March 23, 1965 H. ROSENBERG 3,174,289

TRAVELLING HYDRAULIC DEVELOPMENT FRAME FOR MINING OPERATIONS

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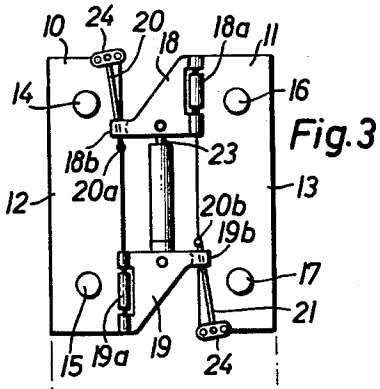


Fig. 3

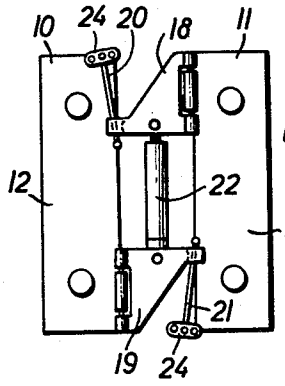


Fig. 4

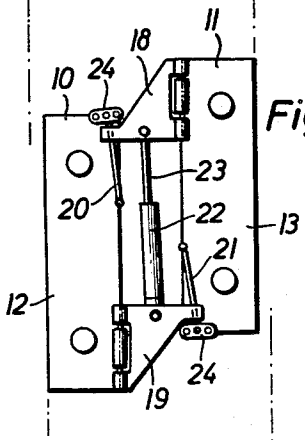


Fig. 2

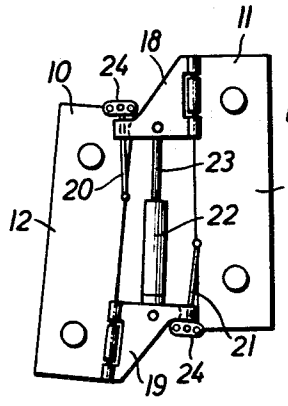


Fig. 5

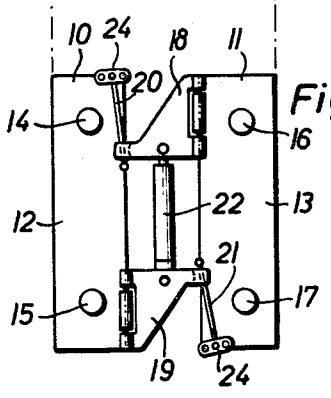


Fig. 1

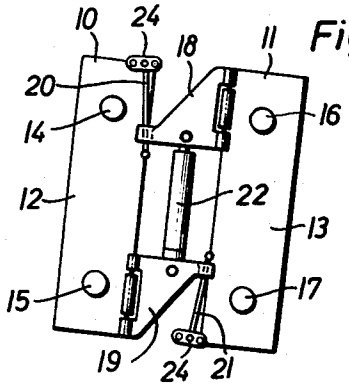


Fig. 6

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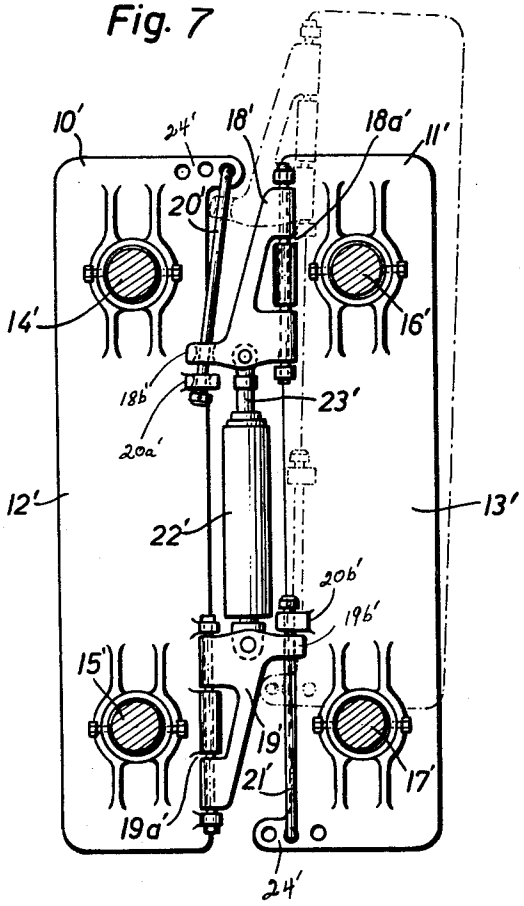
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Fig. 7



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TRAVELLING HYDRAULIC DEVELOPMENT FRAME FOR MINING OPERATIONS

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4 Claims. (Cl. 61—45)

The invention relates to a movable frame for use in mining.

The type of frame to which this invention relates more particularly includes an arrangement of movable pit props which move along progressively on rails and support the roof of the working.

Commonly, such frames shift ahead through pneumatically or hydraulically operated cylinders with pistons. The two frames are alternately displaced parallel to each other. They consist of two frames connected with one another through guides. The moving-ahead of the individual frames takes place by swinging one frame around the stationary other frame.

The disadvantage of the known development frames is, above all, in the lack of adaptability to the conditions given. They may be shifted only in straight line in the longitudinal direction of the overhead and bottom rail. However, frequently a lateral shift, even though only slight, is desirable and even necessary. One need only think of the occurrence of a disturbance in the underground mining installation, of loosened rock layers or of a change of the overhead conditions, through which is made necessary or desirable a change of the distance of the operations and frames from one another. For example, it may be possible at the start of the removal of a prop that the roof was comparatively good, so that the individual frames could be positioned at comparatively large intervals from one another along the coal deposit. As the work progresses, the roof may then become worse, so that it is necessary to position the development frames closer. This means that the development frames must be shifted more closely together, namely in the direction about parallel to the coal deposit, or that, with the spacing of the props remaining the same, additional development frames must be brought in. This mentioned parallel displacement to the coal deposit is difficult or impossible with the customary development frames.

The invention has as its object to create a development frame which may advance in the direction to the coal deposit under simultaneous lateral displacement, thus taking place parallel to the coal deposit. For this, the inventor proposes that two racks of the frame be connected together with a shifting device to permit the change of the interval between both racks and a certain angular position with respect to one another. The means effecting these changes may be at both ends of the frame. In one embodiment of the invention, each of the two racks carries an adjustable guide bar with which a connecting piece on the other rack co-acts. The guide bar is swingable about a pivot and secured at its free end through a plug bolt or a similar device in the adjusted position.

In the drawing are shown two examples of execution of the invention, wherein

FIG. 1 is a plan view of an embodiment of an hydraulically operated development frame;

FIG. 2 is a plan view similar to FIG. 1, in which one rack is shown stepped forward with respect to the other;

FIG. 3 is a plan view of the frame of the preceding figures, in which both racks are shown advanced;

FIG. 4 is a plan view of the frame with the guide bar adjusted for angular advancement;

FIG. 5 is a plan view of the frame showing one rack advanced angularly;

FIG. 6 is a plan view of the frame of FIG. 6 showing both racks advanced angularly; and

FIG. 7 is a plan view, with parts in section, of an alternative form of frame similar to that of FIG. 1.

Referring to the drawing, and particularly to FIGS. 1 to 6, the development frame consists of two racks 10 and 11. Each of these two racks has in each case horizontal skids 12 and 13, two pit props 14 and 15 for skid 12 and two pit props 16 and 17 for skid 13. Props 14, 15, 16 and 17 are hydraulically operated and are extensible columns which extend upwardly from the floor to the roof where they bear against suitable heads or rails to support the roof. The details of the props and the rails are omitted for the sake of simplicity, as they are not part of the present invention. Connected to the two racks 10 and 11 are spacers 18 and 19, which are in each case hinged at one side, at 18*a* and 19*a* respectively, to the two racks 10 and 11 respectively and encircle guide bars 20 and 21 respectively at their opposite ends with loops 18*b* and 19*b* respectively. Cooperative with the two distance pieces and interposed between them is provided a cylinder 22 with piston rod 23. The two guide bars 20 and 21 are each pivotably mounted on their respective racks 10 and 11, in each case with one end at 20*a* and 20*b* respectively.

In FIG. 1, the travelling hydraulic development frame is shown in a starting position. After releasing the two props 16 and 17 of extension rack 11 from the roof, the shifting cylinder 22 is energized. Piston rod 23 displaces the rack 11 upward in the drawing (FIG. 2), whereby there occurs simultaneously a displacement of rack 11 toward the left, effected through the guide bars 20 and 21, which are correspondingly set parallel. Thus, at the end of the displacement, the distance between the racks 10 and 11 of the frame is diminished, as is shown in FIG. 2. After reaching the end position (FIG. 2) of the rack 11, the two props 16 and 17 are again set to grip the roof. Then the props 14 and 15 of the rack 10 may be loosened, whereupon the shifting cylinder 22 is again energized hydraulically to retract the piston rod 23 with respect to cylinder 22. Thus, rack 10 is shifted ahead, as shown in FIG. 3, and thus again is reached the basic position corresponding to FIG. 1 of the drawing. However, the development frame as a unit has been shifted somewhat toward the left. This step in the direction of the coal pile, and in a direction perpendicular thereto, is accompanied by a displacement parallel to the coal pile.

In the development frame according to FIG. 4, the guide bar 21 is turned oppositely to its position in FIGS. 1 to 3, with its free end toward the left. Guide bar 20 remains in its position, as in FIGS. 1 to 3. If now props 14 and 15 of the rack 10 are loosened and the cylinder 22 is energized, there occurs a displacement of the rack 10 from its position according to FIG. 4 into that of FIG. 5. That is to say, the rack 10 assumes a slanting position. Upon reaching the position in FIG. 5, the props 14 and 15 of rack 11 are loosened so that after actuation by cylinder 22 the rack 11 is brought ahead, until the entire development frame takes the position shown in FIG. 6 of the drawing, which, as will be noted, is twisted as a unit.

In the two advancing movements, illustrated in FIGS. 1 to 3 and FIGS. 4 to 6, there takes place simultaneously a displacement of the development frame toward the left and additionally a turning. Of course, the development frame may also, with corresponding adjustment of the guide bars 20 and 21, be brought toward the right. At

their free ends, lying opposite to the pivot points **20***a* and **20***b*, the guide bars carry drilled quadrants **24** by which they may be held in their various positions. Plug-bolt connections, or any other suitable easily detachable connection, may be used to hold them.

FIG. 7 shows an embodiment similar to that of FIGS. 1–6 including the racks **10′** and **11′** having the skids **12′** and **13′**, each with a pair of pit props **14′**, **15′**, and **16′**, **17′**, respectively. The spacers or arm means **18′** and **19′** interconnect the racks **10′** and **11′** via the hinged connections at **18***a′* and **19***a′*, on the one hand, and via the guide bars **20′** and **21′** on the other hand in the same manner as in the case of FIGS. 1–6. The cylinder **22′** and piston rod **23′** represent the driving means for moving the frame arrangement in the manner described hereinabove. The loops **18***b′* and **19***b′* permit the spacers **18′** and **19′**, respectively, to encircle the guide bars **20′** and **21′**, respectively, the loops being constructed to permit sufficient play between the spacers and the corresponding guide bars to permit horizontal angular displacement between such spacers and guide bars. Furthermore, the guide bars **20′** and **21′** are pivotally mounted at one end respectively within looped ears **20***a′* and **20***b′*, respectively. Hence, the opposite end of the particular guide bare may be placed in one of the openings in the end portion **24′** of the corresponding rack to adjust the position of the guide bar with respect to the longitudinal. While in the embodiment of FIGS. 1–6, the guide bars are shown in a position at an angle with respect to the longitudinal direction, in FIG. 7 guide bar **21′** is shown parallel to the longitudinal direction while guide bar **20′** is shown disposed at an angle to such direction. The particular configuration of the looped connection at **20***a′* and **20***b′* is similar to that of the corresponding loops **18***b′* and **19***b′*, whereby the particular guide bar may be pivoted to adjust the angle thereof with respect to the longitudinal, depending upon the particular aperture at **24′** into which the guide bar is placed. A suitable pin in the conventional manner provided on the guide bar in question may be used to hold the guide bar at the opening selected in the portion **24′**. In phantom, the position of rack **11′** may be seen upon energizing the piston-cylinder arrangement to force rack **11′** in the forward direction, whereby the rack **11′** assumes the position shown in phantom.

Other equivalent modifications will occur to those skilled in the art, which are within the scope of the invention as limited only by the appended claims.

I claim:

1. Advancing mining prop arrangement comprising a pair of longitudinal racks arranged side by side, each rack having a forward end and a rearward end and pit prop overhead bearing means supported thereon for alternate extension into and retraction from engagement with the mine ceiling, longitudinally extending coacting moving means including a first moving part and a second moving part disposed between said racks, said parts being movable longitudinally with respect to one another yet being secured from transverse and angular movement with respect to each other, a first arm hingedly attached about a longitudinal axis to the forward end of a first of the longitudinal racks and a second arm hingedly attached about a longitudinal axis to the rearward end

of a second of the longitudinal racks, a first angularly adjustable horizontal guide bar secured to the forward end of said second rack and slidably engaged by said first arm and a second angularly adjustable horizontal guide bar secured to the rearward end of said first rack and slidably engaged by said second arm, said first moving part being pivotally connected to said first arm for moving said first arm and in turn said first rack in the angular direction of said first guide bar and said second moving part being pivotally connected to said second arm for moving said second arm and in turn said second rack in the angular direction of said second guide bar, for the alternate advancing of the racks both angularly and longitudinally with respect to each other.

2. Travelling hydraulic frame device for mining, comprising a pair of prop-supporting racks arranged substantially longitudinally side by side, each rack having pit prop means supported thereon, moving means including hydraulically actuated cylinder means interposed substantially longitudinally between said racks for shifting said racks longitudinally and angularly with respect to each other in horizontal direction, arm means interconnecting said racks with said moving means, and a separate angularly displaceable corresponding longitudinal guide means pivotally connected to each rack at one respective end of such guide means and horizontally slidably displaceably engaging a particular arm means along at least a portion of the remainder of such guide means for changing the horizontal angular direction of movement of a particular rack with respect to the substantially longitudinal disposition of the other rack in the shifting of the racks with respect to each other.

3. Travelling hydraulic frame device for mining, comprising a pair of prop-supporting racks arranged longitudinally side by side, each rack having pit prop means supported thereon, moving means including hydraulically actuated cylinder means interposed between said racks and connected therewith by angularly adjustable horizontal guide means for shifting of the racks longitudinally and angularly with respect to each other in horizontal direction, said guide means including a guide bar provided at one end of each of the racks horizontally swingably mounted thereon to assume angular positions with respect thereto and spaced arms on said racks slidably engaging said bars to guide said racks in their longitudinal shifting with respect to each other.

4. Device according to claim 3 wherein said guide bars are provided with fastening means to fix them in a plurality of angular positions on said racks, and said arms are correspondingly connected to said racks by pivot means permitting displacement of said arms with respect to said racks about a corresponding horizontal axis of pivot.

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