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COUPLING FOR OVERLAPPING PROFILE MEMBERS

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FIG. 1

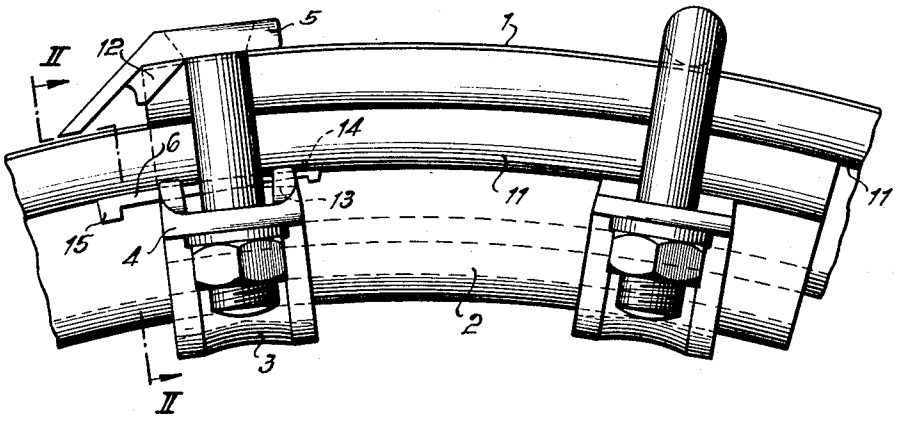
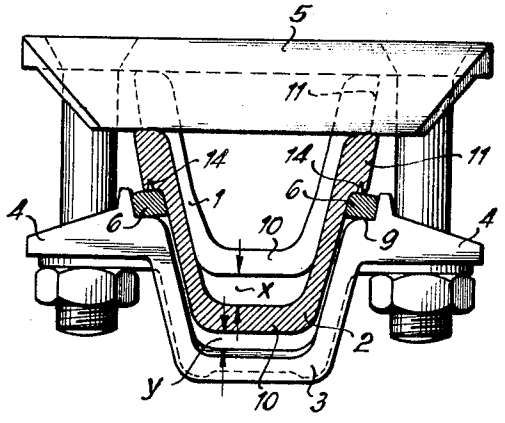


FIG. 2



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COUPLING FOR OVERLAPPING PROFILE MEMBERS

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3 Claims. (Cl. 189—36)

The invention relates to a flexible or yielding connection for extensible supporting frame members, particularly for mine roof supports and underground workings of the type as for example disclosed in application Serial No. 108,254, filed August 3, 1949, now Patent No. 2,713,774, issued July 26, 1955.

This invention has for an object to provide an improved connection for the overlapping ends of the frame members which each have flanges in contact with each other and the tension coupling with a strap extending around an outer frame member or profile section at the overlapping part so that between the underside of the web flanges of the outer profile section and the coupling strap, a thin and elongated cam member is provided. A further object of the invention resides in the provision of the cam or key member having a short length requiring a minimum strength which is sufficient to take care of any relative longitudinal movement of the profile members.

Further objects will be apparent from the following description when considered in connection with the accompanying drawing.

The drawing shows a preferred form of the invention in which;

Figure 1 is a side elevation showing that part of the support frame members which overlap and are secured and coupled together, and

Fig. 2 is a cross section taken on line II—II of Fig. 1 taken in the direction of the arrows.

In the form of the invention illustrated the reference character 1 is the inner U-shaped frame member and 2 is the outer U-shaped frame member, both having the exact and the same precise cross section, so that the members 1 and 2 are U-shaped angle members each with appropriate web flanges. The frame members overlap a short distance as shown in Fig. 1 and one end is within the other with the web flanges 11 in contact with each other, so that between the bottom sections 10 a small space X remains as shown in Fig. 2. To connect the overlapping ends together there is provided an enclosing strap 3 with play or spaced a slight distance from the frame member 2 and having an intermediate strength which is less than the strength of the end portions or flanges 4. Each of the flanges 4 has a shoulder-like cut-out or recess portion 9 on or in which the longitudinal cam 6 is guided and abuts, so that the upper surface of each cam 6 will contact and abut against the respective web flange 11 of the outer frame member 2. The other part of the connection of coupling, as shown in the preferred example, is formed as a clamp or strap screw member 5 with end bolt sections or rods which pass through holes in the flanges 4 and provided with suitable nuts as shown. The holes in the flanges are preferably of greater diameter than the diameter of the bolts.

The clamp 5 passes over or extends beyond the inner frame member 1, so that upon relative movement of the outer frame member and the inner frame member the coupling will be maintained in place.

The cam 6 has a relatively short length which is approximately one and a half times that of the width of the coupling or strap 3. This relationship may of course be greater or smaller if it is necessary to meet certain situations. The cams 6 are relatively thin so that they can, under tension, adapt themselves and bend to the shape of the curve of the flanges 11.

As thin longitudinal cams 6 are to be understood those whose height is essentially smaller than the height of the flanges 11 of the frame members or as to the thickness of the flanges 4 of the strap 3. The intermediate cross section of the cams 6 maintains as to the width and the thickness such dimensions which are approximately equal or smaller than one half of the height of the flanges 11 of the frame members. The support surface 13 of the strap is curved in the longitudinal direction to form an intermediate crown to resemble a cam surface, so that a roof-like form is produced. This construction of the supporting surfaces has the advantage that the connection during tension will be pulled into the correct position. Aside therefrom there is the possibility that the strap can be applied without the necessity of determining the position of the cams, since each cam has a counter surface as a corresponding sliding surface. At the rather thin end of each cam 6 there is provided a spine-like projection 14 which has been shown in slightly excessive size on the drawing. This projection 14 is forced into the flange 11 upon tension between the flange 4 and the clamp 5 so that upon relative sliding movement between the frame members 1 and 2 the cam 6 will be drawn into a sure connection with the cooperating parts. Instead of a spike or pin also a plurality of spikes may be provided and also if desired, the side of the cam 6 which is adjacent the profile may also be provided with one or more ribs or pins which operate in the same manner as the pin 14. It is essential that the thin cam shall be positively connected with its web flange 11.

As soon as the stop 15 of the cam 6 strikes against the strap, the pin 14 will be sheared off or bent so that the smaller end of the cam will bend so that the coupling can be moved. The frame members can even in this relationship move relatively to each other. It is of course to be assumed that the sliding force of the frame members is greater than the frictional resistance between the two frame ends.

With the connecting coupling according to this structure, it is possible to interconnect iron or steel frame elements having circular or arch-shaped forms. Under the pressure of under ground workings it is possible to provide relative movement between the overlapping ends of the support members 1 and 2 in longitudinal direction to thus provide for the flexibility of the support.

When using a plurality of couplings it is sufficient in most cases when only one of the coupling members is provided with the cam members, as shown in Fig. 1. However, the right end coupling of said Fig. 1 may comprise precisely the same parts and functions as the one shown at the left end.

It is, of course, obvious that this invention may be utilized in the construction of tunnels, bridges and similar structures and of course for all types of passages and passageways for the mining industry.

It is, of course, obvious that the invention is capable of being modified as to structural parts and as to combinations in connection with the coupling elements, all of course within the scope of the appended claims.

We claim as our invention:

1. A coupling for the overlapping ends of curved frame members particularly for supporting mine passages and composed of interfitting inner and outer U-shaped frame members with out-turned flanges disposed along the free edges of the U, comprising a U-shaped clamp extending

laterally over the inner frame member, a U-shaped strap member extending around the outer frame member and having a pair of flanges and an intermediate space between the middle part of the U-shaped strap member and the middle part of the outer frame member, means interconnecting the ends of the U-shaped clamp and the U-shaped strap member and including a bolt and nut connection, and an elongated tapered cam member secured between each end of the strap and its respective flange of the outer frame member and each cam being relatively thin in its cross section in a direciton normal to its working surface which is smaller and thinner than the thickness of the flange of the frame member, and is flexible at one end in a direction normal to its working surface with a projecting pin at said flexible end which is adapted to contact the flange of the outer frame member for a firm gripping contact, and the other end of the cam member having a projecting stop to limit the penetrating extent of the cam relative to the strap member when adjacent the latter, said flexible end of the cam flexing to release the pin from contact with the flange of the frame member when the cam is in its end position with the projecting stop against the strap member to permit relative movement of the frame members when subjected to excessive pressure.

2. A coupling according to claim 1, in which each flange of the strap member is provided with a recess portion to receive the cam member.

3. A coupling according to claim 1, in which each flange of the strap member is provided with a recess portion to receive the cam member with a support surface of the recess portion having succesive inclined and declined surfaces longitudinal relative to the length of the cam.

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