May 28, 1957 W. LANGERBEIN 2,793,719

LOCKING METHOD FOR CLAMPING DEVICES OF MINE ROAD WALLING

Filed June 3, 1952

FIG. 1

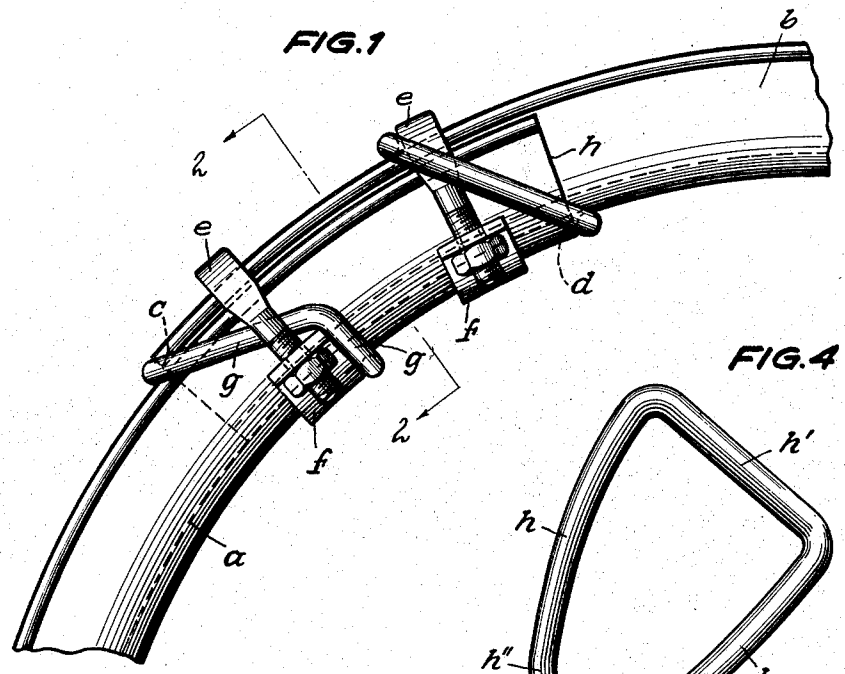
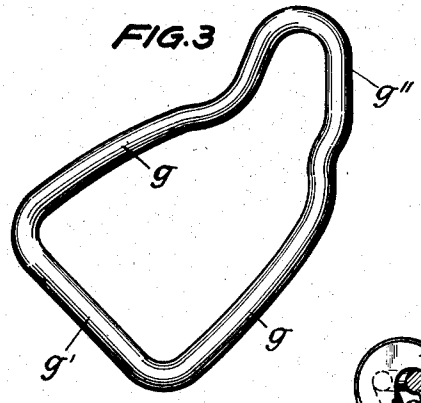


FIG. 4

FIG. 3



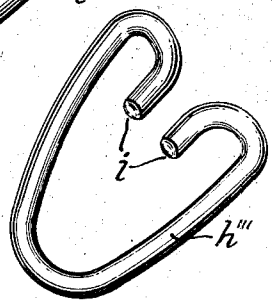
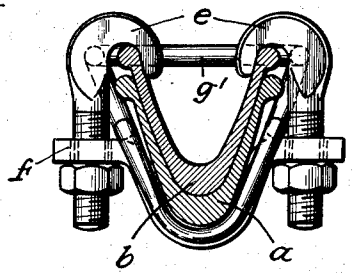


FIG. 2

FIG. 6



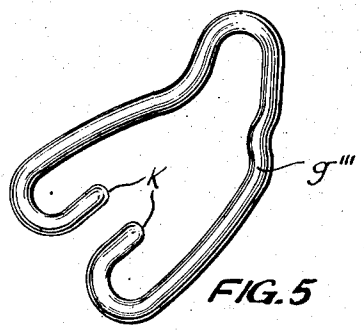


FIG. 5

INVENTOR:

WILHELM LANGERBEIN

BY:

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LOCKING METHOD FOR CLAMPING DEVICES OF MINE ROAD WALLING

Wilhelm Langerbein, Bockum-Hoevel, Germany

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3 Claims. (Cl. 189—36)

The present invention relates to a wall supporting structure as used in mines or tunnels and which consist of metal profiles or frame members, preferably of channel-shaped cross section, clamped together so that they can move relative to each other to a certain degree under the pressure of the surrounding rock material.

One disadvantage of such wall supporting structures according to the prior art, is that the clamping members used to clamp the free ends of one of the members against the profile of the other member have a tendency to move away from the end face of the one member, when the two members move relative to each other under the pressure of the surrounding rocks. In this case, the members are not clamped any more adjacent the ends thereof to the other member, and the end portions of the members, not held any longer against the other member have a tendency to dig into the surrounding rocks, whereby further sliding of the members relative to each other is prevented. In this case the full pressure of the surrounding rock material acts on the stationary held supporting members and will deform these members and tear off the clamps connecting these members together.

It is one object of the present invention to avoid these disadvantages of the wall supporting structure according to the prior art.

It is a further object of the present invention to provide for a clamping arrangement in which the clamping members are locked in fixed position relative to the end portions of the supporting members.

It is an additional object of the present invention to provide for such a clamping arrangement which can be made from few and relatively simple parts so that it can be produced at an economical price.

It is yet another object of the present invention to provide for a clamping arrangement in which clamping members of standard type can be used and in which the clamping members can be locked in place in simple and efficient manner.

It is yet a further object of the present invention to provide for such a wall supporting structure which will perform over a long period of time so that the maintenance cost of the structure will be reduced to a minimum.

With these objects in view the present invention mainly consists in a clamping arrangement comprising, in combination, a pair of elongated members having end portions overlapping each other and being arranged slidably relative to each other in longitudinal direction thereof, each of the end portions having a transverse surface portion, a pair of clamping members, one of the clamping members being arranged in a position spaced a predetermined distance from the transverse surface portion of one of the members, and the other of the clamping members being spaced a predetermined distance from the transverse surface portion of the other of the members, the clamping members extending around the overlapping end portions of the elongated members frictionally engaging the two overlapping end portions and clamping the same to each other, and a pair of locking members having each a first portion engaging the transverse surface portion from which the respective clamping member is spaced the predetermined distance and a second portion engaging the respective clamping member and holding the same in the position so as to prevent movement of the same away from the surface portion when the elongated members move toward each other with the clamping member sliding on the other of the elongated members.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which: Fig. 1 shows the arrangement of the locking device according to the invention in conjunction with a standard clamping device. Fig. 2 is a cross section taken along line 2—2 of Fig. 1 viewed in the direction of the arrows. Fig. 3 shows the locking element for the front clamping device. Fig. 4 shows the same element for the rear clamping device. Fig. 5 is a perspective view of a modification of the locking element shown in Fig. 3 and drawn to a smaller scale. Fig. 6 is a perspective view of a modification of the locking element shown in Fig. 4 and drawn to a smaller scale.

Referring now to the drawings, and more particularly to Figs. 1 and 2, it will be seen that the end portions of the channel-shaped elongated wall retaining members *a* and *b* overlap each other and the segments *a* and *b* are clamped together adjacent their respective end faces *c* and *d* by clamping members *e*, *f*. As can be seen from Fig. 1, the clamping members are locked in position relative to the end faces *c* and *d*, respectively, by locking members *g* and *h* which are arranged in such a way that the forces which cause sliding of the segments *a* and *b* relative to each other do not create any substantially bending moments in the locking members.

By the representation we have started from a so-called standard clip which comprises hook bolts *e* seizing across the rim of the inside segment *b* and which keep and clamp the two section ends to one another by means of nuts screwed onto the threaded ends of bolts *e* and engaging the bottom faces of ears extending laterally from the semi-circular clips *f*. The locking of the clamping device *e*, *f* with the ends *c* and *d* is effected, according to the invention, by simple locking members or lugs *g* and *h*. The lug *g*, adapted to the shape of the sections, is placed with its portion *g'* ahead of the end *c* of segment *b* and abuts with its end *g''* behind the semi-circular clip *f*. The ring itself can be put in across the clamping clip *e*, *f* between section *a* and bolts *e*. The subsequent arrangement of such a locking ring is facilitated if in place of the portion *g'* two hooks *k* are provided as shown in the modified locking ring *g'''*, illustrated in Fig. 5. The locking ring *h* together with clamp *h'* are arranged behind the hook bolts *e* located adjacent the end *d* of the section and engage with the other end *h''* the end *d* of section *a*. A modified locking ring L''' is shown in Fig. 5 which has two prongs or hooks *i*. By this arrangement the rear clip *e*, *f* neighbouring the end *d*, is clamped at a point diagonally from this end *d* so that, even so the friction between the semi-circular clip *f* and the section *a* is greater than the friction between hooks *e* and section *a*, a simultaneous motion of clip *e*, *f* with section end *d* takes place at all events. With the locking ring *g* the attack is in the reverse order, and the semi-circular clip *f* is compelled to move along with the end *c* of section *b*.

Tests have proven that with the locking process according to this invention it is possible to work with consider-

ably weaker clamping elements and that in spite of this the loading capacity is considerably higher because the friction value of the sections seizing one into the other can be reinforced or constantly adjusted uniformly.

By the above invention a solution has finally been found for the old problem aiming at the avoidance of attendance of the clamping devices to obtain, so to speak, an independent adjustment of these devices. Hand in hand with that goes, especially as no essential moment is created with the power attack, the reduction of repairs and the prevention of "spearing" of the walking ends as well as that of the section ends lying towards the face at the face itself or at the lagging.

The lugs or locking members *g* and *h* serve to fix the position of the clamping member *e* relative to the end faces of the segments or elongated support members *a* and *b*, when the same slide relative to each other under the pressure of the surrounding rocks. When the supporting members are used to support for instance the walls of a mine shaft, the rock pressure acts on the elongated members *a* and *b* as well as on the surface of the clamping member *e*. The members *e* tend therefore to remain in fixed position relative to the rock material pressing on the same and, when the elongated members slide relative to each other, the end faces of the elongated members *a* and *b* tend therefore to move away from the clamping members *e* so that an extended portion of the elongated members *a* and *b* will project on opposite sides beyond the clamping member *e*. In this event the end portion of each elongated member is not pressed any longer against the channel portion of the other member and has therefore a tendency to spread away from the channel portion of the other member and to dig into the surrounding rock. Thereby, a further sliding of the two members *a* and *b* relative to each other is prevented and the whole crushing force of the surrounding rocks is transmitted to the stationary held elongated members *a* and *b* and will deform these members and tear off the clamping members *e*. The lugs or locking members *g* and *h* prevent movement of the clamping members *e* away from the end faces of the elongated support members *a* and *b*, whereby, when the elongated members slide relative to each other under the pressure of the surrounding rock material each of the support members remains pressed adjacent its end into the channel of the other member. Thereby, a "spearing" of the walking ends of these members, that is a digging of the end portions of the elongated members into the surrounding rock and the resulting deformation or destruction of the elongated members is prevented.

It is well worth mentioning in this respect that the design according to this invention is not limited to the profile of a bellshaped section as shown, but that it can be used for all yielding mine road supports, in the simplest arrangement, cheapest construction and by the reduction of attendance and maintenance cost.

What is claimed is:

1. A clamping arrangement comprising, in combination, a pair of elongated members having end portions overlapping each other and being arranged slidably relative to each other in longitudinal direction thereof, each of said end portions having a transverse surface portion; a pair of clamping members one of said clamping members being arranged in a position spaced a predetermined distance from the transverse surface portion of one of said members, and the other of said clamping members being spaced a predetermined distance from the transverse surface portion of the other of said members, said clamping members extending around said overlapping end portions of said elongated members frictionally engaging said two overlapping end portions and clamping the same to each other; and a pair of locking members having each a first portion engaging the transverse surface portion from which the respective clamping member is spaced said predetermined distance and a second portion engaging the respective clamping member and holding the same in said position so as to prevent movement of the same away from said surface portion when said elongated members move toward each other with said clamping member sliding on the other of said elongated members.

2. A wall supporting structure comprising, in combination, a pair of elongated wall retaining members having end portions overlapping each other and being arranged slidably relative to each other in longitudinal direction thereof, each of said end portions having a transverse end face; a pair of clamping members, one of said clamping members being arranged in a position spaced a predetermined distance from the end face of one of said wall retaining members, and the other of said clamping members being spaced a predetermined distance from the end face of the other of said wall retaining members, said clamping members extending around said overlapping end portions of said elongated wall retaining members frictionally engaging said two overlapping end portions and clamping the same to each other; and a pair of locking members, each locking member extending obliquely across one of said clamping members and having a first portion engaging the transverse end face from which the respective clamping member is spaced said predetermined distance, and a second portion engaging the respective clamping member and holding the same in said position when said elongated wall retaining members are forced by outside pressure to move toward each other with said clamping members sliding on said elongated wall retaining members.

3. A wall supporting structure as claimed in claim 2 wherein each clamping member has a first clamping portion frictionally engaging the overlapping end portion of the wall retaining member from whose end face the respective clamping member is spaced a predetermined distance, and a second clamping portion frictionally engaging the overlapping end portion of the other of said elongated wall retaining members; and wherein each of said locking members engages with said second portion thereof said second clamping portion of the associated clamping member.

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