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FOOT PLATE FOR PIT PROPS

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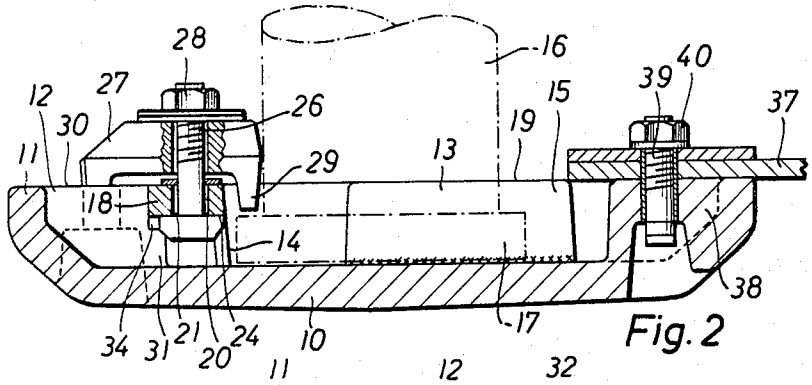


Fig. 2

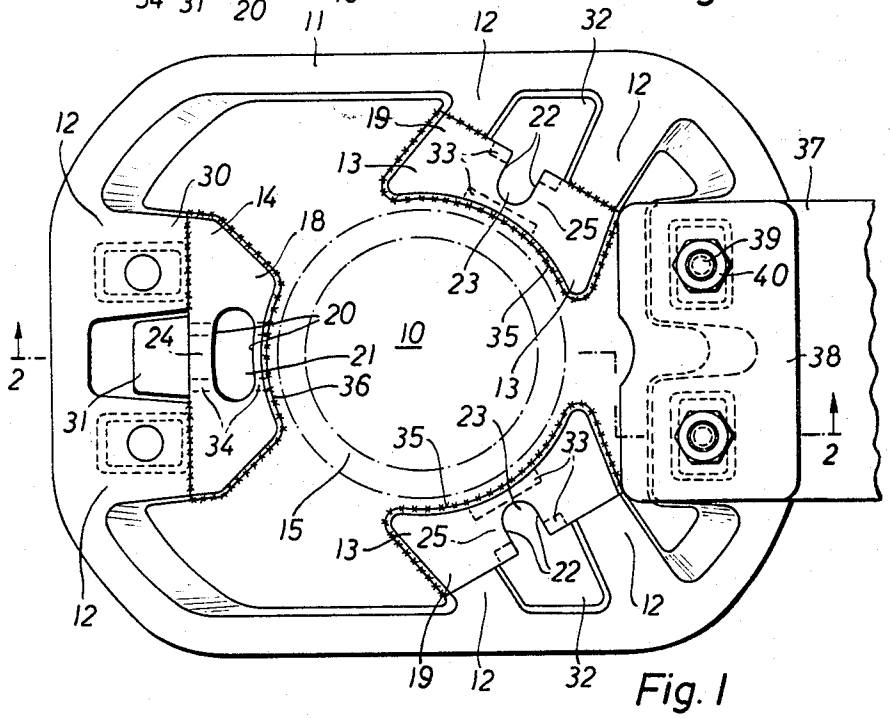


Fig. 1

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FOOT PLATE FOR PIT PROPS

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ABSTRACT OF THE DISCLOSURE

Foot plate arrangement for mounting thereon a support prop having a bottom end peripheral mounting bead, having pocket means for receiving the prop bottom end, and bolt head holding means disposed adjacent the packet means including bolt shank engaging cooperative edge portions situated remote from the pocket means and corresponding bolt head engaging underside surfaces spaced vertically and laterally from the adjacent foot plate portions sufficiently to define a free space thereat permitting free access to the underside surfaces remote from the pocket means, to insert a bolt with its head against said underside surfaces and its shank extending upwardly past said edge portions in seating engagement therewith for connection with a dog for the bead of the prop without hindrance caused by the presence of the prop on the foot plate.

The present invention relates to a foot plate for pit props, and more particularly to a foot plate arrangement for mounting thereon a support prop or pit prop having a bottom end peripheral mounting bead with the use of bolted dogs such that a free access space is provided remote from the prop bottom end to permit the insertion or replacement of the bolts for the dogs without first having to remove the prop from the foot plate.

Foot plates are used for mounting pit props or the like and often such pit props are connected in pairs in the form of prop frames by suitable interconnecting elements. Such prop frames may be interconnected in side-by-side relation and provided with advancing means, such as piston-cylinder means, for alternate advancement of each prop frame. Arrangements of the type in question which utilize foot plates are disclosed, for example, in U.S. Patents 3,169,377, 3,186,179, 3,192,722 and 3,225,547. Such advanceable or travel arrangements of the foregoing type are often described as advancing or traveling roof-supporting frames as they are frequently used for supporting a mine roof. As a rule, the props are releasably inserted into the foot plates of such frames and secured in place by bolts or the like. In prior art constructions, the bolts used are ordinarily in the form of stud bolts and accordingly a great deal of breakage or snapping of the bolts occurs because the props when moved, as for example in a prop frame being advanced, are subjected not only to tension stress but also to bending stress.

It is an object of the present invention to overcome the foregoing drawback and to provide a foot plate arrangement for mounting thereon a support prop or pit prop having a bottom end peripheral mounting bead with the use of bolted dogs such that a free access space is provided remote from the prop bottom end to permit the insertion or replacement of the bolts for the dogs without first having to remove the prop from the foot plate.

It is another object of the present invention to provide

an arrangement of the foregoing type in which a bolt having a shank and a head may be inserted via the free space remote from a pocket means on the foot plate in which the prop is received for removable mounting of the bolt in a bolt head holding means on the foot plate such that the bolt head is seated against cooperating undersides surfaces with the bolt shank extending upwardly past adjacent edge portions thereat in seating engagement therewith, whereby removable connection of the bolt shank with the corresponding dog to be clamped thereby against the bottom end peripheral mounting bead of the prop may be provided, without hindrance caused by the disposition of the prop in the pocket means.

It is still another object of the present invention to provide an arrangement of the foregoing type using hammerhead bolts as the bolts for the dogs.

It is still another object of the present invention to provide an arrangement of the foregoing type in which socket members welded to the foot plate serve to define centrally the pocket means for receiving the pit prop bottom end and to define peripherally the bolt head holding means containing the bolt shank engaging cooperative edge portions and the corresponding bolt head engaging underside surfaces, yet with a free space being defined peripherally outwardly thereof to permit access to the particular socket members for inserting or replacing a dog bolt thereat.

It is a still further object of the present invention to provide an arrangement of the foregoing type in which lateral stop means are disposed at the underside surfaces of the bolt head holding means for abutment with the corresponding bolt head thereat to secure the bolt against rotation and optionally to provide the bolts in a predetermined size so that they may function as rated-breaking-point connections.

It is a still further object of the present invention to provide a foot plate arrangement of the foregoing type in which the prop is releasably inserted into the pocket means and secured by dogs clamped by corresponding bolts with a constructional relationship of parts easier and more convenient to handle and which will tend to avoid or prevent breakage of the bolts.

It is a still further object of the present invention to provide an arrangement of the foregoing type which is simple and economical to manufacture, durable in use and, especially where rated-breaking-point bolts are employed, substantially free from damage due to excessive stresses by reason of the initial snapping of the so-rated bolt rather than deformation or rupture at another point on the foot plate.

Other and further objects of the present invention will become apparent from a study of the within specification and accompanying drawing, in which:

FIG. 1 is a schematic top view of the foot plate arrangement of the present invention illustrating certain details of construction in dash-line, and

FIG. 2 is a schematic sectional side elevation taken along the line 2—2 of FIG. 1, showing a bolt and dog positioned on the foot plate and schematically the disposition of the bottom end of a support prop having a peripheral mounting bead clampingly engaged by the dog.

It has been found, in accordance with the present invention, that a foot plate arrangement for mounting thereon a support prop or pit prop having a bottom end peripheral mounting bead may now be provided, which comprises a foot plate having pocket means thereon for receiving the support prop bottom end, and bolt head holding means disposed on said foot plate adjacent said pocket means, said holding means including bolt shank engaging

cooperative edge portions situated remote from said pocket means and corresponding bolt head engaging underside surfaces spaced vertically and laterally from the adjacent portions of said foot plate sufficiently to define a free space thereat to permit free access to said underside surfaces remote from said pocket means, whereby a bolt having a shank and a head may be inserted via said free space remote from said pocket means for mounting removably in said bolt head holding means with the bolt head seated against said underside surfaces and the bolt shank extending upwardly past said edge portions in seating engagement therewith, for removable connection with a corresponding dog to be clamped thereby against the bottom end peripheral mounting bead of such support prop received in said pocket means, without hindrance caused by the disposition of such support prop in said pocket means.

Thus, the fastening of the clamping plates or dogs used for releasably clamping the particular prop on the foot plate is performed by loose clamping bolts which engage behind the bolt head retaining means in the foot plate. Specifically, the bolt head holding means or retaining means are constructed so that even after insertion of the prop into the pocket means of the foot plate, the clamping bolts can be installed or replaced without hindrance. Advantageously, hammerhead bolts may be used for the desired purpose and the foot plate can be equipped expediently with a plurality of bolt head holding means disposed substantially tangentially to the pocket means so as to hold the bolts with the shanks passing through a corresponding marginal cut out or opening in the holding means.

The bolt head holding means may be constructed as flat bars although it is more desirable to design them as as hood plates or hollow socket members which may be welded to the foot plate. The foot plate is preferably trough-shaped and formed as a casting. Also, the raised margin of the foot plate can be provided with rib portions disposed preferably in pairs in spaced relationship with one another and projecting radially inwardly for connection, such as by welding, with the corresponding hood plate located centrally thereof. The hood plates advantageously are shaped at their inward faces so as to provide the pocket means for the prop and possess a conformation which complements the shape of the bead at the foot of the prop received thereat. As aforesaid, the clamping bolts can be secured against rotation by stop means, such as abutment strips or the like, on the underside of the hood plates adjacent the marginal cut-out or opening through which the bolt or shank extends upwardly. Furthermore, the thickness of the clamping bolts may be predetermined so that they may serve simultaneously as safety bolts having a corresponding rated yield point or breaking point.

Referring to the drawing, the foot plate **10** is provided with a raised margin or side wall **11** from which the appropriate pairs of spaced apart ribs **12** radially inwardly extend. The inward ends of ribs **12** abut against socket pieces or hollow socket members **13** or **14**, as the case may be, with the members **13** and **14** being secured in place, for example by welding to the foot plate and to the adjacent ribs **12**. By reason of the presence of the arcuate inward surfaces **35** and **36**, as the case may be, of the hollow socket members **13** and **14**, a pocket **15** is defined in which a prop **16** (the bottom end of which is shown in phantom in FIG. 2) may be received. Such prop is provided with a bottom end peripheral mounting bead **17** which conforms with the arcuate shape of the arcuate surfaces **35** and **36**. The bolt head holding means **18** and **19**, as the case may be, are disposed rearwardly of the arcuate surfaces **35** and **36** forming the pocket **15** and are spaced peripherally from one another in consequence of the spaced disposition of the two hollow socket members **13** and the one hollow socket member **14**.

It will be realized, of course, by the artisan that a greater or fewer number of socket members may be provided and that other means, such as fixed tongues, may be provided so as to engage the appropriate peripheral mounting bead of the prop, so long as at least one hollow socket member having a bolt head holding means **18** or **19** is provided for accommodating the insertable or replaceable bolt and dog connection in question.

In particular, the bolt head holding means **18** is provided with the slightly arcuate aperture **21** defined therethrough so as to form the cooperative edge portions **20** and also with the corresponding bolt head engaging underside surfaces. **24**. In the case of the bolt head holding means **19**, the notched aperture **23** is provided which forms thereby the similar cooperative edge portions **22** containing adjacent thereto the underside surfaces **25**. It will be realized that while the notched apertures **23** and the peripherally confined aperture **21** have been shown, the type of aperture and the conformation thereof are not critical so long as the adjacent edge portions in question and the appropriate underside surfaces thereat provide retaining means sufficiently to position in the desired manner the particular bolt in question.

In FIG. 2, a hammerhead bolt **26** is shown with its head engaged seatingly against the underside surfaces **24** and with its shank extending between the edges **20** of the aperture **21** and upwardly past the top surface of the hollow socket member **14**. A dog **27** is operatively seated on the bolt head holding means **18** with its rearward portion in abutment with the upper surface **30** of the appropriate rib **12** and with the forward claw **29** extending downwardly into the pocket **15** in clamping engagement with the peripheral mounting bead **17** of the prop **16** shown schematically thereat. A nut **28** operatively engages threads on the outer end of the shank of the bolt **26** whereby to clamp the claw **29** of the dog **27** against the prop bead **17**. It will be realized that similar dogs **27** and bolts **26** are provided for each of the other two hollow socket members in question appropriately seated in the apertures **23** with the particular bolt head against the underside surfaces **25** and the shank extending between the cooperative edges **22** and upwardly therepast for connection via corresponding bolts with dogs to be used thereat.

Peripherally outwardly or rearwardly of the bolt head holding means **18** and **19**, as the case may be, are the corresponding free spaces **31** and **32**. These are defined between the appropriate spaced apart pair of ribs **12**, the outer marginal wall **11** and the rear portions of the hollow socket members **14** and **13**. The particular free space permits access of the workmen (see FIG. 1) to the rearward portion of the bolt head holding means in question to insert or replace a bolt **16** for removable connection via a corresponding nut with the particular dog thereat. By inserting the shank end of the bolt through the free space **31** and under the underside surfaces **24** of the hollow socket member **14**, the shank may be drawn up through the confined aperture **21** such that the bolt head will be seated against the underside surfaces **24** and the bolt shank will be guidedly engaged by the adjacent side edges **20**. In the same way, the bolt may be inserted via the free space **32** into the bolt head holding means **19** of the hollow socket member **13** at the notched aperture **23** such that the bolt head will engage the underside surfaces **25** and the shank will be guidedly engaged by the adjacent side edges **22**. Preferably, the bolts used will be hammerhead bolts, and stops or abutment strips, blocks, or the like, **33**, adjacent the underside surfaces **25** of the hollow socket member **13** as well as stops **34** or the like adjacent the underside surfaces **24** of the hollow socket member **14** are provided to prevent undesired rotation of such hammerhead bolts. This is true since the stops will engage the bolt head to prevent rotation whereby the appropriate nut may be screwed onto the bolt to achieve the removable connection in question with a minimum of difficulty.

Therefore, even where a pit prop or supporting prop, or the like, such as a hydraulic prop, is disposed in the pocket **15** in confining abutment with the arcuate surfaces **35** and **36**, the appropriate bolt **26** may be inserted or replaced via the rearwardly disposed free space **31** or **32** without hindrance and, more importantly, without the need for first removing the prop from the foot plate.

In order to effect the connection of the foot plate and in turn the prop with another prop to form a prop frame or with an advancing means, such as a piston-cylinder means, or with a side shoe or slide runner of the type illustrated in FIG. 1 in the aforementioned U.S. Patent 3,192,722, a strap seat **38** is provided at one marginal portion of the foot plate to which the appropriate connecting strap **37**, such as a resilient strap, may be connected by suitable bolts **39** and nuts **40**. At the opposite end of the foot plate, similar provision is made in the appropriate ribs **12** to receive if desired a further strap **37** with appropriate bolt and nut connections.

It will be seen that the foot plate will be prepared in the form of a casting with the ribs **12** and strap seat **38** integrally provided therewith and with the appropriate bolt openings therein to receive strap connections thereat. The hollow socket members **13** and **14** may be formed as separate elements of the desired configuration and welded to the adjacent portions of the foot plate and the inward ends of the appropriate ribs **12**. On the other hand, the hollow socket members may be formed as integral parts with the ribs and/or the foot plate so long as the desired configuration appropriate for the particular prop bottom end will be attained as well as the necessary free spaces **31** and **32** rearwardly of the hollow socket members and adjacent the apertures **21** and **23** to achieve the simple insertion or replacement of bolts **26** in the described manner. While in the case of the elongated aperture **21**, the bolt will be inserted via the free space **31** and turned 90° in direction to draw the shank up through the aperture, the free space **32** in conjunction with the notched aperture **22** permits the bolt in question to be inserted in vertical form directly into the notched aperture to achieve the engagement of the head with the underside surfaces and the shank with the adjacent edges. The stops of blocks **33** or **34** in effect are positioned to cradle the bolt head whereby to prevent its turning when the nut is tightened thereon.

It will be realized that in the advancing of the prop, such as when connected with another prop in the form of a prop frame, inevitably the props will be subjected to tension and bending stresses and by reason of the present construction, the bolts will in turn be subjected to such stresses. The bolts are preferably designed to give without snapping, but if a bolt should break, it is easily removed and replaced by a new one via the free space in question without the need for removing the prop from the pocket **15**.

Thus, in accordance with the present invention, a foot plate arrangement for mounting thereon a support prop having a bottom and peripheral mounting bead is provided which comprises a foot plate having pocket means thereon for receiving the support prop bottom end, and bolt head holding means disposed on said foot plate adjacent said pocket means, said holding means including dog supporting top surface means and bolt shank engaging cooperative opposing medial edge portions spaced laterally from each other a predetermined distance and situated remote from said pocket means, as well as corresponding bolt head engaging underside surfaces adjacent said edge portions and spaced vertically and laterally from the adjacent portions of said foot plate sufficiently to define a free space thereat to permit free access to said underside surfaces remote from said pocket means, whereby a bolt having a shank corresponding substantially in width to said predetermined distance and a head of correspondingly greater width may be inserted via said free space remote from said pocket means for mounting removably in said bolt head holding means with the bolt head seated against said underside surfaces and the bolt shank extending between and upwardly past said edge portions in seating engagement therewith, for removable connection with a corresponding dog adapted to be supported on said top surface means and in turn clamped via such removable connection against the bottom end peripheral mounting bead of such support prop received in said pocket means without hindrance caused by the disposition of such support prop in said pocket means.

Advantageously, a plurality of bolt head holding means are situated on the foot plate substantially tangentially or peripherally outwardly of the pocket means and a hammerhead bolt is mounted removably in each such bolt head holding means with the bolt head thereof seated against the underside surfaces and the bolt shank thereof extending upwardly in turn past the edge portions in seating engagement therewith. In the same way, a corresponding plurality of radially arranged spaced apart hollow socket members are connected to said foot plate which define along their radially inward portions spaced apart corresponding tangential abutment faces together forming said pocket means with said foot plate thereat and which define along their radially outward portions the part of said bolt head holding means containing said edge portions and said underside surfaces.

In accordance with a specific embodiment, the foot plate is provided with an upturned peripheral edge defining a marginal wall and with corresponding pairs of parallel ribs radially inwardly extending from said wall to and being connected with said socket members to reinforce said socket members, and the tangential abutment faces of the socket members conform in shape with the conformation of the bead of the support prop to be received in the pocket means. As aforesaid, preferably lateral stop means are provided at the underside surfaces of the bolt head holding means for abutment with the corresponding bolt head thereat to secure the bolt against rotation, and the bolts are provided in a predetermined size to function as rated-breaking point connections.

It will be seen in accordance with the present invention that the foot plate in question is primarily usable with a pit prop having a laterally protruding margin or peripheral mounting bead at its bottom end. Otherwise the conformation of the prop may be as desired. Generally, hydraulic props of the conventional type are contemplated. These props have the advantage that when inserted on the foot plate they can be braced with considerable preliminary stress between the floor and the roof of a mineway and thus assure very gentle treatment of the mine roof in the interests of safety to the mine workmen. Naturally, as the artisan will appreciate, the foot plate with all of its attendant apertures, recesses and projections, and the like, can be easily die forged or produced by the conventional die casting process, and the hollow socket members may be produced in the same manner and simply welded in place since installation by welding is not particularly costly. However, the hollow socket member may be formed integrally with the foot plate. In any case, the foot plate construction of the invention provides an absolutely firm fastening thereof to the bottom portion of the appropriate prop by simple means whereupon the prop provided with such a foot plate can be secured via the appropriate bolts and dogs even while the system is under load and without the necessity of removing the prop to insert or replace the particular bolt.

By providing the foot plate with an upturned marginal wall so as to form a skid or sled, the prop can be extended into pressure supporting engagement with the mine roof and mine floor yet be displaced while the

system is under load without first completely relieving the prop of pressure, simply because of the skid-like construction of the foot plate. Specifically, by employing appropriately connected advancing means, for example connected to the foot plate via a strap 37, the foot plate may be advanced linearly and in turn the prop while the prop is under load between the mine roof and mine floor due to the configuration and sturdy construction of the foot plate.

Naturally, where various constructional parts have been defined in terms of "means" in the instant specification and/or claims, such means have been illustrated in the accompanying drawing as specific elements, but in accordance with the present invention, such means contemplate any and all elements usable to achieve the combination arrangement of the invention, as the artisan will appreciate, so long as the disposition of the parts in question is maintained, and any and all such constructional elements are contemplated herein just as if prolix enumeration thereof were set forth in detail herein.

It will be appreciated that the instant specification and drawings are set forth by way of illustration and not limitation, and that various modifications and changes may be made without departing from the spirit and scope of the present invention which is to be limited only by the scope of the appended claims.

What is claimed is:

1. Foot plate arrangement for mounting thereon a support prop having a bottom end peripheral mounting bead, which comprises a foot plate having pocket means thereon for receiving the support prop bottom end, and bolt head holding means disposed on said foot plate adjacent said pocket means, said holding means including bolt shank engaging cooperative edge portions situated remote from said pocket means and corresponding bolt head engaging underside surfaces spaced vertically and laterally from the adjacent portions of said foot plate sufficiently to define a free space threreat to permit free access to said underside surfaces remote from said pocket means, whereby a bolt having a shank and a head may be inserted via said free space remote from said pocket means for mounting removably in said bolt head holding means with the bolt head seated against said underside surfaces and the bolt shank extending upwardly past said edge portions in seating engagement therewith, for removable connection with a corresponding dog to be clamped thereby against the bottom end peripheral mounting bead of such support prop received in said pocket means, without hindrance caused by the disposition of such support prop in said pocket means.

2. Arrangement according to claim 1 wherein a hammerhead bolt is mounted removably in said bolt head holding means with the bolt head thereof seated against said underside surfaces and the bolt shank thereof extending upwardly past said edge portions in seating engagement therewith.

3. Arrangement according to claim 2 wherein a plurality of bolt head holding means are situated on said foot plate substantially tangentially to said pocket means.

4. Arrangement according to claim 3 wherein a corresponding plurality of radially arranged spaced apart hollow socket members are connected to said foot plate which define along their radially inward portions spaced apart corresponding tangential abutment faces together forming said pocket means with said foot plate thereat and which define alone their radially outward portions the part of said bolt head holding means containing said edge portions and said underside surfaces.

5. Arrangement according to claim 4 wherein said foot plate is provided with an upturned peripheral edge defining a marginal wall and with corresponding pairs of parallel ribs radially inwardly extending from said wall to and being connected with said socket members to reinforce said socket members.

6. Arrangement according to claim 5 wherein said tangential abutment faces conform in shape with the conformation of the bead of the support prop to be received in said pocket means.

7. Arrangement according to claim 6 wherein lateral stop means are provided at the underside surfaces of said bolt head holding means for abutment with the corresponding bolt head thereat to secure the bolt against rotation.

8. Arrangement according to claim 7 wherein said bolts are provided in a predetermined size to function as a rated-breaking-point connection.

9. Foot plate arrangement for mounting thereon a support prop having a bottom end peripheral mounting bead, which comprises a foot plate having pocket means thereon for receiving the support prop bottom end, and bolt head holding means disposed on said foot plate adjacent said pocket means, said holding means including dog supporting top surface means and bolt shank engaging cooperative oppposing medial edge portions spaced laterally from each other a predetermined distance and situated remote from said pocket means, as well as corresponding bolt head engaging underside surfaces adjacent said edge portions and spaced vertically and laterally from the adjacent portions of said foot plate sufficiently to define a free space thereat to permit free access to said underside surfaces remote from said pocket means, whereby a bolt having a shank corresponding substantially in width to said predetermined distance and a head of correspondingly greater width may be inserted via said free space remote from said pocket means for mounting removably in said bolt head holding means with the bolt head seated against said underside surfaces and the bolt shank extending between and upwardly past said edge portions in seating engagement therewith, for removable connection with a corresponding dog adapted to be supported on said top surface means and in turn clamped via such removable connection against the bottom end peripheral mounting bead of such support prop received in said pocket means without hindrance caused by the disposition of such support prop in said pocket means.

10. Arrangement according to claim 9 wherein a plurality of bolt head holding means are situated on said foot plate substantially tangentially to said pocket means.

11. Arrangement according to claim 10 wherein a corresponding plurality of radially arranged spaced apart hollow socket members are connected to said foot plate which define along their radially inward portions spaced apart corresponding tangential abutment faces together forming said pocket means with said foot plate thereat and which define along their radially outward portions the part of said bolt head holding means containing said edge portions and said underside surfaces, and wherein said foot plate is provided with an upturned peripheral edge defining a marginal wall and with corresponding pairs of parallel ribs radially inwardly extending from said wall to and being connected with said socket members to reinforce said members.

12. Arrangement according to claim 11 wherein a hammerhead bolt is mounted removably in each said bolt head holding means with the bolt head thereof seated against the corresponding underside surfaces and the bolt shank thereof extending between and upwardly past the corresponding edge portions in seating engagement therewith, wherein lateral stop means are provided at the underside surfaces of said bolt head holding means for abutment with the corresponding bolt head thereat to secure the bolt against rotation, and wherein said tangential abutment faces conform in shape with the confirmation of the bead of the support prop to be received in said pocket means.

13. Arrangement according to claim 12 wherein said bolts are provided in a predetermined size to function as a rated-breaking-point connection.

14. Arrangement according to claim 12 wherein a support prop having a bottom end peripheral mounting bead conforming with the shape of said abutment faces is disposed in said pocket means in confining abutment with said abutment faces, and wherein a corresponding dog is disposed in supporting engagement with the top surface means of each of said bolt head holding means and in turn clamped via a removable connection with the corresponding bolt shank thereat against the bottom end peripheral mounting bead of such support prop in said pocket means.

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