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CONNECTING STRUCTURE FOR BEAMS OF A ROOF SUPPORT OR THE LIKE

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Fig. 1

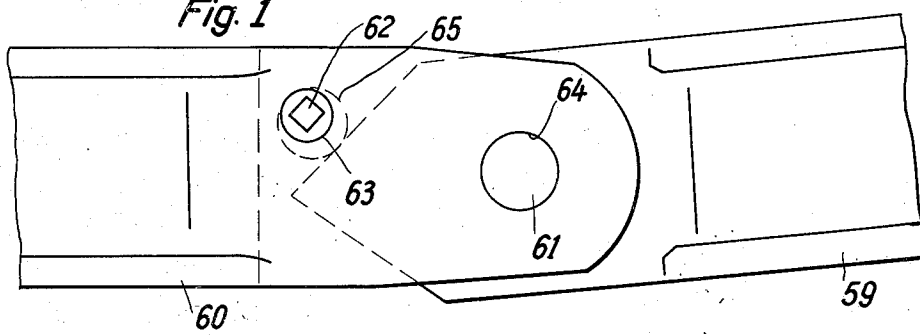


Fig. 1a

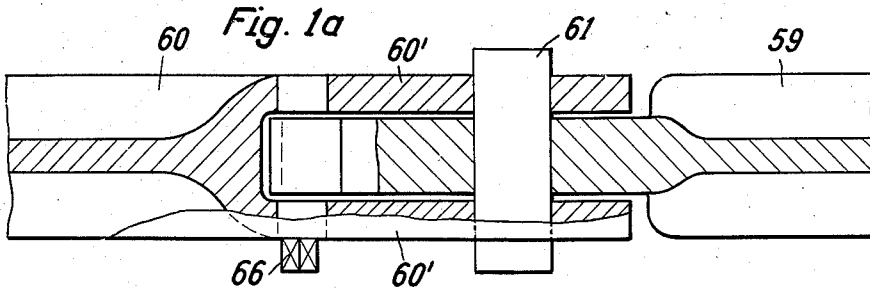


Fig. 2

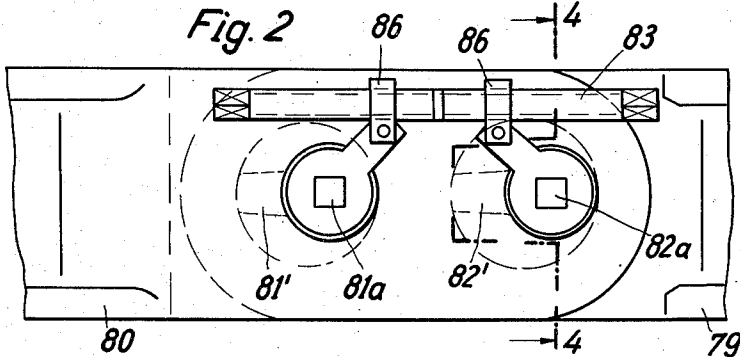


Fig. 4

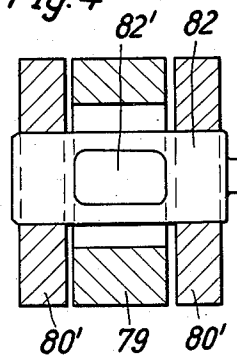
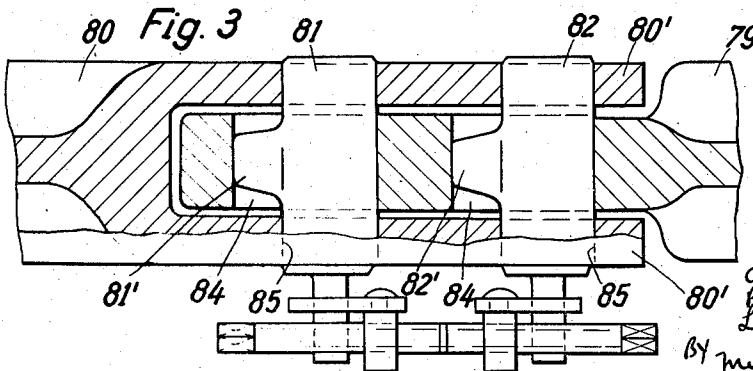


Fig. 3



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4 Claims. (Cl. 287—99)

This application is a divisional application of our co-pending application Serial No. 510,204, filed on May 23, 1955.

The present invention relates to supporting structures particularly of the type used to support the roof of a mine shaft or the like.

Particular problems are involved in supports of the above type because, on the one hand, they must be robust enough to withstand great forces and because, on the other hand, they must be flexible enough to conform to whatever shape the roof of the mine shaft or the like happens to take.

One of the objects of the present invention is to solve the above problems by providing connections between a plurality of beams which lend to the connected beams sufficient flexibility to conform to a given roof shape and which also lock the beams together in such a way that they provide an extremely strong support.

Another object of the present invention is to provide a beam connecting structure of the above type which is exceedingly simple and which prevents angular displacement of a pair of beams with respect to each other in either direction.

Furthermore, it is an object of the present invention to provide a beam arrangement of the above type which may be disassembled whenever desired to have the beams reversed, for example.

Also, it is an object of the present invention to provide a beam adjusting structure which in addition to adjusting the angle between a pair of successive beams serves also to lock the beams in their adjusted position.

With the above objects in view, the present invention mainly consists of a supporting structure which includes a first beam having a bifurcated end portion provided with a pair of spaced walls each of which is formed with openings, the openings of one wall being aligned with those of the other wall. A second beam has an end portion extending between the spaced walls of the first beam and formed with an opening aligned with one set of openings of the spaced walls. A pivot pin extends through the aligned openings so that the first and second beams are turnable with respect to each other to a desired angular position. At least one eccentric element is pivotally supported in another set of aligned openings in the walls of the bifurcated end portion of the first beam for camming engagement with an abutment surface at the front end of the second beam for locking the beams in a given angular position as well as for turning the beams to the desired angular position.

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:

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FIG. 1 is a fragmentary side elevational view illustrating one possible manner of interconnecting a pair of beams;

FIG. 1a is a partly sectional plane view of the device of FIG. 1;

FIG. 2 is a fragmentary side elevational view of a different embodiment of the invention;

FIG. 3 is a plane view of the device of FIG. 2; and

FIG. 4 is a fragmentary sectional view of the device of FIG. 2, the section being taken along line 4—4 of FIG. 2.

Referring now to the drawing, it will be seen that the beam 60 of FIG. 1 has a bifurcated end portion provided with a pair of spaced walls 60', 60' between which the end portion of the beam 59 freely extends. The beams 59 and 60 are supported in a known way by suitable props not shown in the drawing and serving to hold the beams against the roof of a mine shaft or the like. This is true of all the embodiments of the invention.

The walls of the bifurcated end portion of beam 60 and the end portion of beam 59 are respectively formed with openings 64 which are aligned and through which a pivot pin 61 extends so that in this way the beams 59 and 60 are pivotally connected for angular movement with respect to each other. Through such angular movement of the beams it is possible to arrange them so that they correspond to the contour of a particular roof to be supported.

The walls 60' of the bifurcated end portion of beam 60 are furthermore formed with a pair of aligned openings 63 respectively which turnably carry a member 62 having between these spaced walls an eccentric portion 65, shown in dotted lines in FIG. 1. The end face of beam 59 is V-shaped, and is engaged by the eccentric portion of member 62 to determine the angular position between beams 59 and 60. The member 62 has a non-circular end portion 66 so that member 62 may be turned with a suitable wrench and by such turning the angular position of the eccentric is changed to regulate the angle between beams 59 and 60.

FIGS. 2 and 3 show an embodiment where the beam 80 is provided with a bifurcated end portion having spaced walls 80', 80' between which an end portion of the beam 79 extends. These spaced walls and the end portion of beam 79 are respectively formed with two pairs of aligned openings, as indicated most clearly in FIG. 3, the openings 84 of the beam 79 being larger than the opening 85 of the beam 80, as is evident from FIG. 2. Elongated cylindrical members 81 and 82 respectively extend through the two sets of aligned openings and are turnably carried by the beam 80. These members 81 and 82 having eccentric projections 81' and 82' in the openings of beam 79, respectively, which engage this beam 79. Of course, members 81 and 82 are composed of several interconnected elements. The members 81 and 82 having non-circular, free end portions 81a and 82a, respectively, which extend respectively through mating non-circular openings of a pair of cranks to which a pair of nuts 86 are pivotally connected, nuts 86 being threaded oppositely from each other and respectively being in threaded engagement with oppositely threaded portions of a screw member 83 having non-circular end portions, as indicated in FIGS. 2 and 3. Thus, when the screw member 83 is turned about its axis the members 81 and 82 turn in opposite directions in order to turn beams 79 and 80 with respect to each other as well as to hold these beams in the angular position to which they are turned.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of supporting structures differing from the types described above.

While the invention has been illustrated and described as embodied in pivotally interconnected beams of a supporting structure, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a supporting structure, in combination, a first beam having a bifurcated end portion provided with a pair of spaced walls each of which is formed with a pivot opening, said opening in one of said walls being aligned with that in said other wall; a second beam having an end portion freely extending between said spaced walls and formed with a pivot opening aligned with said pivot openings in said walls; a pivot pin extending through said openings; the end portions of one of said first and second beams being formed with an additional opening spaced from said pivot opening in said end portion, the end portion of the other one of said first and second beams being formed with an abutment face; and camming means rotatably supported in said additional opening for camming engagement with said abutment face.

2. In a supporting structure, in combination, a first beam having a bifurcated end portion provided with a pair of spaced walls each of which is formed with two openings, said openings of said walls being aligned with each other to provide two pairs of aligned openings, and one of said pairs of aligned openings being located nearer to the extremity of said end portion of said first beam than the other pair of aligned openings; a second beam having an end portion extending between said pair of

spaced walls, formed with an opening aligned with said one pair of aligned openings to provide three aligned openings, and terminating in a substantially V-shaped end face located adjacent said other pair of aligned openings; a pivot pin extending through said three aligned openings; and an adjusting pin having end portions extending through said other pair of aligned openings, respectively, and having between said walls an eccentric portion engaging said V-shaped end face of said second beam.

3. In a supporting structure, in combination, a first beam having a bifurcated end portion provided with a pair of spaced walls each of which is formed with a pair of openings distributed longitudinally along said beam with the openings of one wall aligned with those of the other wall to provide two pairs of aligned openings; a second beam having an end portion extending between said pair of spaced walls and formed with a pair of openings respectively overlapping said two pairs of aligned openings and being larger than the same; a pair of pins respectively extending through said openings of said second beam and said two pairs of aligned openings and respectively having eccentric portions in said openings of said second beam in engagement with the latter; and turning means connected to said pins for simultaneously turning the same in opposite directions.

4. In a supporting structure, in combination, a first beam having a bifurcated end portion provided with a pair of spaced walls; a second beam having an end portion freely extending between said spaced walls; pivot means connecting said end portions for tilting movement about an axis substantially normal to said beams; cam means carried by said end portion of one of said beams turnable about an axis spaced from, and substantially parallel to, said axis of said pivot means; and a cam face provided on the end portion of the other of said beams and engaged by said cam means.

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