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2,373,370

SHAVING MACHINE

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Fig. 1

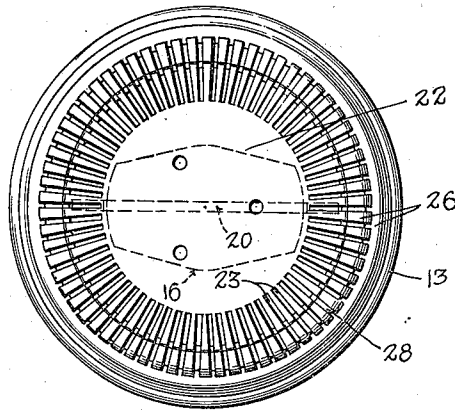


Fig. 2

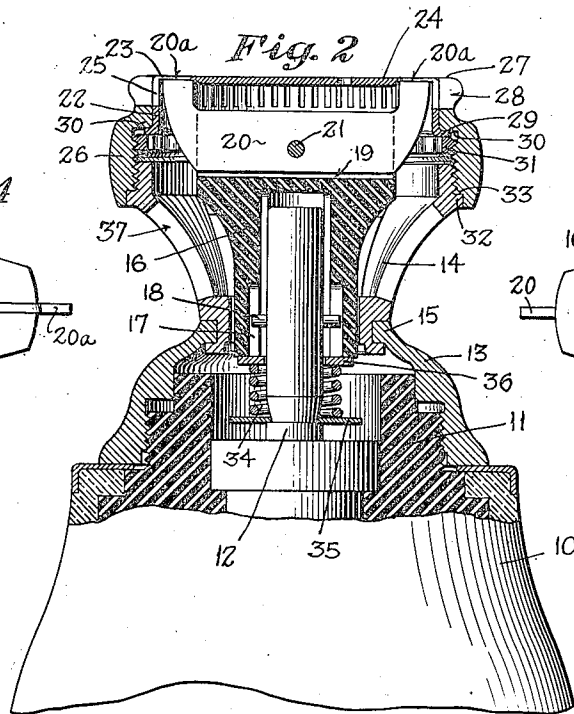


Fig. 4

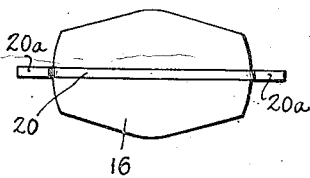


Fig. 5

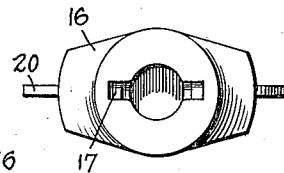
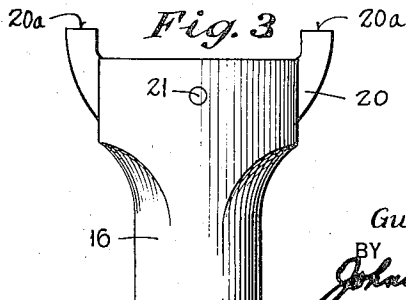


Fig. 3



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SHAVING MACHINE

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14 Claims. (Cl. 30—43)

This invention relates to dry shavers for personal use, and, more particularly, to the cutter blade assembly used therein.

In dry shaving devices of the type currently used in which the driven blade is urged into engagement with an apertured removable head, difficulty has been encountered because of the tendency of the blade to separate from the drive shaft when the head is removed for the purpose of cleaning the blade and interior of the head.

In these constructions, the blade is free to move outward under the action of the means normally urging the same into engagement with the head, and a feature of this invention is the means employed to prevent the tendency of the blade to separate from the drive shaft when the head is removed but yet allow the blade to have a free limited movement so that the same may be urged into engagement with the cutter head.

According to the present invention, a flat cutter member, having cutting surfaces at opposite ends thereof, is seated within a slot extending transversely of a coupling member which couples the cutter member to the drive shaft for rotation therewith. The walls of the slot are preferably substantially the length of the cutter member and engage and support the opposite faces of the cutter member to maintain the same rigid. The cutter member is held within the slot by means of a transversely extending pin disposed intermediate the cutting surfaces so that the blade may pivot about an axis transverse to the shaft. The coupling member is also mounted on the drive shaft for movement axially thereof and may be completely removed therefrom if desired.

A coil spring carried by the shaft and having one end thereof fixed relative to the same normally urges a ring coaxially disposed relative to the shaft into engagement with the coupling member. The coupling member is, therefore, urged outwardly of the shaft and the cutting surfaces are held in cooperable engagement with the cutter head. The coupling member is coupled to the shaft for rotation by means of a pin-and-slot connection, and the ring is limited in its movement by the pin which is carried by the shaft. The pin is carried by the shaft at a point spaced from the end thereof sufficient to prevent the coupling member from being separated from the shaft even though the spring has urged the same the limit of movement permitted by the pin.

The spring and ring are preferably disposed axially of the shaft, which permits of a compact construction easily assembled. This construction

not only prevents the blade and its coupling member from becoming separated from the shaft, but also as well prevents the spring from becoming separated and lost at the time when the head is removed.

The pivotal and yieldable support by which the cutter member is affixed to the shaft insures that the cutting surfaces of the same will uniformly bear against the under surface of the head even though the cutting surfaces and head may not be perfectly machined or in exact axial alignment when assembled. The pivotal mounting of the blade also will permit one of the cutting surfaces to be moved away from engagement with the undersurface of the head should the surface encounter an unusual obstruction projecting through a hair-receiving aperture of the head.

Other features and advantages will hereinafter appear.

20 In the accompanying drawing:

Figure 1 is a top plan view of the cutter head of the present invention.

Fig. 2 is a longitudinal sectional view of the cutter head and blade assembly with a portion of the casing of the device being broken away.

25 Fig. 3 is a side elevational view of the coupling member with the blade secured thereto.

Fig. 4 is a top plan view of the coupling member shown in Fig. 3.

30 Fig. 5 is a bottom plan view of the coupling member.

The preferred embodiment of the razor of the present invention comprises, as illustrated in the drawing, a casing or body 10 surrounding a subframe 11 in which is mounted a drive shaft 12, usually driven by an electric motor or other suitable power means, not shown, housed within the body 10. The subframe has threaded thereto a substantially conical shaped collar 13 having an outwardly flared casing 14 secured thereto at the reduced portion 15 of the collar. The hollow casing surrounds the drive shaft to which a cutter blade assembly is coupled for rotation therewith.

The cutter blade assembly is coupled to the drive shaft for rotation therewith by means of a coupler comprising a sleeve 16 of insulating material having a bore therein to receive the end of the drive shaft 12. The sleeve is provided with a transverse flat walled slot 17 adapted to receive the opposite ends of a transverse pin 18 carried by the end of the drive shaft 12 to insure a positive drive connection between the shaft and the coupling member.

The coupler sleeve is flared at its outer end and 55 is provided with a transverse slot 19, coincident

with the longer axis of the flared end, in which a flat cutter blade 20 is located. The cutter blade, as clearly shown in Figs. 2 and 3, is provided with a pair of cutting surfaces 20a disposed at opposite ends thereof. The blade is held within the transverse slot by means of a pin 21 having a driving fit through the coupler sleeve. The pin holds the blade in the proper position in the transverse slot and yet allows a pivotal movement of the blade about the same on an axis transverse to the drive shaft. The opposite walls of the slot 19 engage and support the opposite faces of the blade, and, as the walls are substantially the length of the blade, they form relatively large surfaces to support the blade and hold the same rigid even when the blade is constructed of relatively thin stock.

The casing 14 has a thin circular cutting head 22 mounted thereon so as to enclose the cutter blade. The head is made of thin metal or the like, and is provided with a plurality of hair-receiving apertures 23 through which hairs project to be severed by the cutting surfaces which engage the inner surface of the cutter head.

The apertures 23 may be of any desired shape, but, in the preferred form of the invention, however, they are illustrated as radially extending slots opening in the face-engaging portion 24 of the head and in the side walls 25 thereof. The cutting surfaces of the cutter blade engage only the slots in the face-engaging portion of the head 22, the side edges thereof being spaced from the side walls 25 of the same.

The portions of the slots formed in the side walls of the head permit the hairs to pass readily into the slots in the face-engaging portion and into the path of the cutting surfaces of the cutter blade where they are severed by the action of the rotating blade member against the inner edge of the slots of the face-engaging portion.

While the slots and the side walls of the head readily permit hairs to enter, they will also permit loose skin, such as is to be found on the neck and under the chin of the face, to enter and become pinched or cut by the rapidly rotating blade member. To prevent the skin from entering the slots and from being pinched or cut, the present invention provides improved means for spacing the skin from the side walls of the cutter head while permitting the hairs to pass into the slots 23.

This means, in the preferred form of the invention, comprises a ring or band 34 of metal or other suitable material which is adapted, as shown in Fig. 2, to surround the side walls of the cutter head. The band or ring is provided with a smooth face-engaging surface 27, which can be readily moved over the skin without irritating or chafing the same.

According to the present invention, the ring is provided with hair passages or openings 28, preferably slots, spaced at intervals therearound so that the same can be aligned with the slots 23 in the head as shown in Fig. 1. When the slots in the head and ring have been aligned, as shown, the ring and head are clamped together to form a unit.

Preferably, this is done by providing the bottom of the side walls of the head with an outwardly projecting flange 29, and forming the ring 26 with a shoulder 30 which abuts one face of the flange 29 and locates the ring with respect to the face-engaging portion of the cutter head. The ring or band projects downwardly of the head and is internally threaded as shown in Fig. 2. A locking ring 31 is threaded into the band and into engage-

ment with the other face of the flange 29 to clamp it against the shoulder 30 of the band. Thus the protecting ring and head become locked together as a unit to be mounted on the casing so as to cooperate with the rotating blade member.

While the ring and head can be mounted on the casing in any desired manner, the preferred form of the invention utilizes the downwardly extending portion of the ring for this purpose. As clearly shown in Fig. 2, the internally threaded ring is threaded on the open end of the outwardly flared casing 14 so as to enclose and cooperate with the rotating blade member.

To properly position the head with respect to the blade, the casing is provided with an outwardly projecting flange 32 which engages an annular internal shoulder 33 formed in the end of the ring to limit the relative movement therebetween. When the flange is seated on the shoulder, the head will have been moved into the proper cutting relation with the blade member. With the head and ring surrounding the blade member and secured to the casing, the shaver can be moved over any part of the face and the protecting ring will hold the skin away from the sharp edge and slots in the side wall and thus prevent the skin from passing through the slots and being pinched or cut by the surfaces of the blade member. The slots or hair-receiving passages in the ring will permit the hair, however, to pass into the slots in the face-engaging portion through the slots in the side wall where they will be engaged by the rotating cutting surfaces and severed.

To hold the cutting surfaces of the cutter blade in engagement with the underside of the face-engaging portion of the head, the present invention employs a spring which normally urges the coupling sleeve outward and insures that the cutting surfaces of the blade will always be held against the undersurface of the face-engaging portion of the cutter head.

In the now preferred form of the invention, a spring 34 is coaxially disposed about the drive shaft, and has one end thereof seated on a collar 35 fixed relative to the drive shaft 12. The opposite end of the spring 34 engages a ring 36 movable axially of the drive shaft 12. The ring 36 engages the inner end of the coupler sleeve 16, and, as the same is movable longitudinally of the drive shaft, the ring 36 under the urging of the spring 34 will move the coupler sleeve and the cutting member carried thereby outwardly so that the cutting surfaces of the blade are urged against the undersurface of the face-engaging portion of the head.

It will be seen, referring now to Fig. 2, that the blade member is supported upon the coupling by means of the transverse pin 21. The bottom edge of the blade member is spaced from the bottom wall of the slot and the blade member is, therefore, free to pivot about the axis of the pin which is transverse to the drive shaft. The pivotal mounting of the blade, together with the action of the spring, insures that the cutting surfaces of the blade member will always be in proper cooperating engagement with the underneath surface of the head, even though the cutting surfaces and the head may not be perfectly machined or in exact axial alignment when assembled. This pivotal mounting of the blade member also will permit one of the cutting surfaces to be pivotally moved downward and out of engagement with the undersurface of the head

should an unusual obstruction project through a hair-receiving aperture of the head.

To prevent the coupling member from becoming separated from the drive shaft when the head is removed for cleaning the blade, the outward movement of the ring 36 axially of the drive shaft is limited by the pin 18.

It will be noticed that the distance between the projecting ends of the pin 18 and the outer end of the drive shaft 12 is such, relative to the depth of the shaft-receiving socket of the coupling member, that the latter will not become separated from the drive shaft even though the coupling member has been moved outwardly of the shaft the entire range of movement permitted by the pin. This construction not only prevents the coupling member and blade from becoming separated from the shaft and possibly lost, but also holds the spring within the casing and precludes the possible loss thereof.

As shown in Fig. 2, the outwardly flared casing 14 is provided with openings 37 in its undersurface through which the severed hairs can pass and be disposed of without clogging the cutter blade.

If, however, it is desired to remove the head for the purpose of cleaning the blade and dislodging long hairs which might accumulate within the head, the same can be easily removed by unscrewing the band from the casing 14 and lifting out the coupler sleeve 16.

When it is desired to reassemble the head, the blade, if removed from the end of the drive shaft, may be returned to its proper position by slipping the coupler sleeve onto the end of the drive shaft with the projecting ends of the pin 18 riding in the slot 17. The head, as a unit, may then be reassembled by threading the band 26 onto the threads of the casing 14, compressing the spring 34 as the head is returned to the proper assembled position. The coupler sleeve with the cutting member secured thereto is now mounted on the drive shaft and will be urged outwardly thereof so that the cutting surfaces will be in good cutting engagement with the undersurface of the cutting head.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. In a dry shaving device, a casing; a removable cutter head having radial hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a rotatable cutter member having a plurality of cutting surfaces and cooperating with the radial hair-receiving apertures in the head to sever hairs extending therethrough; removable means sleeving said shaft for coupling the cutter member to the drive shaft for rotation therewith and for removal therefrom; means for normally urging the coupling means axially of the shaft whereby the cutting surfaces of said cutter member are urged into engagement with the undersurface of the head to sever hair extending through the radial hair-receiving apertures of the head; and stop means engageable by the urging means and cooperable therewith for limiting the movement of the coupling means axially of the shaft and preventing the separation of the coupling means from the drive shaft by the urging means when the cutter head is removed.

2. In a dry shaving device, a casing; a removable cutter head having hair-receiving apertures therein mounted on the casing; a drive

shaft in the casing; a flat cutter member; a coupler of insulating material having a transverse slot formed in an end thereof, the cutter member being supported and held in said slot, said coupler having a socket on the opposite end for sleeving the drive shaft and cooperating with means carried by said shaft to insure a driving connection therebetween; means tending to separate the coupler from said drive shaft whereby the cutter member is urged into engagement with the undersurface of said head; and means cooperable with the means carried by said shaft for limiting the movement of said coupler by the means tending to separate the coupler from the drive shaft to prevent the separation of said coupler from the shaft when the head is removed.

3. In a dry shaving device, a casing; a removable cutter head having hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a cutter member; a coupler of insulating material connected to the cutting member and mounted on the drive shaft for rotation therewith, the driving connection between the coupler and the drive shaft comprising a pin-and-slot connection; and means for normally urging the coupler axially of the shaft whereby the cutter member is urged into engagement with the undersurface of said head, the means last-mentioned including means adapted to engage the pin of said driving connection for limiting the action of the urging means and the movement of the coupler thereby, axially of the drive shaft when the cutter head is removed.

4. In a dry shaving device, a casing; a removable cutter head having hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a flat cutter member having a plurality of cutting surfaces cooperating with the hair-receiving apertures in the head to sever hairs extending therethrough; and means for coupling the cutter member to the drive shaft for rotation therewith, said means including a cylindrically shaped member having one end thereof enlarged to form a head having one axis substantially longer than the other, the end face of said head having formed therein a slot coincident with the longer axis thereof and extending transversely of said member for receiving the cutter member, the opposite walls of said slot forming bearing surfaces substantially the length of said cutter member for supporting said cutter member, the opposite end of said member having a socket for receiving the drive shaft; and a pin carried by said drive shaft adapted to be received by a transverse slot formed in the end of said member opposite to the first-mentioned slotted end.

5. In a dry shaving device, a casing; a removable cutter head having hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a cutter member; a coupler of insulating material connected to the cutting member and mounted on the drive shaft for rotation therewith, the driving connection between the coupler and the drive shaft comprising a pin-and-slot connection; a collar fixed to said shaft; a ring coaxially mounted on said shaft for movement longitudinally thereof; and a coil spring disposed about said shaft and seated on said collar normally urging said ring into engagement with the coupler whereby the cutter member is urged into engagement with the undersurface of said head, the ring engaging the pin of said driving connection and limiting the expansion of

the spring and movement of the coupler thereby along said drive shaft when the cutter head is removed.

6. In a dry shaving device, a casing; a drive shaft mounted in the casing; a cutter member having a cutting edge extending generally radially from an end of said shaft; a coupling member sleeving the shaft for coupling the cutter member to the shaft for rotation therewith, the coupling member having an enlarged end formed with a slot, the cutter member being seated within said slot, said slot extending transversely of said coupling member, the cutter member being held within said slot by a pivot member permitting pivotal movement of said cutter member about an axis transverse to said slot and shaft; a cutter head having hair-receiving apertures therein mounted on the casing with the cutting edges of the cutter member in engagement therewith to sever hairs extending through the hair-receiving apertures; and resilient means carried by the shaft for urging the coupling member outwardly of the same whereby the cutting edges of said cutter member are resiliently held in engagement with the undersurface of said cutter head.

7. In a dry shaving device, a casing; a drive shaft mounted in the casing; a cutter member; a coupling for connecting the cutter member to the shaft for rotation therewith; a cutter head having hair-receiving apertures in the face-engaging portions and side walls thereof; a protector band disposed about the side walls of the cutter head to hold the skin of the user from entering the apertures and having openings therein adapted to be positioned in alignment with the apertures in the side walls of the cutter head; a ring threaded into said band for locking the head and protector band in assembled relation, the protector band being threaded to said casing for securing the assembled head and band to the casing; and means including a spring coaxially carried by said shaft for normally urging the cutter member into engagement with the undersurface of the face-engaging portion of said cutter head.

8. In a dry shaving device, a casing; a removable cutter head secured to said casing having radial hair-receiving apertures in the face-engaging portions and side walls thereof; a protector ring disposed about the side walls of the cutter head to prevent the skin of the user from entering the apertures and having openings therein adapted to be positioned in alignment with the apertures in the side walls of the cutter head whereby hairs can pass into the said hair-receiving apertures; a drive shaft in the casing; a cutter member; a coupling member for connecting said cutter member to said shaft for rotation therewith, said cutter member being mounted on said coupling member by a pivot means permitting pivotal movement of said cutter member about an axis transverse to said shaft; and means carried by said shaft for urging said coupling member outwardly of said shaft whereby the cutting surfaces are normally urged into engagement with the undersurface of said cutter head.

9. In a dry shaving device, a casing; a removable cutter head secured to said casing having hair-receiving apertures in the face-engaging portions and side walls thereof; a protector ring disposed about the side walls of the cutter head to prevent the skin of the user from entering the apertures therein, said ring having openings therein adapted to be disposed in alignment with the apertures in the side walls of the cutter

head whereby hairs can pass into the said hair-receiving apertures; a drive shaft in the casing; a coupler of insulating material; a cutter member mounted on said coupler by a pivot member permitting pivotal movement of said cutter member; means for connecting said coupler to the drive shaft for rotation therewith; means tending to separate the coupler from said drive shaft whereby the cutter member is urged into engagement with the undersurface of said head; and means limiting the movement of the coupler axially of the shaft by the means tending to separate the coupler and shaft to prevent the separation of the coupler from the shaft by said last-named means when the cutter head is removed.

10. In a dry shaving device, a casing; a removable cutter head secured to said casing having radial hair-receiving apertures in the face-engaging portions and side walls thereof; a protector ring disposed about the side walls of the cutter head to prevent the skin of the user from entering the apertures and having openings therein adapted to be positioned in alignment with the apertures in the side walls of the cutter head whereby hairs can pass into the said hair-receiving apertures; a drive shaft in the casing; a cutter member; means including a cylindrically shaped member merging into an enlarged portion having a substantially elliptically shaped end face coupling the cutter member to said shaft for rotation therewith, the end face of said member having formed therein a slot coincident with the longer axis thereof and extending transversely of said coupling member for receiving the cutter member, the opposite walls of said slot forming bearing surfaces substantially the length of said cutter member for supporting said cutter member; means for holding said cutter member in said slot including pivot means permitting the cutter member pivotal movement about an axis transverse to said shaft; and means carried by said shaft for urging said coupling member outwardly of said shaft whereby the cutting surfaces are urged into engagement with the undersurface of said cutter head.

11. In a dry shaving device, a casing; a removable cutter head having hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a flat cutter member having a plurality of cutting surfaces adapted to engage the undersurface of said cutter head and shear off hair extending through the apertures thereof; means for connecting the cutter member to the drive shaft for rotation therewith, said means including a member sleeving the end of said drive shaft and connected thereto for rotation therewith, said member terminating in an enlarged portion having a major axis transverse to said drive shaft, said enlarged portion having a slot formed in an end face thereof coincident with the major axis thereof for receiving said cutter member, the walls of said slot forming bearing surfaces substantially the length of said cutter member for holding said cutter member against bending movement; means for securing said cutter member in said slot including a pivot pin permitting pivotal movement of said cutter member about an axis coincident with the minor axis of said enlarged portion of the coupling member and transversely to the axis of said drive shaft; and means normally tending to separate said coupling member from said shaft whereby the cutting surfaces of the said cutter member are urged into engagement with the undersurface of said head.

12. In a dry shaving device, a casing; a removable cutter head having hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a flat cutter member having a plurality of cutting surfaces cooperating with the hair-receiving apertures in the head to sever hairs extending therethrough; means for coupling the cutter member to the drive shaft for rotation therewith, said means including a cylindrically shaped member merging into an enlarged end portion having a substantially elliptically shaped end face, said face having a slot formed therein coincident with the major axis thereof, said cutter member received in said slot, the opposite walls of which form surfaces engaging and supporting the opposite faces of said cutter member, said cutter member being held in said slot by a pivot pin extending radially of said shaft and permitting the cutter member to pivot about an axis transverse of said shaft, the opposite end of said coupling member having a socket for receiving the end of said drive shaft, the wall of said socket being formed with diametrically formed slots; and a pin carried by said drive shaft, the opposite ends of which are adapted to be received in said diametrically opposite slots formed in the wall of the socket.

13. In a dry shaving device, a casing; a drive shaft mounted in the casing; a cutter member; a coupling for connecting the cutter member to the shaft for rotation therewith; a cutter head having hair-receiving apertures in the face-engaging portions and side walls thereof; a protector band disposed about the side walls of the cutter head to hold the skin of the user from entering the apertures and having openings therein adapted to be positioned in alignment

with the apertures in the side walls of the cutter head; a ring mounted in said protector band for locking the head and protector band in assembled relation with the openings in the band in alignment with the openings in the said walls of the cutter head; means integral with the protector band for securing the assembled head and band to the casing; and means including a spring coaxially carried by said shaft for normally urging the cutter member into engagement with the under-surface of the face engaging portion of said cutter head.

14. In a dry shaving device, a casing, a removable cutter head having hair-receiving apertures therein mounted on the casing; a drive shaft in the casing; a flat cutter member having a plurality of cutting surfaces cooperating with the hair-receiving apertures in the head to sever hairs extending therethrough; and means for coupling the cutter member to the drive shaft for rotation therewith, said means including a cylindrically shaped member having one end thereof enlarged to form a head having one axis substantially longer than the other, the end face of said head having formed therein a slot coincident with the longer axis thereof and extending transversely of said member for receiving the cutter member, the opposite walls of said slot forming bearing surfaces substantially the length of said cutter member for supporting said cutter member, the opposite end of said member having a socket for receiving the drive shaft; a longitudinal groove formed in said socket; and a pin carried by said drive shaft adapted to be received by said longitudinal groove formed in the end of said member opposite to the first-mentioned slotted end.

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