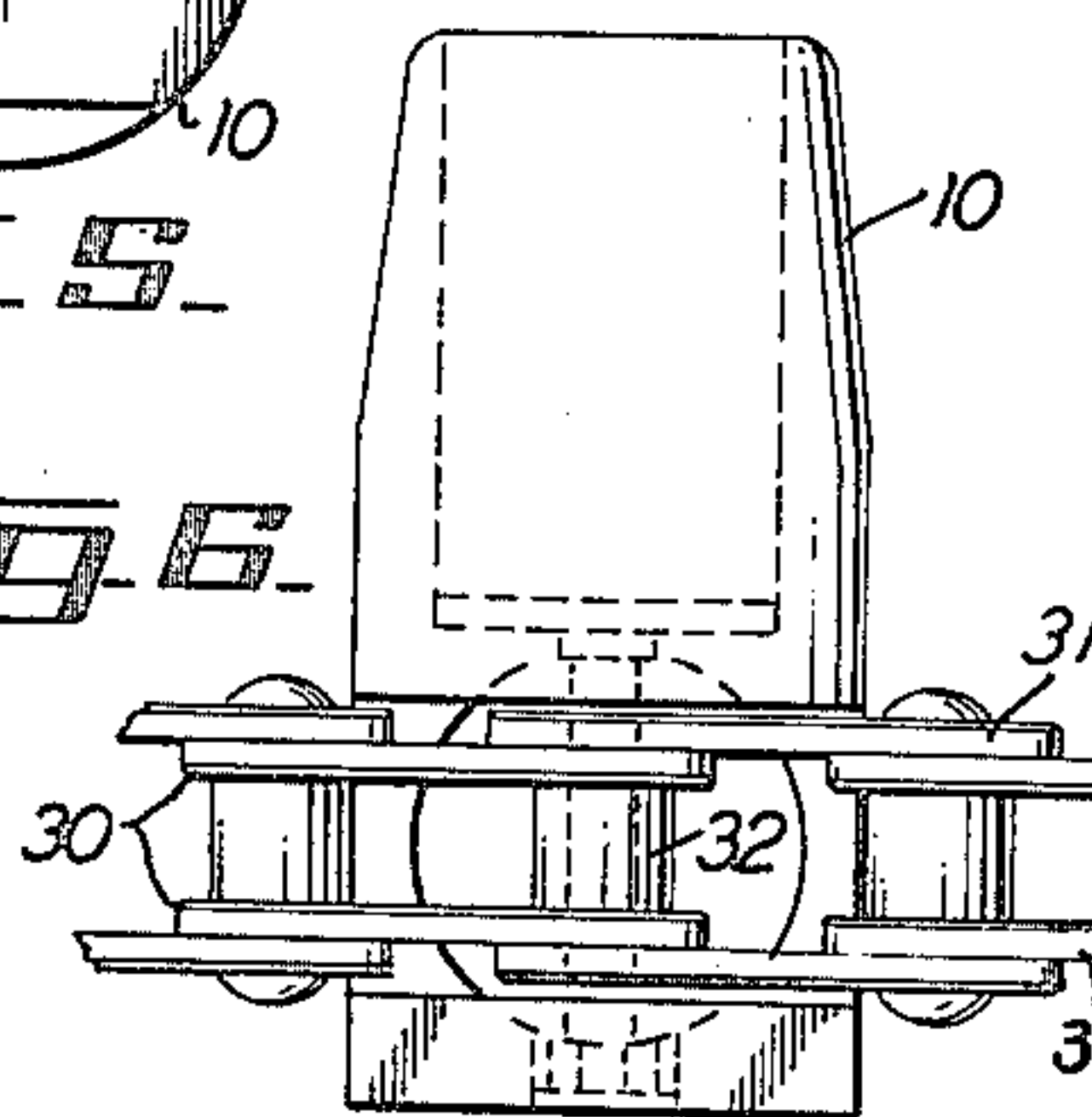
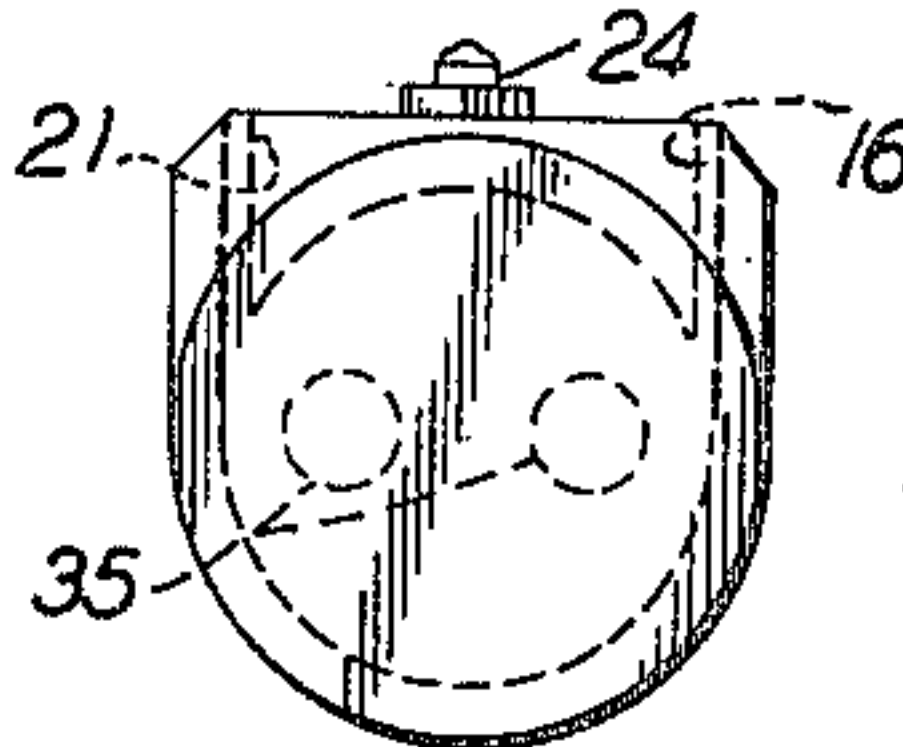


FIG. 8.

FIG. 9.



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2,544,484

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8 Claims. (Cl. 74-245)

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This invention relates to flexible connectors having particular application to chain constructions, and contemplates more specifically self-aligning linkage by which mechanism of various types may be secured to chains for the transmission of power therebetween.

As is recognized in the art prior to my invention, the translation of rotary motion into straight line or reciprocatory movement is effectively accomplished by endless drive chains which are arranged parallel to one another in flat loops, opposite reaches of each thereof being held in parallel relationship by sprockets by which they are driven. Mechanism connected between a pair of opposed links of the respective chains is accordingly moved through the loop described by the chains. In order to effect the straight line motion of the mechanism or other work carried between the chains, four chains are employed between which a crosshead is suspended. The crosshead comprises a frame in which a pair of roller blocks, connected respectively between different pairs of opposed chains, are disposed. The blocks are adapted for lateral movement within the frame to an extent equal to the diameter of the sprockets by which the chains are driven so as to compensate for the movement of the links of the respective chains from one straight reach thereof to the other during operation. In such structures it is very difficult to obtain perfect alignment and balance of the crosshead, due to the number of the various components of the chains and crosshead and the necessity for flexibility between these various elements. As a result, the links of the chains with which the connecting expedients are associated are often at some stage of the operation, if not continuously, misaligned to a certain extent. Unless adequate compensation is made in the connector for such misalignment, the operation of the unit causes excessive wear on the subject parts, resulting in structural failures. It will be appreciated that such problems arise in any apparatus involving a connective between parallel reaches of separate chains whether a conventional crosshead is utilized or not.

It is a principal object of the present invention to provide a device adapted for universal application as means for flexibly connecting a chain or a pair of parallel chains to other mechanical units, as for example conveyors, reciprocating crossheads, and the like, for transmitting the motion or part of the cycle of movement of elements of the chain to such other mechanism.

More specifically, it is an object hereof to pro-

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vide a connector of the character above alluded to, incorporating an expansible assembly to compensate for lateral movement of the chain to which it is connected, in combination with a double pivot associated with elements of the chain operable to permit lateral angular variation between the reaches of the chain projecting from either side of the connector as well as the lateral movement of both reaches with respect to the apparatus connected with the chain by means of the present invention.

Another object is the provision of a master link comprising a pair of link pins which, in combination with a ball and yoke member, are adapted to displace a link of the chain with which the connector is assembled, and form a swivel between the adjoining links of the chain and the auxiliary structure to or from which power is to be transmitted thereby.

Other objects and salient features of my invention, such for example as simplicity of construction, ease of operation and replacement of worn parts, facility of assembly, wide application to numerous chain-operated structures, economy of manufacture, and durability, will be apparent to those of skill in the art upon an examination of the following description read in the light of the accompanying drawings, in which:

Fig. 1 is a side elevation of one embodiment of link fitting, showing the yoke for accommodating a reach of chain;

Fig. 2 is a perspective view of the opposite end of the fitting, depicting particularly the tubular construction thereof;

Fig. 3 is a longitudinal sectional view through the device;

Fig. 4 is a plan view of a pair of connectors of my invention, operatively associated and assembled between a pair of chains shown partially broken away;

Fig. 5 is an end elevation of one of the master links;

Fig. 6 is a plan view of a link and chain in a position inverted with respect to the view of Fig. 4;

Fig. 7 is a plan view of one of the connectors partially broken away, illustrating in dotted lines the flexibility contributed by the master link thereof;

Fig. 8 is a reduced sectional view, partially broken away, through the yoke of a modified form of my invention, with opposite reaches of a chain operatively associated therewith;

Fig. 9 is an end elevation of the embodiment illustrated in Fig. 8.

Referring to the drawings in detail, the numerals of which indicate similar parts throughout the several views, 10 designates generally each of a pair of master link fittings which are generally round in cross-section, the outer surface of each of which is tapered slightly at one end. Each fitting is formed with a coaxial bore 11 to accommodate the end of a shaft or rod 12 of a diameter to insure a sliding fit within the bore 11. In Fig. 4 I have illustrated two fittings 10 slidably carried on opposite ends of a shaft 12, through which the opposite reaches of synchronously driven chains 13 are connected by the present assembly. It will be understood that shaft 12 will in most applications of the connector be a part of the unit to be carried, actuated or controlled by the chains, or from which power may be transmitted to the chains, and is merely illustrative of such mechanism which will vary in accordance with specific requirements of purpose to be attained, or function to be effected, and with the design and arrangement desired.

The outer end of each fitting 10 is undercut and transversely recessed as at 14, forming a yoke 15 comprising an overhanging extension 16 having a flat upper surface 17 and a depending end wall 18, which is parallel to the wall 19 defining the end of the bore of the fitting (see Fig. 3). In operation of a dual embodiment hereof, two master links 10, slidably carried on opposite ends of coaxially aligned rods projecting from the unit from or to which power is transmitted by the chains, (of which shaft 12 is representative) are juxtaposed over parallel transversely-aligned reaches of two separate chains 13, respectively, which the assembly is adapted to connect, each yoke 15 accommodating one of the chains. The depth of the bore 11 of respective fittings 10 and the length of the rods or shaft 12 are proportioned to the distance between chains 13, whereby in normal operation the outer ends of the rods or shaft 12 are spaced a short distance from the end wall 19 of the bores 11 of the respective fittings 10.

Thus, no restraint against limited lateral motion of chains 13 in either direction is imposed by the connector, the assembly being expansible and contractible in accordance with requirements through telescopic movement of the rods or shaft 12 and each of the fittings.

The opposing surfaces of the walls 18 and 19 are arcuately formed with their arcs having a center coinciding with the point intermediate said walls and lying on the longitudinal axis of fitting 10 so as to provide a bearing for supporting a ball swivel element 20. An opening 21 in the upper extension 16 of the yoke permits insertion and removal of ball 20. Plug 22 is normally threaded into opening 21 to retain ball 20 in the described position during operation. The under-surface of plug 22 is arcuately formed, as indicated at 23, to conform to the contour of the ball with which it is contiguous. In order to facilitate swiveling the ball within its bearing, an Alemite fitting, generally indicated by the numeral 24, may be threaded into the upper surface of plug 22 through which grease or other lubricants may be forced into the bearing. 25 indicates a cotter key which is inserted through wall 18 and an upper flange of plug 22 to resist rotative displacement of the latter while the unit is in operation. Ball 20 is formed with a rectangular cut-out 26, extending through a lower arc thereof, re-entering to a depth beyond the center of the ball, with its edges corresponding in shape to the contour of the surface of the walls 18 and 19. The ball is drilled at

right angles to the opposing inner surfaces thereof to form diametrically opposed holes 27 on either side of cut-out 26 which are aligned with a pair of holes 28 formed in walls 18 and 19, all of such holes being in coaxial alignment with fitting 10. Opposite reaches of the chain to be joined by the master link of my invention are projected into the yoke 15 and cut-out 26 of ball 20 for connection by means of a link pin 29, projected through holes 27 and 28. To this end, the inner end links 30 of one reach of the chain and the outer end links 31 of the other reach of the chain are arranged for assembly with the openings 27 and 28 of ball 20 and yoke 15 and the holes in the ends of the links of the respective reaches of chain 13 in alignment to receive link pin 29. The end of pin 29 is reduced in cross-section and threaded for engagement in the side of ball 20 contiguous with wall 19 of the fitting. It will be understood that the openings 28 in the walls 18 and 19, adapted to house the end of the shank and the head of link pin 29, respectively, are of sufficient diameter to permit ball 20 to swivel within yoke 15 to a degree sufficient to enable the angular variations between the fitting and the chain required to compensate for misalignment or lack of proper adjustment of the chains and/or associated structure, resulting from wear or the application of an unbalanced load.

Encircling pin 29 between the inner links 30 of the pivoted chain is provided the conventional sprocket-bearing collar 32 which serves to maintain the required spaced relation of the links. An inner circular bearing sleeve (not shown in the embodiment of Figs. 1 through 7) may be interposed between the collar and pin, as is illustrated in the embodiment of Fig. 8, about to be described.

In Figs. 8 and 9 I have illustrated a modified form of my invention which is characterized essentially by independent pivotal mountings for each of the respective chains with which each master link is associated. The fitting 34 of this embodiment is substantially the same as that shown in the embodiment of Figs. 1 through 7 with the omission of the holes 28 in the yoke. It will be observed that in this embodiment the link pins 35—35 are housed entirely within ball 36, segments of the latter being cut away as at 37 to accommodate the heads of pins 35—35. The opposite ends of the pins are threaded into openings in the opposite side of the ball. The inner pair of links 38 at the end of each reach of chain to be joined are spaced apart by a collar 39 journaled upon a sleeve 40 having its ends secured in holes in the respective links 38. As above indicated, this assembly of each chain is carried on an independent link pin 35 which is spaced from its complementary pin 35 a distance sufficient to maintain the lateral spacing of collars 39 carried thereby, in accordance with corresponding dimensions of the rest of the chain.

In order to permit assembly and disassembly of the unit, the link pins 41 of the links 42 adjoining those secured in the yoke of fitting 34, are removable, being normally secured in operative position by cotter pins 43. Thus, in assembling the mechanism the inner links 38 to be carried by the respective link pins 35—35 of the yoke are disengaged from their respective reaches of the chain and are assembled as described in ball 36 before insertion of the latter into the yoke of fitting 34. The pins 35—35, detached from their respective reaches of chain 13, are turned into parallel relationship so as to extend below ball 36, which is then inserted through the cir-

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cular opening 21 in the flat extension 16 of the fitting. With ball 36 in position, the links 38 are extended laterally of the fitting and joined in an obvious manner with the opposite reaches of the chain by pins 41. 24 indicates an Alemite fitting corresponding in construction and function with the fitting hereinabove alluded to.

It will thus be seen that I have provided a connector embodying one or more master chain links, through which power may be transmitted between a chain or a pair of chains and associated mechanism of any of a variety of types well known in the art, each master link incorporating a flexible quality to compensate for lateral play in the chain or chains, or mechanical inaccuracies in any of the associated structure, as well as for misalignment, in a dual assembly, of the master links forming parts of a pair of chains, operating synchronously for the control or actuation of mechanism such, for example, as a crosshead or conveyor disposed between the chains.

It will be apparent to those of skill in the art that the features of my invention hereinabove described may be embodied in many forms differing in size, shape, number and proportion of the various parts, and that the master links may be incorporated in a connecting expedient having a tubular structure projecting from each side of the yoke instead of the single tubular receptacle associated with each yoke as illustrated, without departing from the spirit of my invention as defined in the appended claims.

What I claim and desire to secure by Letters Patent is:

1. In a device of the character described, a chain comprising a plurality of links, a rod disposed to form substantially a right angle with the chain, a sleeve telescopically associated with said rod, said sleeve having a recess in one end thereof to receive links of said chain, and means to pivotally connect said last-named links to said sleeve within said recess.

2. In a device of the character described, a chain comprising pairs of links, a rod adjacent and forming substantially a right angle with said chain, a sleeve telescopically fitted over one end of said rod and movable axially relative to the latter, one end of said sleeve being recessed to accommodate pairs of links at opposite ends of said chains, and means comprising a pin to pivotally connect said last-named links to said sleeve within said recess.

3. In a device of the character described, a pair of chains supported in parallel spaced relation, a shaft between and transverse to said chains, sleeves carried on the ends of said shaft, and

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means comprising a link pin to pivot said sleeves to said chains, respectively, about a center coinciding with the axis of said shaft.

4. In a device of the character described, a pair of chains supported in spaced parallel relation, each chain comprising a plurality of links, a shaft between and transverse to said chains, a sleeve longitudinally slidable on each end of said shaft, each sleeve having a recess in its outermost end to accommodate one of the chains, and means comprising a pin to pivotally connect links of said chains to said sleeves, respectively.

5. In a device of the character described, a pair of chains disposed in spaced parallel relationship, each chain comprising a plurality of links, a shaft between said chains and forming substantially right angles therewith, a sleeve carried telescopically on each end of said shaft, the outer end of said sleeves having recesses therein forming yokes overhanging respective chains, a ball swiveled in each yoke, and means to pivotally connect each ball to the adjacent chain.

6. In a device of the character described, a chain comprising links, a rod, a sleeve telescoping one end of said rod and slidable thereon, a ball swiveled in the outer end of said sleeve, said ball having a recess therein, and means to pivotally connect links of said chain in the recess of said ball.

7. In a device of the character described, a pair of chains, each comprising links, a pair of yokes, a ball swiveled in each of said yokes, each ball having a recess therein, links of said chain projecting into said recesses, respectively, means comprising a pin to pivotally connect said links of said chains to said balls, respectively, and means connecting said yokes together.

8. In a device of the character described, a chain comprising a plurality of links, a yoke having an opening therein, a ball swiveled in the opening formed in the yoke, a plug closing said opening, said ball and yoke being formed with registering recesses to accommodate links of said chains, and means to pivot said last-named links to said ball.

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