Aug. 6, 1957 O. KUHN 2,801,522

MINE ARCH SUPPORTS

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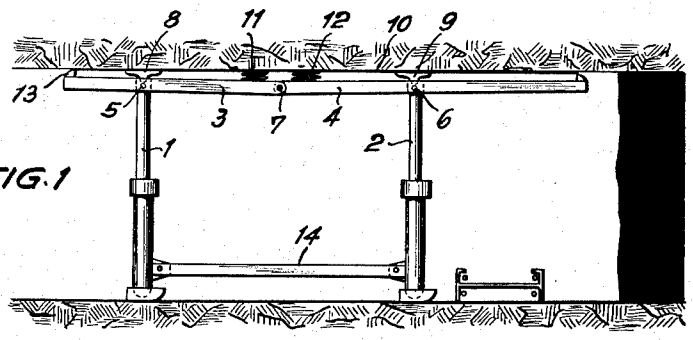


FIG. 1

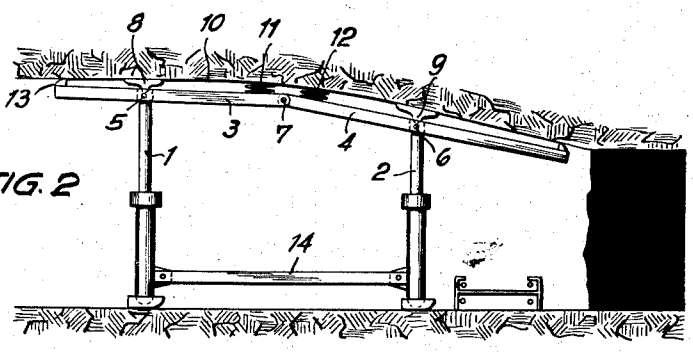


FIG. 2

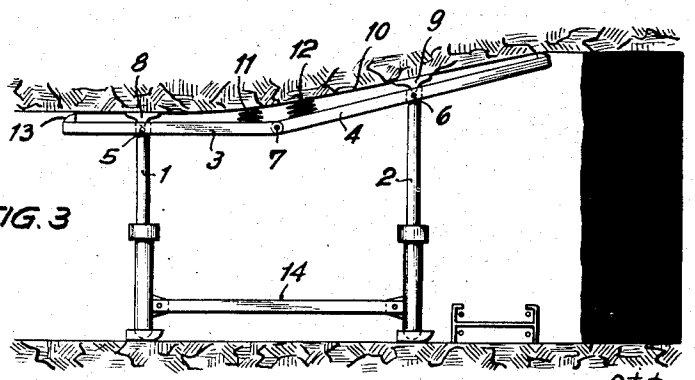


FIG. 3

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FIG. 4

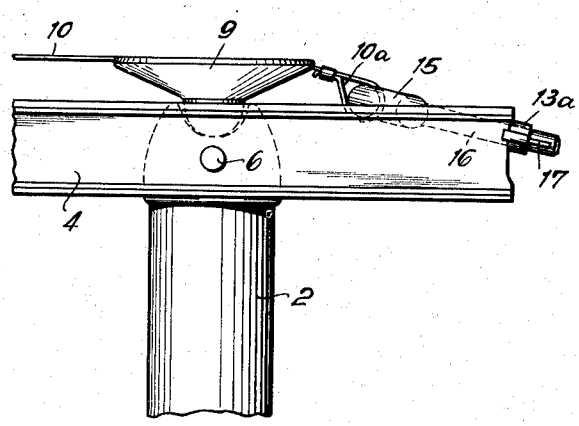
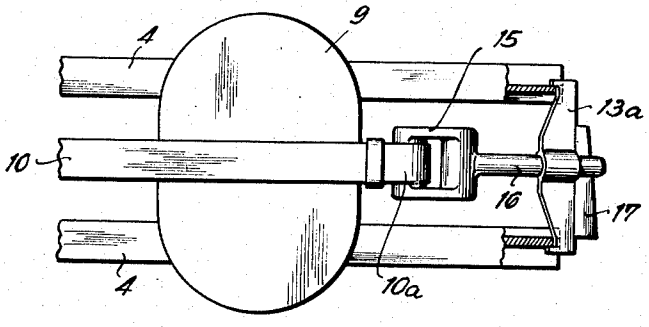


FIG. 5



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MINE ARCH SUPPORTS

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7 Claims. (Cl. 61—45)

In carrying out the mechanisation of face roadways in mines, roof supporting structures have been proposed which comprise two props which are of adjustable length and a roof bar connecting these props, the latter being arranged on a common sole piece or being interconnected by a cross bar above the sole. The roof bars used in these constructions have the disadvantage that where the roof is uneven they are only applied against the roof over a small part of their length, for instance at the ends only, and consequently are subjected to objectionable bending strains. This drawback is also encountered in a roof support, for use at the coal face, in which pivotally interconnected short roof bars are each supported by a pit prop somewhere about midway along its length.

The invention is aimed at overcoming this drawback, to which end it resides in a combination of the following features:

(*a*) The roof bar is composed of a plurality of sections (preferably two) which are hingedly interconnected at joints which permit a relative angular adjustment of the jointed sections at least in the vertical plane.

(*b*) Each section of the roof bar is pivotally connected to a pit prop which serves to support the same.

(*c*) The outer ends of the roof bar made up of the inter-coupled roof bar sections are connected by a draw means which is located at the roof side of the bar and which is supported against the bar sections by resilient means (particularly by springs).

Advantageously the props are equipped with supporting members (for example head plates or laggings) which are located between the roof and the roof bar sections, these members also preferably being used to press the draw means against the roof. In a preferred case, the draw means itself consists of a steel strip, but other means can be employed, for example a wire cable.

The individual features of the combination of this invention are per se known, but the object of the invention is only met by a combination of all these features, such combination producing a simple high load-capacity roof bar of small thickness which supports the roof over a comparatively extended length even where this is most uneven, whilst at the same time undesirable bending strains are avoided.

Tightening devices, for example in the form of wedges or screws, can be associated with the draw means. Moreover, the ends of such draw means can be detachably secured to the ends of the roof bar, e. g. by means of pushed-on sleeves or the like, which enables roof bars which, in principle, are of known form, to be readily modified in accordance with the proposal of this invention.

The invention is suited, with particular advantage, to the production of an arch support for a mechanical face working. A structural element of this character will then advantageously comprise two hingedly interconnected roof bar sections or parts each of which is supported by a prop, these props being connected together by a cross piece or the like located close to the floor of the working. It is, however, to be understood that mine arches in accordance with this invention are also capable of use with advantage otherwise than in a mechanical face working. An embodiment of the arch support according to this invention is illustrated in the accompanying drawing.

Figure 1 is an elevational view of the arch structure mounted in a coal seam which has an even roof;

Figures 2 and 3 illustrate the same structure used in connection with roofs which are, respectively, of concave and convex formation; and

Figures 4 and 5 are respectively a side elevation and a plan view, on a larger scale than that of Figures 1 to 3, of the connection between the prop, roof bar and draw means of the structure of Figures 1 to 3.

In the embodiment illustrated, the arch support consists of pit props **1** and **2** which are interconnected by a cross bar **14** near the floor and serve to support the roof bar which is made up of two sections **3** and **4** respectively pivoted to the props **1** and **2** at **5** and **6**. The sections **3** and **4** are interconnected at their adjacent ends by a hinged joint **7**. Head plates **8** and **9** are pivotally connected at the top of the props **1** and **2** respectively. The outer ends of the roof bar sections **3** and **4** are connected by a steel strip **10** which is passed over the upper sides of the head plates **8** and **9**. Upstanding projections **13** may be provided at the outer ends of the sections **3** and **4** for connection of the strip ends, or these ends may be detachably secured to the respective ends of the sections, for example by sleeves **13***a* which releasably engage the ends of the roof bar sections as shown in Figures 4 and 5.

Thus as shown in Figures 4 and 5, the strip **10** terminates in a loop **10***a* which embraces one limb of a shackle **15** the other limb of which is formed with an extension **16** which passes through a central boss in a cross-head form sleeve **13***a*, the limbs of which are adapted releasably to engage the end of the roof bar section **4**; the latter, as clearly shown in Figure 5, comprises a pair of parallel beams disposed one on each side of the prop **2**. The extension **16** is slotted to accommodate a wedge **17** which may be driven into the slot to effect tensioning of the strip **10**.

Springs **11** and **12** are disposed between the strip **10** and the upper face of the two roof bar sections. It will be understood that more springs than are actually here illustrated can be employed, this multiplicity of springs being distributed over the length of the roof bar. Advantageously the springs **11** and **12**, where only these two are employed, are arranged in the vicinity of the joint **7**. As can be seen from Figure 2, the springs prevent the hinged connecting joint **7** between the roof bar sections from being pressed upwards to an excessive extent.

To enhance the elasticity of the roof bar, and thus its capacity to conform to the roof, it is of advantage to make the sections **3** and **4** of a material having a small modulus of elasticity but a high elastic limit, for example of an improved aluminium alloy of the Al-Cu-Mg type.

I claim:

1. A mine roof support, comprising: a roof bar composed of a plurality of sections hingedly jointed end-to-end for relative angular adjustment in a vertical plane, a pit prop for pivotally supporting each of said roof bar sections, a draw means interconnecting the outer ends of the composite roof bar and disposed at the roof side of the bar, compression springs disposed between said roof bar and draw means at least in the region of the hinged connection between the adjacent roof bar sections, and a supporting member pivotally mounted at the upper end of each prop between the roof bar sections and the draw means and serving to press the draw means against the roof.

2. A mine roof support according to claim 1, in which the draw means is a steel strip.

3. A mine roof support, comprising: a roof bar composed of a plurality of sections hingedly jointed end-to-end for relative angular adjustment in a vertical plane, a pit prop for pivotally supporting each of said roof bar sections, a draw means interconnecting the outer ends of the composite roof bar and disposed at the roof side of said bar, compression springs disposed between said roof bar and draw means in the region of the hinged connection between the adjacent roof bar sections, a supporting member on the end of each pit prop and in contact with the draw means, and tightening means for said draw means.

4. A mine roof support according to claim 1, in which each section is pivotally mounted on the upper end of its pit prop approximately at the mid-point of the section.

5. A mine roof support according to claim 1, in which the pair of sections include two pairs arranged parallel to each other one on each side of the pit prop.

6. A mine roof support, comprising: a roof bar composed of a plurality of sections hingedly jointed end-to-end for relative angular adjustment in a vertical plane, a pit prop for pivotally supporting each of said roof bar sections, a draw means interconnecting the outer ends of the composite roof bar and disposed at the roof side of the bar, compression springs disposed between said roof bar and draw means at least in the region of the hinged connection between the adjacent roof bar sections, a supporting member pivotally mounted at the upper end of each prop between the roof bar sections and the draw means and serving to press the draw means against the roof, and a cross bar connected to the pit props near the bottom ends thereof to form a closed frame relative to the roof bar and the pit props.

7. A mine roof support, comprising: a roof bar composed of a plurality of sections hingedly jointed end-to-end for relative angular adjustment in a vertical plane, a pit prop for pivotally supporting each of said roof bar sections, a draw means interconnecting the outer ends of the composite roof bar and disposed at the roof side of said bar, compression springs disposed between said roof bar and draw means in the region of the hinged connection between the adjacent roof bar sections, a supporting member on the end of each pit prop and in contact with the draw means, tightening means for said draw means, and a cross bar connected to the pit props near the bottom ends thereof to form a closed frame relative to the roof bar and the pit props as an approximate rectangular configuration.

References Cited in the file of this patent

UNITED STATES PATENTS

2,650,475	Gerlach	Sept. 1, 1953
2,714,505	Joy	Aug. 2, 1955

FOREIGN PATENTS

891,261	France	of 1943
961,322	France	of 1949
805,635	Germany	May 25, 1951