

[54] **DRILLING BOLT HOLES**

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[58] **Field of Search** .....408/108, 115, 105; 173/32,  
173/33; 125/20

[56]

**References Cited**

**UNITED STATES PATENTS**

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[57]

**ABSTRACT**

Apparatus for use in locating and aligning holes for bolts in bridge parapets and the like consists of a flat plate bearing adjustable guides, adjustable locating means and power-operated clamping means.

**7 Claims, 2 Drawing Figures**

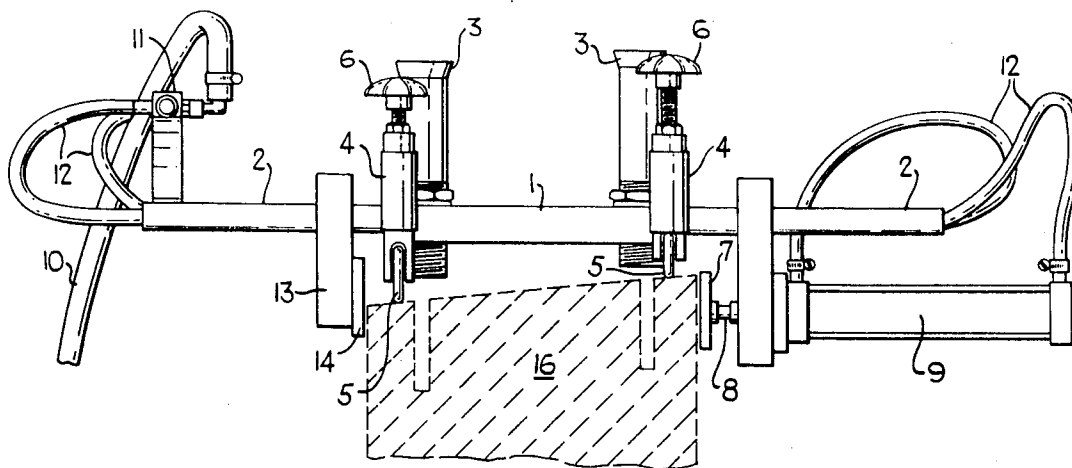


FIG. 1.

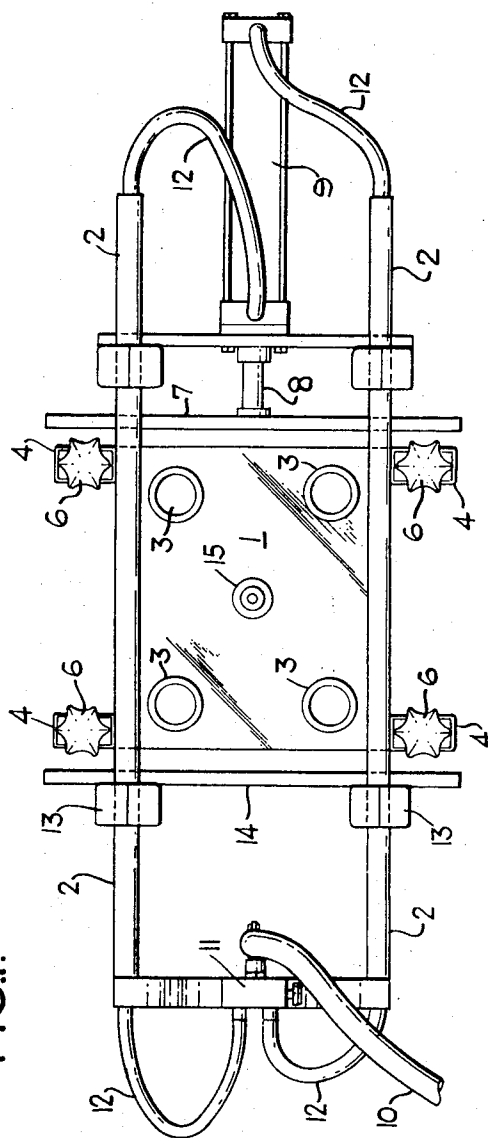
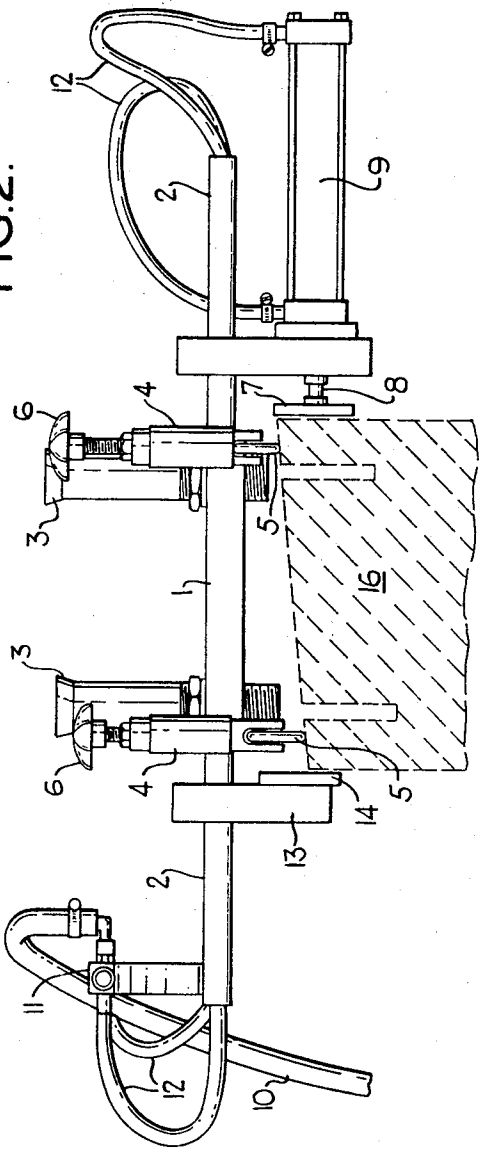


FIG. 2.



## DRILLING BOLT HOLES

This invention relates to apparatus for locating drilling positions for bolt holes and for controlling the depth of drilling and accuracy of drilling such bolt holes.

In recent years, a need has grown up for constructional fixing bolts of high strength for use in fixing devices such as vehicle crash barriers onto concrete bases. These fixing bolts should have the requisite strength, should be easily anchored in the base material (usually concrete, stonework or the like), and should be easily replaceable in the event of damage or destruction. In addition to these requirements, such fixing bolts should conform to the relevant design specifications laid down in respect of the particular use involved. For example, bolts for bridge parapet barriers in the United Kingdom should conform to the requirements laid down in the Ministry of Transport Technical Memorandum (Bridges) No. B.E.5., "Design of Highway Bridge Parapets." Similar standards apply in other countries of the world, and there is a general tendency to increase the necessary requirements of standard specifications in the building and construction industries.

Many prior attempts have been made to provide fixing bolt systems which fulfil these requirements, but the known types suffer from a number of disadvantages. One particular disadvantage of known types is the necessity for complete replacement of the bolt fixing in the event of damage thereto, for example, if a vehicle hits a crash barrier, the posts of which are anchored with fixing bolts.

Our earlier copending application discloses fixing bolts which avoid these disadvantages, and methods of fixing structures to substrates using them.

The type of fixture in our copending application has a large number of advantages, both as regards installation and use. The fixing bolts may be installed simply by drilling a hole in a substrate of suitable diameter, and then setting part of the bolt therein, e.g. by means of a cementitious grout or mortar, or by means of a cured resin system. The preferred fixing methods are those described in British Patent Specification 1,127,913. Each fixing bolt is installed separately and thus if necessary, each bolt can be separately replaced. Installation is quick and easy, and does not entail, as known systems do, for example, locating the bolt in situ prior to casting the concrete base around it. The preferred fixing method of our copending application referred to above is also advantageous from the point of view of high strength, speed, and efficiency even in extreme conditions of temperature or humidity.

It will be appreciated that in order to secure the maximum advantage for the use of fixing bolts as aforesaid, and generally in the fixture of bolts for the purposes indicated, it is important that several bolt holes should be preformed by drilling into the concrete or stone base at positions precisely located relative to one another, of the same depth and all parallel (usually all vertical). It is an object of the present invention to provide apparatus for use in the achievement of these objects.

According to the present invention there is provided apparatus for use in the location of holes in the upper surface of a stone, concrete or like structure, the apparatus comprising a plate having a plurality of guides

extending vertically there-through, power clamping means for clamping the plate to said structure, locating devices adapted to contact the surface of the structure, and means for independently vertically adjusting the position of each of the locating devices and each of the guides relative to the plate so that the locating devices and guides may make contact with the upper surface of the structure, the plate remaining horizontal.

The apparatus is of particular value for use in the location of bolt holes in the upper surface of an upstanding block of stone, concrete or the like, e.g., a parapet of a bridge construction. In that case the apparatus may be made to straddle the block, clamps being provided at the sides of the block. When the block is a bridge parapet this arrangement avoids any danger to personnel which might otherwise arise due to their having to work beyond the margin provided by the parapet. The slope of the parapet (if any), in either of the directions at right angles, is accommodated by the adjustable locating devices, preferably wheels, and guides, preferably in the form of tubes.

By means of the correct use of the apparatus of the invention, it is ensured that the drilled holes are correctly spaced relative to one another and all parallel (generally vertical). The relative arrangement of the guides may vary to suit the circumstances. Often, the guides will be four in number and arranged in the form of a rectangle, but there may be more or less guides and the arrangement may be, for example, that they lie on the corners of a triangle, or around an oval or circle, or about a semicircle.

A particular embodiment of apparatus according to the present invention is illustrated by way of an example, in the accompanying drawings in which:

FIG. 1 diagrammatically illustrates the apparatus in plan,

FIG. 2 diagrammatically illustrates the apparatus in elevation.

Referring to these drawings the apparatus comprises a plate 1 mounted on hollow bars 2. The plate is provided with four screw-threaded guide tubes 3 which, by use of the thread can be adjusted in position so that more or less of the tube projects above the plate 1 (and consequently less or more projects below the plate 1).

Secured to the plate, at its corners are four sleeve elements 4 within each of which is housed a member carrying a wheel 5, the arrangement being such in each case that the location of the height of the wheels relative to the plate 1 may be adjusted by means of a screw control 6.

Mounted on the hollow bars 2 extending on one side of the plate 1 is an assembly providing a positioning plate 7 secured to the end of a hydraulically or pneumatically controlled piston 8 in a hydraulic or pneumatic cylinder 9. The feed lines to this cylinder consist of a main feed 10 to a valve mechanism 11 mounted on the extension of the bars 2 on the other side of the plate 1 and thence, through the hollow bars 2 via hose 12 to the ends of the cylinder 9.

Also mounted by brackets 13 on the hollow bars 2 is a fixed positioning plate 14. A spirit level 15 is provided on the plate 1.

The apparatus is illustrated in the position in which it would be used on a coping 16 which sloped upwards to the right, the coping 16 being indicated in dotted out-

line section. The positioning (clamping) plates 7 and 14 grip the sides of the coping 16 and the wheels 5 are adjusted to rest on the top of the coping 16 while keeping the plate 1 horizontal. Before drilling commences the guide tubes 3 are screwed down to the surface of the coping. It will be appreciated that since the guide tubes are vertical the holes drilled will also be vertical.

Four holes having been drilled the hydraulic or pneumatic pressure may be released, the positioning plates 7 and 14 thus allowed to separate and the device rolled forward on its wheels 5 to a next adjacent position for the drilling of a further set of holes, requiring only such further adjustment as may be dictated by a change in slope of the surface of the coping.

Thus, by means of the device a series of holes may be drilled along the surface of a coping, e.g., to accept bolts holding a crash-barrier, which are regularly spaced, and all vertically aligned, thereby greatly facilitating the erection of a crash barrier or the like on the coping.

I claim as my invention:

1. Apparatus for use in the location of holes in the upper surface of stone or concrete structures, the apparatus comprising a plate, a plurality of guides supported by and extending vertically through the plate,

power clamping means for clamping the plate to the structure, locating devices mounted on and extending vertically through the plate and adapted to contact the surface of the structure, means for vertically adjusting the position of each of the locating devices and means for vertically adjusting the position of each of the guides relative to the plate so that the locating devices and guides may make contact with the upper surface of the structure to position the plate in a horizontal plane.

2. Apparatus according to claim 1 wherein the power clamping means are adapted to engage the vertical sides of the structure.

3. Apparatus according to claim 1 wherein there are four guide members arranged in a rectangle.

4. Apparatus according to claim 1 wherein screw thread adjustment means are provided for the vertical adjustment of both locating devices and guides.

5. Apparatus according to claim 1 wherein the guide members are tubes.

6. Apparatus according to claim 1 wherein the power clamping means are hydraulically operated.

7. Apparatus according to claim 1 wherein the locating devices includes wheels that engage the upper surface of the structure.

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