

The invention relates to a drill bit according to the preamble of the main claim.

In order to produce drilled holes, the depth of which is to be accurately maintained, drills with a depth stop arranged on the drill shank are used. DE-U-85 15 960 discloses a drill bit with a depth stop arranged fixedly on the drill shank, the depth stop being in the form of a shock-absorbing element. When using this drill bit for hard building materials and in combination with a hammer drill, once the set drilled hole depth has been reached the impacts coming from the hammer drill are damped to avoid damage to the surface of the building component. The rigid connection of the stop to the drill shank and the fact that it rotates with the shank, however, means that prolonged contact of the stop and the surface of the building component must be avoided to prevent abrasion of the rubber-like stop. Apart from the lack of any facility for producing an undercut drilled hole, the stop of the known drill bit would therefore also be unsuitable for reaming out the undercut.

DE-U-88 08 256 discloses a tool with which in a subsequent second operation an undercut can be reamed out in a pre-drilled cylindrical hole. To produce the undercut, the drill shank of the tool has a bulge, the largest diameter of the bulge corresponding to the diameter of the cylindrical part of the drilled hole. In conjunction with the wall of the drilled hole the bulge therefore forms a pivot bearing which enables the undercut to be reamed out by a gyratory movement. For the reaming-out process a drill must be used exclusively in plain rotary operation. As the depth stop for positioning the undercut in the drilled hole, use is made of a steel part fixedly joined to the reaming-out tool, the end face of which part is slightly rounded to allow the swivelling movement to

take place. In this solution, although abrasion of the stop is largely avoided, the tool is merely a reaming-out tool which is not suitable for producing a drilled hole with an undercut in one operation.

A tool of that kind is disclosed in DE-B-25 47 412. This publication describes a drilling device with a depth stop pulled freely over a collar of the drill shank. The depth stop serves both to limit the depth of the drilled hole and as a pivot bearing for swivelling the drill bit. For that purpose the depth stop has a concavely shaped joint socket in which the stop collar mounted on the drill shank is supported with a convex end face for pivoting the drill bit. The pivot bearing located outside the drilled hole gives rise, however to adverse lever ratios and to an unsatisfactory support in the pivot bearing, which makes reaming out an undercut in hard building materials difficult or even impossible. In addition, the type of pivot bearing in the known drill bit is not capable of absorbing the blows coming from a hammer drill and of remaining undamaged. The drilling device is therefore provided exclusively for use in soft materials, for example, aerated concrete, and in conjunction with a drilling machine operating in plain rotary mode.

The invention is based on the problem of providing a drill bit with which in one operation it is possible to produce a drilled hole with an undercut even in hard building materials while avoiding damage to the surface of the building component or to the tool.

The solution to this problem is provided by the features given in claim 1. The bulge provided on the drill shank between the drill tip and the depth stop and the wall of the drilled hole together create the pivot bearing which, because of the favourable lever ratios, reinforcement of the drill shank and a stable support, enables high radial forces to be generated to

ream out the undercut in hard building materials. Since furthermore the depth stop comprises a resilient, ring-shaped shock-absorbing element, damage to the wall surface in the region of the mouth of the drilled hole and to the tool is avoided. The free engagement of the shock-absorbing element engaging over the collar on the drill shank allows swivelling movement of the drill bit and also avoids rotation of the shock-absorbing element with the drill bit as the undercut is being reamed out.

The shock-absorbing element, which preferably consists of polyurethane or a corresponding plastics material, has sufficient resilience for the depth stop to lie full-face against the wall surface during the swivelling movement of the drill bit as an undercut drilled hole is being made. During the swivelling movement the shock-absorbing element is, it is true, alternately resiliently deformed in accordance with the swivelling movement, but the contact face of the depth stop lying against the wall surface does not change its position. The shock-absorbing element has therefore not only the advantage that the wall surface sustains no damage, but also the advantage that an optimum contact area of the depth stop on the wall surface is maintained for reaming out the undercut.

Between the shock-absorbing element and the collar integrally formed with the drill shank there is a bearing washer which substantially reduces the friction between the rotating collar and the shock-absorbing element which, in contact with the wall surface, does not rotate with the collar. The bearing washer can be constructed as a metal washer or may consist of a plastics material with good sliding properties.

The shock-absorbing element can be secured against axial displacement on the shank by a casing engaging over the collar formed on the drill shank. The casing may also completely enclose the shock-absorbing element

or engage the cylindrical side wall of the shock-absorbing element so that the lower region of the shock-absorbing element, being the contact face of the depth stop, projects freely in the direction of the drill tip. This last-mentioned embodiment has a soft contact face, as for the embodiment without an enclosing casing, whereby the wall surface in question is afforded particular protection.

A further development of the invention provides that the depth stop comprises a resilient, cup-shaped shock-absorbing element which with its side wall engages over a collar formed on the drill shank and has a base with a through-opening through which the drill shank leading from the collar to the drill tip passes. The shock-absorbing element can simply be pushed over the drill tip up to the collar along the drill shank, the side wall of the shock-absorbing element engaging over the collar being pushed over the collar by applying a little pressure. The shock-absorbing element may also be manufactured as a one-piece part from a resilient plastics material, for example from polyurethane.

To reduce or avoid friction losses between the collar and the base of the shock-absorbing element, a bearing washer that is arranged between the collar and the base inside the space enclosed by the shock-absorbing element can be pushed onto the drill shank.

The invention is explained in detail hereinafter with reference to the drawing, in which

Figure 1 shows a first example embodiment of a drill bit with a shock-absorbing element,

Figure 2 shows a second example embodiment with a casing engaging over the shock-absorbing element,

Figure 3 shows part of a further example

embodiment of a drill bit with the casing engaging the shock-absorbing element laterally and

Figure 4 shows a further example embodiment of a drill bit with a depth stop constructed as a resilient, cup-shaped shock-absorbing element.

The drill bit 1 illustrated in Figure 1 has, integrally formed with the drill shank, a collar 2 against which a bearing washer 3 bears. Below the bearing washer 3 there is arranged a shock-absorbing element 4 which is a washer consisting of resilient plastics material.

The drill bit 1 has a drill tip 5 with lateral cutting edges 6, 7 projecting laterally beyond the drill shank; the cutting edges serve in a manner known per se to produce an undercut at the bottom of a drilled hole. The drill shank has a bulge 8 which, inside the drilled hole, defines a pivot point when reaming out the undercut. The drill bit 1 lies with the widest point 9 of the bulge 8 against the wall of the drilled hole and allows itself to be swivelled laterally about this pivot point.

The collar 2, the bearing washer 3 and the shock-absorbing element 4 together form a depth stop 10 which defines the maximum depth to which the drill bit 1 can penetrate into masonry. As soon as the shock-absorbing element 4 lies with its contact surface 11 against the wall surface 12 of the masonry 13, the drill bit 1, which is chucked in a hammer drill, not illustrated here, can be swivelled laterally in order to ream out the undercut 14 at the bottom of the drilled hole. Through the swivelling movement the collar 2 is inclined correspondingly towards alternate sides, the shock-absorbing element 4 undergoing slight resilient deformation. The shock-absorbing element 4 thus lies with its contact surface 11 full-face against

the wall surface 12.

The drill bit 1 illustrated in Figure 2 has a depth stop 10 which consists of a collar 2, a bearing washer 3, a shock-absorbing element 4 and a casing 15 engaging over the shock-absorbing element 4 and the collar 2. The casing 15 has an upper through-opening 16 and lower through-opening 17 and for the rest is closed on all sides.

In Figure 3, the depth stop 10 also has a casing 18, the lower edge 19 of which is angled inwards and engages the cylindrical side wall of the shock-absorbing element 4 laterally.

The bearing washer 3 is a metal washer, but a plastics washer made of a plastics material with good sliding properties can also be used.

The drill bit 1 shown in Figure 4 has as its depth stop 10 a resilient, cup-shaped shock-absorbing element 20, and a collar 21 integrally formed with the drill shank. In the space between the base 22 of the shock-absorbing element 20 and the collar 21 there is a bearing washer 23, which can consist of metal or of a plastics material with good sliding properties. The shock-absorbing element 20 is made of a resilient plastics material as a one-piece, approximately frustoconical part.

The shock-absorbing element 20 has in its base 22 a through-opening 24 through which the drill shank with drilling dust grooves 25 and the drill tip 26 projects in a downward direction. The side wall 27 tapers upwardly, likewise the peripheral face of the collar 21. The tapering peripheral face of the collar 21 has the same inclination as the tapering inner surface of the side wall 27 of the shock-absorbing element 20.

The drill bit 1 illustrated can be chucked by the upper part of its shank in a hammer drill, not illustrated here, or in a similar apparatus. With the shock-absorbing element 20 being positioned against a

wall surface, the blows transferred from the hammer drill to the drill shank are so well absorbed that damage to the wall surface in the region of the mouth of the drilled hole is reliably avoided.

Patent Claims

1. A drill bit for producing drilled holes with an undercut in masonry, the drill tip of which has lateral cutting edges projecting laterally beyond the shank and a collar formed on the drill shank, over which a depth stop engages so as to be freely rotatable, characterized in that on the drill shank between the drill tip (5) and the depth stop (10) there is formed a bulge (8) to create a pivot bearing, the depth stop (10) comprising a resilient, ring-shaped shock-absorbing element (4) which lies against a bearing washer (3) that bears against the collar (2) formed on the drill shank.

2. A drill bit according to Claim 1, characterized in that a casing (15, 18) engaging over the collar (2) adjoins the shock-absorbing element (4).

3. A drill bit according to Claim 2, characterized in that the casing (15) encloses the shock-absorbing element (4) and the collar (2).

4. A drill bit according to Claim 2, characterized in that the casing (18) engages the shock-absorbing element (4) laterally so that the lower part of the shock-absorbing element (4) directed in the direction of the drill tip (5) projects free of the casing (18).

5. A drill bit according to Claim 1, characterized in that the depth stop (10) comprises a resilient, cup-shaped shock-absorbing element (20) which, with its side wall (27) engages over a collar (21) formed on the drill shank and has a base (22) with a through-opening (24) through which the drill shank leading from the collar (21) to the drill tip (26) passes.



6. A drill bit according to Claim 5, characterized in that the shock-absorbing element (20) has the contour of a truncated cone.

7. A drill bit according to one of Claims 5 or 6, characterized in that the inner wall of the shock-absorbing element (20) and the shape of the collar (21) have conical peripheral faces.

8. A drill bit according to claim 7, characterized in that the bearing washer (23) is mounted between the base (22) of the shock-absorbing element (20) and the collar (21).

