Oct. 2, 1956 K. GERLACH 2,765,140

PIT PROP

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Fig. 1

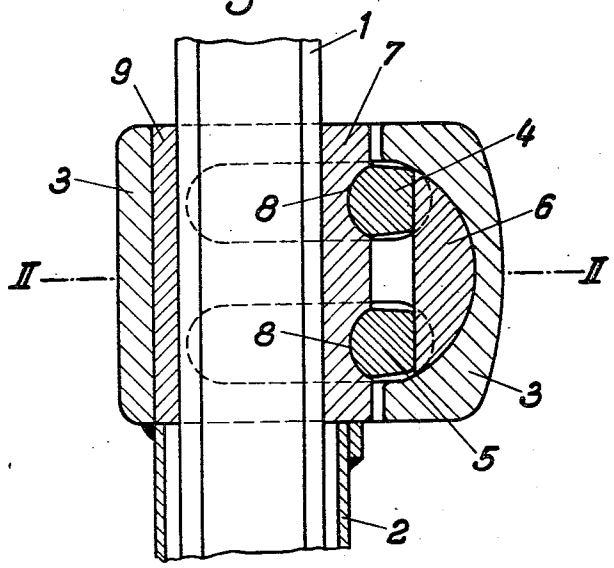
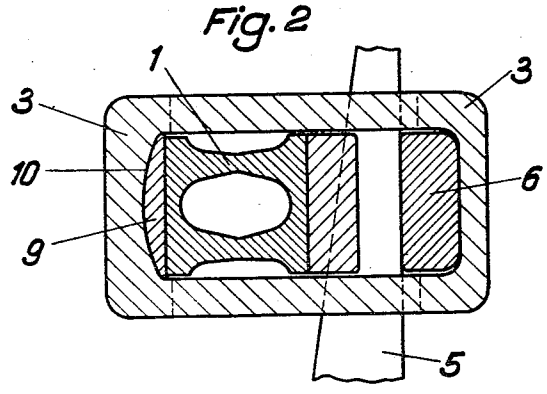


Fig. 2



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Fig. 3

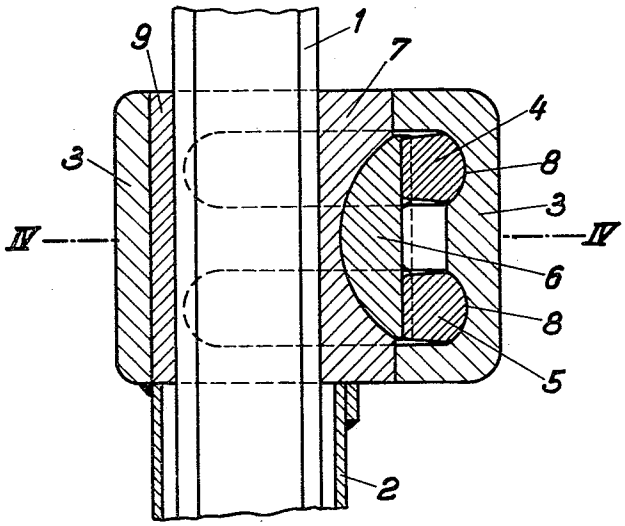
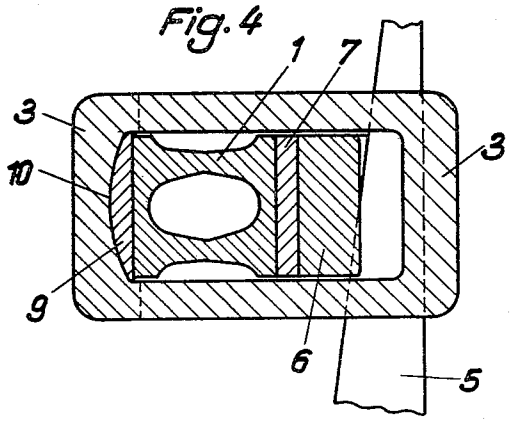


Fig. 4



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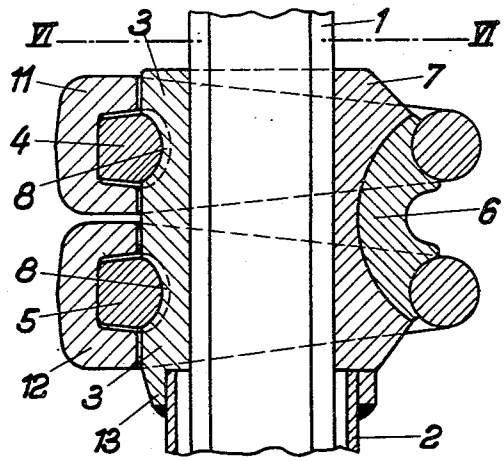


Fig. 5

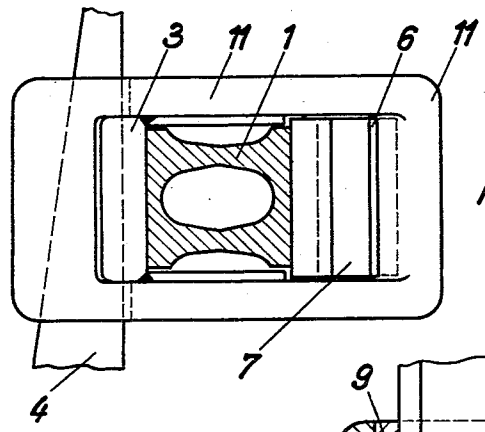


Fig. 6

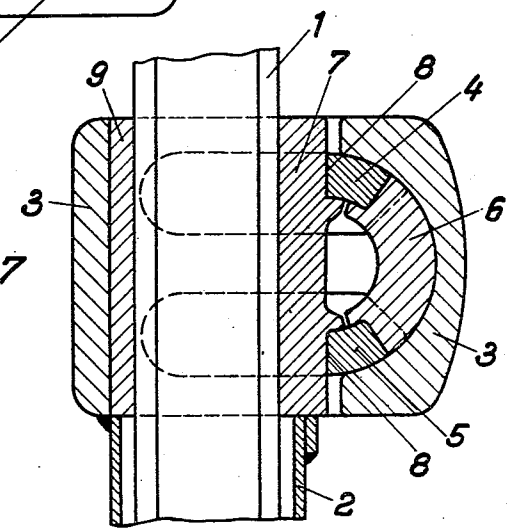


Fig. 7

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Application May 29, 1952, Serial No. 290,673

Claims priority, application Germany December 22, 1951

3 Claims. (Cl. 248—354)

It is known, in connection with multipartite pit props, to clamp the inner prop element to the outer prop element, or to the prop lock, by means of two tightening devices which are adapted to be fastened independently of one another. The object of using two such tightening devices is to apply the pressure over the inner prop element as uniformly, and over as large an area, as possible. To achieve this result it is, however, a criterion that the two devices be tightened up by absolutely equal amounts, a requirement which can never be met in practice. It has also been found that when one such tightening device was tightened up, the other became loosened.

The present invention concerns a multipartite pit prop in which the inner prop element is clamped to the prop element, or the prop lock, by means of two tightening devices and it is the object of the invention to overcome the shortcoming mentioned above. In accordance with the present invention this is substantially achieved by the fact that the tightening up or the clamping of the two tightening devices is effected in that the movement of one directly affects the other. Thus, the primary feature of the invention resides in the fact that the tightening devices are coupled together by means which transmit or balance the forces produced. An adjustable bearing can, for example, be used for this purpose.

In this way the clamping force exerted when one device is tightened up is simultaneously transformed into an augmented clamping action on the lock or prop part located in the vicinity of the other tightening device, so that by excessive alternate tightening-up of the two tightening devices, a cumulative, regulated, and continuously-increasing clamping effort is produced. When the prop is released there is the advantage that the freeing of one tightening device enables the bearing to become simultaneously freely movable and thereby also releases the other tightening device.

In one embodiment of the present invention the tightening devices can be supported against the prop lock or the outer prop element through a common bearing adapted to be rocked when these devices are tightened up. In this connection embodiments of the invention are also possible in which the tightening devices are engaged with bearings therefor through slip means which are preferably adjustable.

In many cases it is advantageous to support the inner prop element against the outer prop element or the prop lock through a bearing which is transversely adjustable, with the object of making the uniform clamping action, which is achieved in this invention, independent of any irregularities in, or maladjustment of, the components.

Further advantageous details of the invention are disclosed in the ensuing claims and in the accompanying drawings, which illustrate three specific embodiments of this invention. In these drawings:

Figure 1 is a longitudinal section through part of a pit prop in accordance with a first embodiment;

Figure 2 is a section on the line II—II of Figure 1;

Figure 3 is a longitudinal section through the pertinent parts of a second embodiment;

Figure 4 is a cross-section on the line IV—IV of Figure 3;

Figure 5 is again a longitudinal section through a third embodiment;

Figure 6 is a cross-section on the line VI—VI of Figure 5; and

Figure 7 is a longitudinal section through a further embodiment.

Like parts are indicated by the same reference characters in the various drawings, and in all the embodiments illustrated the inner prop element, which is parallel-walled or has a slight taper, is designated 1, whilst 2 indicates the outer prop element and 3 the prop lock.

In the embodiments illustrated in Figures 1 and 2 the inner element 1 is clamped to the outer element 2, or in the prop lock 3, by two tightening devices 4 and 5, each having the form of a transverse wedge, which are given a wedge-face inclination which makes them self-locking. Arranged between the inner prop element and the transverse wedges 4 and 5 is a spacing member 7, whilst the transverse wedges 4 and 5 are supported against the prop lock 3 through a rockable bearing 6 of calotte form which is mounted in a correspondingly curved bearing surface in the prop lock 3. The curvature and thickness of the bearing 6, in this example and in those described hereinafter, are advantageously such that this bearing is capable of ready adjustment when the transverse wedges 4 and 5 are driven in, and that for example the clamping pressure exerted by the tightening-up of transverse wedge 4 is transmitted, as a result of a corresponding rocking action, to the transverse wedge 5 and the parts affected thereby, or in the vicinity of the inner prop element 1, the spacing member 7 and the prop lock 3. The ready adjustability of the bearing 6 has, in connection with the release of the prop, the important advantage that this bearing is freed by the release of one only of the wedges 4 or 5, and as a result the other wedge is automatically released.

As can be seen from the drawings, the transverse wedge 5 is mounted on the spacing member 7 in curved parts 8 having the form of bearing cups. At the opposite side the inner prop element 1 is supported against the prop lock 3 through a transversely-adjustable bearing 9 having an appropriately-curved face 10 engaging a correspondingly-shaped counter surface of the prop lock, thereby being displaceable in the transverse direction. The bearing 9 therefore serves to compensate for any workshop inaccuracies in the inner prop element 1, or a misalignment of this element, in the transverse direction.

In the embodiment illustrated in Figures 3 and 4 the rockable bearing 6 for the transverse wedges 4 and 5 is mounted in the movable spacing member 7, and the transverse wedges 4 and 5 have curved faces 8 which are applied against complementary curved counter-surfaces in the prop lock 3.

Figures 5 and 6 illustrate an embodiment of the invention in which the transverse wedges 4 and 5 engage the bearing 6, which is rockably mounted in the spacing member 7 through two displaceable or adjustable clamps 11 and 12 respectively. The amount of rocking of the lower clamp 12 can be limited by an abutment 13 provided for this purpose on the outer prop element 2. The prop lock 3 against which bear curved faces 8 on the transverse wedges 4 and 5, is open at one side so as to form merely a backing plate. As in the other embodiments of the invention illustrated, the spacing member 7 is formed and arranged to be movable.

It is to be understood that the possible variations of the invention are not exhausted by the embodiments illustrated and described above, and that the basic principle thereof, which lies in the coupling together of two or more clamping devices, for effecting the rigid clamping of a pit prop, by a positive transmission of the clamping pressure, can be carried into effect in other advantageous ways. Thus, although transverse wedges may represent a preferred form of the tightening devices, other kinds of such devices, for example eccentrics, can be used in appropriate cases within the scope of the invention. It is, moreover, possible within the scope of this invention, to combine two different kinds of clamping device, using for instance one in the form of an eccentric and the other in the form of a transverse wedge.

The clamping parts or tightening devices can, furthermore, be arranged at an angle relative to one another. Again the bearing which, in the embodiments illustrated, is the basic force-transmitting means, can have spherical surfaces applied against correspondingly-shaped counter surfaces, so as to provide for a universal adjustment thereof.

It is also to be noted that in accordance with the invention one or more hydraulic chambers can be used as the tightening means; it is also possible on the other hand to use a hydraulic chamber as a means for transmitting or balancing the force. Additionally, such balancing of the forces between the two tightening devices may, for example, be effected through a lever transmission or by using a balancing device as the bearing.

It is possible in all instances to equip a pit prop according to the invention with an additional pressure element, for example, in the form of a sliding wedge, which is carried along by the inner prop element for a part of its downward travel into the outer element, or a part of the clamping device, such for example as the bearing, may be formed as an additional load-carrying element which is carried along by the inner prop element.

The embodiment of the invention illustrated in Figure 7 comprises an arrangement in which the wedges **4** and **5** are arranged in the axis of the arc defined by the bearing **6** and have similarly-curved surfaces applied against the prop lock **3**. In this arrangement there is a particularly satisfactory disposition of the forces and a very good transmission of the effort between the wedges **4** and **5** through the bearing **6**.

I claim:

1. A pit prop comprising an outer prop member, an inner prop member telescopically related to said outer prop member and locking means including in combination a clamp means disposed circumferentially of said pit prop providing support to securely fasten said prop members relative to each other, a spacing member presenting a friction surface in engagement with said inner prop member, a pair of spaced, independent wedge shaped and axially movable tightening devices extending through said clamp means and a rockable member disposed intermediate said clamp means and said spacing member, said rockable member presenting a convex cylindrical surface the axis of which extends substantially parallel to the axes of said tightening devices and one member of said locking means presenting a concave cylindrical surface engaged by said convex cylindrical surface and said rockable member presenting, adjacent opposite edges, an elongate surface, each elongate surface being parallel to the axis of said convex cylindrical surface and each elongate surface being subject to wedge action by one of said tightening devices to receive pressure therefrom and transfer pressure by way of said rockable member to the other said tightening device and to said spacing member.

2. A pit prop comprising an outer prop member, an inner prop member telescopically related to said outer prop member and locking means including in combination a clamp means disposed circumferentially of said pit prop providing support to securely fasten said prop members relative to each other, a spacing member presenting a friction surface in engagement with said inner prop member, a pair of spaced, independent wedge-shaped and axially movable tightening devices extending through said clamp means and a rockable member disposed intermediate said clamp means and said spacing member, said rockable member presenting a convex cylindrical surface the axis of which extends substantially parallel to the axes of said tightening devices and one member of said locking means presenting a concave cylindrical surface engaged by said convex cylindrical surface and said rockable member presenting, adjacent opposite edges, an elongate surface, each elongate surface being parallel to the axis of said convex cylindrical surface and each elongate surface being subject to wedge action by one of said tightening devices to receive pressure therefrom and transfer pressure by way of said rockable member to the other said tightening device and to said spacing member, said concave cylindrical surface being defined in said spacing member on the side opposite said friction surface.

3. A pit prop comprising an outer prop member, an inner prop member telescopically related to said outer prop member and locking means including in combination a clamp means disposed circumferentially of said pit prop providing support to securely fasten said prop members relative to each other, a spacing member presenting a friction surface in engagement with said inner prop member, a pair of spaced independent and axially movable tightening devices including at least one wedge-shaped device extending through said clamp means and a rockable member disposed intermediate said clamp means and said spacing member, said rockable member presenting a convex cylindrical surface the axis of which extends substantially parallel to the axes of said tightening devices and one member of said locking means presenting a concave cylindrical surface engaged by said convex cylindrical surface and said rockable member presenting, adjacent opposite edges, an elongate surface, each elongate surface being parallel to the axis of said convex cylindrical surface and each elongate surface being engaged for wedge action by one of said tightening devices to receive pressure therefrom and transfer pressure by way of said rockable member to the other said tightening device and to said spacing member, each said tightening device presenting on one side thereof a substantially cylindrical surface adapting said device in response to the rocking movements of said rocking member to follow the rocking movement and maintain its surface engagement with said rocking member.

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