

APPARATUS FOR SUPPORTING PIPES

The invention relates to an apparatus for supporting pipes during their storage and transport in a specified arrangement next to and on top of one another in layers at a distance from one another, with pipe holders, which, in the operating position, are disposed vertically above one another above and below each layer of pipes and which have on their upper side and underside a number of diametrically opposite, spaced-apart recesses for accommodating pipes and can be clamped together by clamping means into a unit.

Different versions of apparatuses of the aforementioned type are known (DE 39 28 320 C2, EP 0 415 265 B1, US brochure "SIGMA-PAK" of SIGMA-Chemie (U.S.A.) Inc., P.O. Box 90398, Houston, TX 77090). For all the known embodiments, the recesses have a partially cylindrical cross sectional shape, the diameter of the partially cylindrical recess corresponding to the diameter of the pipes, which are to be stored and transported. Special apparatuses must therefore be kept for each pipe diameter.

The invention is concerned with the problem of providing a supporting device, which can be manufactured price-effectively, is of light construction, can be manufactured cost-effectively and used universally. Pursuant to the invention, this objective is accomplished with the distinguishing features of claim 1. With regard to further important developments, reference is made to claims 2 to 20.

The inventive apparatus can be used for pipes of a broad spectrum of diameters, since pipes, the diameters of which lie within a range of diameters than can

be determined by the trapezoidal shape, can be supported securely within the trapezoidal recesses. Moreover, the pipe carriers can be manufactured easily and reasonably priced and clamped together entirely stably and securely by simple means as a unit.

Further details and advantages arise out of the following description and the drawing, in which an example of the object of the invention is shown in greater detail diagrammatically. In the drawing,

- Figure 1 shows a perspective view of an inventive apparatus for accommodating three layers of three pipes each,
- Figure 2 shows a perspective detailed representation of a pipe carrier of Figure 1,
- Figure 3 shows a side view of the pipe carrier of Figure 2 to illustrate the range of pipe diameters that can be accommodated,
- Figure 4 shows a view of the right end of the lowest pipe carrier in Figure 1,
- Figure 5 shows a view of the left end of the top pipe carrier in Figure 1,
- Figure 6 shows a section through the pipe carrier along the line A-A in Figure 3,
- Figure 7 shows a front view of an inventive apparatus with screw turnbuckles as locking means and

Figure 8 shows a truncated view of the one-sided end faces of the pipe holders to illustrate a screw turnbuckle.

The supporting device, illustrated in the drawing, comprises pipe holders 1 which, in the operating position, are disposed vertically above one another above and below each layer of pipes and have on the upper side and underside a number of diametrically opposite, mutually spaced-apart recesses 2 for accommodating pipes. In the case of the example shown, each pipe holder 1 has three recesses 2 on the upper side and the underside, so that it is suitable for supporting three pipes within a layer of pipes. It is, however, self evident that the number of recesses can be 2, 4 or more than 4. The number of layers of pipes is also not limited to three; for example, it may be 2, 4 or more than 4.

All the recesses 2 have a trapezoidal cross sectional shape, the outwardly diverging side surfaces 3, between which there is the base surface 4, enclosing an angle of 120° to 150° and preferably of 135°. On the outside, the diverging side surfaces 3 go over into outer surfaces 5 of the pipe holder 1, which are directed parallel to the base surfaces 4 and can be used as a base for the top or bottom pipe holder 1 of a unit.

At the ends, the pipe holder 1 have flat surfaces 6, which are vertical in the operating position and connect in each case outer end edges 7, 8 of the internally adjacent outer surfaces 5. Moreover, the pipe holders 1 are provided at their end surfaces in each case with a groove 9, which is vertical in the operating position and continuous from top to bottom and serves for the passage of means to clamp the intervening pipe holders 1 into a unit.

All end faces of the pipe holder 1 are provided with a continuous,

transverse borehole 11, which extends at the level of the horizontal median plane 12 and which is intended to accommodate a transverse connector 13, freely passing through the front groove 9. These transverse connectors 13, visible over split pins, are inserted in the transverse boreholes 11 of the top and bottom pipe holder 1 in a unit. They serve to support the clamping means, which can be constructed as flat belts 10, which can be passed around the transverse connectors 13 and can be clamped by means of a ratchet turnbuckle 14.

For mounting such a ratchet turnbuckle 14, for example, on the transverse connectors 13 of the top pipe holder in a unit, the inner side walls of the groove 9 are provided at the level of the transverse boreholes 11 with an internal groove 15, which is aligned perpendicularly to the end surface 6 of the pipe holder 1 and the width of which is greater than the diameter of the transverse boreholes 11 or of the diameters of the transverse connectors 13, which can be accommodated in these boreholes 11, so that a shoulder of the ratchet turnbuckle 14 can extend into the inner grooves 15. Accordingly, the inner groove 15 can be omitted, if different clamping means are used.

In their central part 16 between the recesses 2 on either side, the pipe holders 1 are provided with a reinforcing insert 17, if they are produced, as is preferred, from a polymeric material. The reinforcing insert 17 preferably consists of a metallic material, such as steel, and is cast or injected into the pipe holder 1. Advantageously, the reinforcing layer 17 consists of an I beam, the center leg 18 of which is disposed parallel to the base surface 4 of the recesses 2 centrally between these, as shown in Figure 6. The reinforcing insert 17 extends essentially over the whole length of the pipe holder 1; at the ends, however, it is also covered by the material of the pipe holder 1. It occupies a predominant part of the width and height of the central part 16 of the pipe holder 1, as is also shown in Figure 6. The middle

leg 18 of the reinforcing layer 17 is recessed in the regions of the grooves 9 to such an extent, that its end faces are still covered in the region of the grooves 9 by the material of the pipe holder 1.

As polymeric material, a plastic, such as polyethylene, is preferably used which, while having adequate strength, nevertheless offers a certain flexibility and has a Shore hardness D of, for example, 43 to 48, so that, when the pipe holder 1 is clamped, the pipes, accommodated in the recesses 2, make strip-shaped contact and not linear contact with the surfaces 3 or 3 and 4 of the recesses 2.

As can be seen in Figure 3, the recesses 2 can accommodate and support securely pipes, the diameter of which can differ over a considerable range, it being understood that only pipes of one and the same diameter can be supported in a layer of pipes. The range of diameters, which can be accommodated in each case, depends on the geometry of the trapezoidal recesses, that is, on the slope of the side surfaces 3 and on the mutual distance between the side surfaces 3 at the level of the base surfaces 4. For pipes with a diameter in the intended range, the shape of the recesses 2 ensures everywhere that the pipes lie at least against the side surfaces 3 or the side surfaces 3 and the base surface 4 of each recess 2.

Instead of the flat belt 10 and the ratchet turnbuckle 14, a screw turnbuckle 20, which may consist, for example, of a hollow tension rod 21, which is hexagonal in outer cross section, and two cocking levers 22, may also be provided as clamping means for heavy use cases. The tension rod 21 is provided at its ends with opposite internal threads 21', into which clamping bolts 23 of the cocking levers 22, which are provided with external threads 23', can be screwed. Both cocking levers 22 carry a clamping hook 24, which in each case can be placed upon a transverse connector 11. At least one clamping hook 24 can also be replaced by a lug.

In the operating position shown in Figures 7 and 8, clamping is accomplished by turning the tension rod 21 with the help of a wrench applied to the tension rod 21 or with the help of a clamping lever if, for example, the tension rod 21 is provided with an insertion or lead-through opening in the region between the cocking levers 22. In the case of such a construction, the tension rod can have any external cross section, including, for example, also a circular cross section.

All suitable and known means can be used to secure the clamped position of the parts of the screw turnbuckle 20. A particularly simple construction provides that a locking nut 26, which can be screwed in counter-engagement against the adjacent front end of the tension rod 21, is provided on at least one clamping bolt 23.



Claims

1. An apparatus for supporting pipes during their storage and transport in a specified arrangement next to and on top of one another in layers at a distance from one another, with pipe holders (1) which, in the operating position, are disposed vertically above one another above and below each layer of pipes and which have on their upper side and underside a number of diametrically opposite, spaced-apart recesses (2) for accommodating pipes and can be clamped together by clamping means (10, 14; 20) into a unit, characterized in that the recesses (2) have a trapezoidal cross-sectional shape.

2. The apparatus of claim 1, characterized in that the in each case outwardly diverging side surfaces (3) of the recesses (2) of the pipe holders (1) enclose an angle of 120° to 150° and preferably of 135° with the base surface (4) that lies between them.

3. The apparatus of claims 1 or 2, characterized in that the diverging side surface (3) of the recesses (2) change over into outer surfaces (5) of the pipe holder (1) aligned parallel to the base surfaces (4).

4. The apparatus of one of the claims 1 to 3, characterized in that the ends of the pipe holders (1) have flat surfaces (6), which are vertical in the operating position and in each case connect the outer end edges (7, 8) of the inwardly adjacent outer surfaces (5).

5. An apparatus for supporting pipes during their storage and transport in a specified arrangement next to and on top of one another in layers at a distance from one another, with pipe holders (1) which, in the operating position, are disposed

This Sheet Has Been Replaced



THIS SHEET HAS BEEN
REPLACED



vertically above one another above and below each layer of pipes and which have on their upper side and underside a number of diametrically opposite, spaced-apart recesses (2) for accommodating pipes and can be clamped together by clamping means (10, 14; 20) into a unit, characterized in that the pipe holders (1) are provided in their central part (16) between the recesses (2) on either side with a reinforcing layer (17).

6. The apparatus of claim 5, characterized in that the reinforcing insert (17) is formed by an I beam, the middle leg (18) of which is disposed parallel to the base surfaces (4) of the recesses (2) and centrally between these.

7. The apparatus of claims 5 or 6, characterized in that the reinforcing insert (17) extends essentially over the whole length of the pipe holder (1).

8. The apparatus of claims 5 to 7, characterized in that the reinforcing insert (17) occupies essentially the width and height of the central part (16) of the pipe holder (1).

9. The apparatus of claims 1 to 8, characterized in that the pipe holder (1) is provided at its ends in each case with a groove (9), which is continuous from top to bottom and vertical in the operating position.

10. The apparatus of one of the claims 5 to 9, characterized in that the reinforcing insert (17) is recessed in the region of the grooves (9) at the ends of the pipe holder (1).

11. The apparatus of one of the claims 5 to 10, characterized in that end faces of the pipe holder (1) are provided with a continuous borehole (11) extending at the level of the horizontal median plane (12) for accommodating a transverse

This Sheet Has Been Replaced



THIS SHEET HAS BEEN
REPLACED



connector (13) traversing the front groove.

12. The apparatus of claim 11, characterized in that, level with the transverse boreholes (11), the internal walls of the groove are provided with an internal groove (15), which extends perpendicular to the end surfaces (6) of the pipe holder (1) and the width of which is greater than the diameter of the transverse boreholes.

13. The apparatus of claims 11 or 12, characterized in that a flat belt (10) is provided as clamping means, can be placed around equilateral transverse connector (11) in the in each case top and bottom pipe holders (1) and clamped by means of a ratchet turnbuckle (14).

14. The apparatus of claims 11 or 12, characterized in that, as clamping means, a screw turnbuckle (20) is provided, which has a tension rod (21) that is provided at the end with opposite internal threads and two cocking levers (22), which can be screwed into these opposite internal threads and comprise clamping hooks (24), which can be connected with transverse connectors (13) of pipe holders (1) and a clamping bolt (23) having an external thread (23').

15. The apparatus of claim 14, characterized in that the tension rod (21) is provided at least regionally with a external contour, which is polygonal in cross section, to form a surface that can be engaged by a chuck.

16. The apparatus of claims 14 or 15, characterized in that the tension rod (21), at least regionally, has an external contour that is hexagonal in cross section.

17. The apparatus of one of the claims 13 to 16, characterized by means

This Sheet Has Been Replaced



THIS SHEET HAS BEEN
REPLACED



for securing the clamped position of the parts of the screw turnbuckle (20) in its operating position.

18. The apparatus of claim 17, characterized in that, on at least one of the clamping bolts (23), a locking nut (26) is provided, which can be screwed in counter-engagement against the adjacent front end of the tension rod 21 in the clamped position of the parts of the screw turnbuckle (20).

19. The apparatus of one of the claims 1 to 18, characterized in that the pipe holder (1) consists of a polymeric material and the reinforcing insert (17) consists of a metallic material.

20. The apparatus of claim 19, characterized in that the reinforcing insert (17) is embedded in the pipe holder (1) by casting or injecting a polymeric material around it.

This Sheet Has Been Replaced



THIS SHEET HAS BEEN
REPLACED