

COMMISSIONER'S DECISION

OBVIOUSNESS: Dowel Anchoring Device

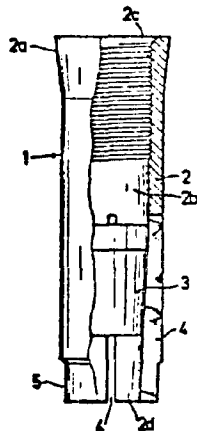
Use of a tapered spreader member to match with the interior walls of the expanding dowel sleeve are known. Applicant has a smooth exterior cylindrical surface in the expanding region to attain increased holding capacity over the prior art ribbed or ridged dowel exterior surfaces. Evidence addressed at the Hearing, and after the Final Action, demonstrated unexpected advantages in the new dowel.

Final Action: Reversed.

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This decision deals with a request for review by the Commissioner of Patents of the Examiner's Final Action dated January 12, 1976, on application 152,192 (Class 85-5.3). The application was filed on September 20, 1972, and is entitled "Straddling Dowel." The Patent Appeal Board conducted a Hearing on August 17, 1977, at which Mr. G. Ralston represented the applicant.

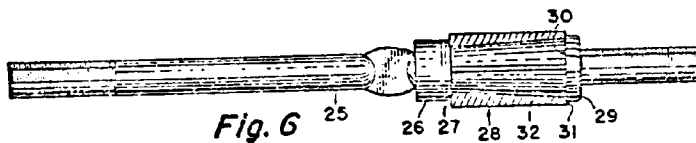
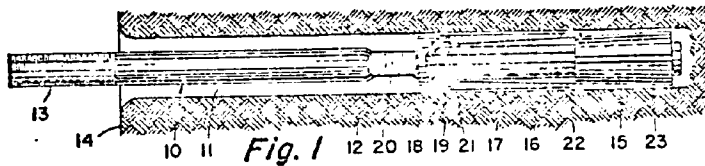
This application relates to a straddling dowel-type anchoring device for securing the inner end of a bolt in a hole in rock or concrete. The dowel has a smooth outer surface and a conical inner surface having a corresponding frusto-conical spreader element. A drawing of applicant's dowel is shown below.



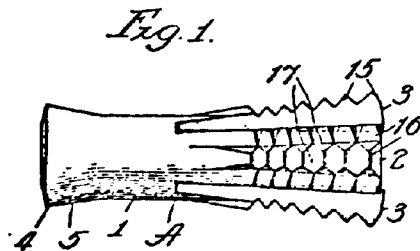
In the Final Action the examiner refused the application for failing to set forth a patentable advance over the following references:

Canadian Patent	818,833	July 29, 1969	Williams
Belgian Patent	564,476	Feb. 28, 1958	Bergbaustahl
British Patent	1,186,035	Apr. 2, 1970	Fischer
United States Patents	1,000,715	Aug. 15, 1911	Caywood
	2,616,328	Nov. 5, 1952	Kingsmore
	3,042,961	July 10, 1962	Tieri
	2,479,075	Aug. 16, 1949	Martin
	3,042,094	July 3, 1962	Liljeberg

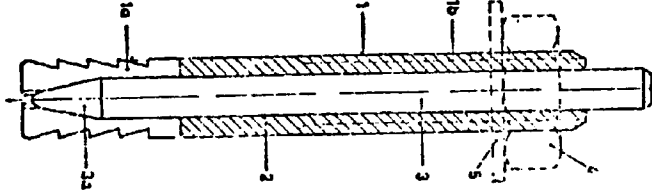
The Williams patent relates to a mine roof rock anchoring device having a threaded rod section, a generally cone-shaped expander in threaded engagement with the rod section, and an expansible shell having an interior surface normally bearing on the peripheral surface of said expander. Figures 1 and 6 of Williams are shown next:



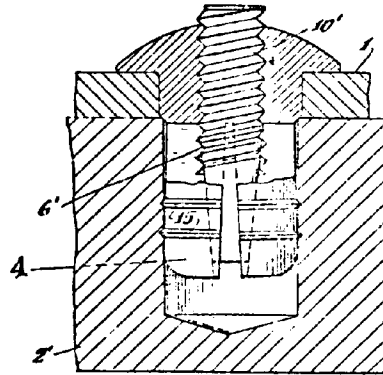
Caywood relates to an expansion wall plug adapted to be inserted in an opening in a wall. Figure 1 from his disclosure is shown below.



Fischer and Bergbaustahl both relate to mounting bolts capable of anchorage in a bore. The expanding section has peripheral serrations which grip the surrounding cavity walls. Figure 4 of Fischer is shown.



Kingsmore discloses an anchoring device where the expansion of the inserted portion is brought about by means of an inserted bolt. Figure 3(a) is reproduced next.



Liljeberg and Martin both relate to locking means for bolts wherein a threaded receiving cavity utilizes a locking screw expanding means to retain the hollow bolt in position.

The Tieri patent is for an ophthalmic mounting hinge using a soft deformable expansion hinge pin tube.

In the Final Action the examiner gave the following reasons (inter alia) for making the rejection:

...

Caywood discloses an expanding sleeve with a cylindrical middle portion, a tapered enlarged head, and a bevelled forward end on the outside, similar to applicant's device. The spreading portion is grooved on the outside and has a square tapered interior chamber to house an expander wedge, which features differ from the applicant's device.

Kingsmore is suggestive of applicant's device in that the leading end is rounded and thus reduced; the taper of the frustro-conical bore of the sleeve and the taper of the expander member are close, though not the same, and the middle portion of the sleeve is cylindrical and smooth or provided with raised ridges as in Figure 3a.

Tieri's sleeve, particularly as shown in Figure 2, is suggestive of the applicant's sleeve in that it has a cylindrical middle portion, a cylindrical leading end of reduced diameter, a tapered enlarged head, and a tapered bore. However, Tieri's device is not slotted and the expanding member is cylindrical, unlike applicant's device.

Martin discloses screw locking means which comprises a tapered hole in a screw member and a correspondingly tapered frustro-conical expanding member, thus showing one of the main features of applicant's device.

Liljeberg employs the feature mentioned above for a locking screw, and radial slots in the expanding range of the screw.

Fischer discloses an anchor bolt having features common with the applicant's device, such as an expanding sleeve member slotted in its expanding range, and an expansion member with a conical point which matches the conical restriction in the sleeve member.

The Bergbaustahl patent discloses a rock bolt having a frustro-conical threaded end adapted to engage an expansion sleeve having a similarly tapered threaded hole therein to co-act with said bolt end. The sleeve has slots and the end faces thereof are chamfered.

Williams discloses a rock anchoring device which utilizes a cone shaped expanding nut axially movable by a threaded rod, to expand a slotted expansible shell having smooth cylindrical outer surface and an axial bore tapered the same way as said cone. The disclosure states, on page 1, paragraph 3:

"A problem has been encountered in cases where the rock formation is soft or resilient, or when the bolt is installed in concrete not yet fully cured."

...

In his response to the Final Action the applicant submitted an affidavit and had this to say (in part):

In the Official Action of January 12th, 1976 top of page 2 the Examiner summarizes Applicants' invention in six (6) lines.

This is an over-simplification of the invention. The invention has the characteristics actually defined in the Patent Claim. To reduce the Patent Claim which covers two (2) pages, to six (6) lines undermines the entire purpose of Patent Claim drafting and prosecution.

If it were possible to define a complex invention of this nature in six (6) lines, then the work of Patent Agents, and Examiners would be greatly simplified. Experience indicates that it is not possible to simplify inventions to this point.

What possible purpose is there in drafting Patent Claims if they are simply going to be ignored by the Examiner? If a Judge of the Federal Court, in a Patent lawsuit were to proceed on this basis, his reasons for judgment would be severely criticized on Appeal. It is also instructive to compare the Official Action of January 12th, 1976 top of page 2 with the Official Action of May 7th, 1975 on the bottom of page 1 to the middle of page 2. It would be noted that in the May 7th, 1975 Official Action, the Examiner has picked out ten (10) distinctive features of the invention. In the more recent of January 12th, 1976 Official Action, the Examiner has picked out only two (2).

In this respectful submission both Official Actions fall into the error of over-simplification, and of ignoring the actual wording of the Patent Claim. Of the two, however, the Official Action of May 7th, 1975 is certainly to be preferred.

...

Again, it is noted that these four references are only cited as disclosing the single feature of the matching taper. The other features of Applicant's invention are clearly absent. It is this respectful submission simply a matter of mosaicing of Patents to produce a composite image of Applicant's invention. There is nowhere in any of these Patents a teaching that a specific feature might be adapted from one Patent to another. There is nowhere any suggestion that the feature of for example the use of matching tapers is an improvement over earlier expanding devices.

The newly cited Patents represent merely a selection made by the Examiner for the purpose of supporting a pre-conceived argument. This is totally the wrong approach to the question of Patentable subject matter. It has been laid down over and over again that all of the prior art must be reviewed to determine whether or not Patentable subject matter exists in any particular invention as at the date when the invention was made.

In this respectful submission, the Examiner has not done this in the present Application. Having read Applicant's invention and thoroughly understood it, he has simply gone to the shelves of the Patent Office and selectively pulled out those Patents which he felt revealed the individual features claimed in respect to Applicant's invention.

We have carefully studied the prosecution of this application, and considered the extensive remarks made at the Hearing by Mr. Ralston.

The issue to be considered by the Board is whether or not the applicant has made a patentable advance in the art over the cited references.

According to the applicant his device provides greatly increased pull-out resistance over that of the prior art by:

- 1) matching the tapering angle of the interior of the expanding range with the taper of the frustro-conical expansion member.
- 2) provision of a smooth cylindrical exterior surface in the expanding range free of any ridges or ribs.
- 3) provision of a reduced diameter portion at the inner end of the expansion range so that the inner end of the expansion range of the dowel does not immediately come into contact with the rock until the expansion member has been driven substantially into the expanding range of the dowel.

Considering the first feature, a spreader member tapered to match with the interior walls of the dowel sleeve, we find that to be a well known form to accomplish dowel expansion. Dowel expansion in Fischer, Bergbaustahl, Caywood and Kingsmore is attained in a similar manner.

The use of a smooth cylindrical exterior surface in the expanding range of the plug was represented by the applicant as a major factor for increased holding capacity. He argued that when the prior art uses ridges or ribs on the outer expanding surface, this causes stress peaks which pulverize the hole wall surface, and gives poorer holding capabilities than expected. Looking at Williams we find his rock bolt anchor uses a smooth wall exterior shell to bind against the bore hole surface, but Williams does not indicate this results in superior holding power. It appears that Williams is concerned with the prior art rock anchoring arrangements where the expander cone pulled through the shell, and he devised an abutting shoulder in the shell to overcome that problem. Granted, Williams discloses a different kind of anchor which is expanded from the inside of the hole, with the expander moving to the hole surface, as compared to what is done in this application in which the expander moves away from the hole surface. Nevertheless the concept of a smooth cylindrical exterior is illustrated.

The third feature stressed by the applicant is the reduced outer diameter portion at the end of the expanding members. Tieri does disclose the use of a reduced end diameter in his deformable cylindrical hinge member, but this is in a rivetted hinge construction. We find no comparable reduced end diameter in the remainder of the cited art.

An affidavit by Mr. Christian Giesler (an engineer with Hilti) was submitted with the request for review. According to this affidavit, increased holding power of the applicant's dowel results from the combination of the three referred to above. However there was no test data in the affidavit to support the claims for increased holding power, and at the Hearing Mr. Ralston was asked to submit this data. We have now received that information, and considered them in conjunction with the arguments presented at the Hearing and the affidavit.

From the new data it appears that the average holding power of the applicant's dowel, when compared to ribbed or ridged dowels, is 12 to 58% greater. From the HILTI International Technical Information Bulletin, NR667-13, page 4, Section 5.1, we reproduce the following chart to illustrate that point.

Size	Average holding power *	
	HKD	TZD
1/4 W (M6)	2100 lb (950 kp)	1320 lb (600 kp)
5/16 W (M8)	3000 lb (1350 kp)	2400 lb (1100 kp)
3/8 W (M10)	4300 lb (1950 kp)	3850 lb (1750 kp)
1/2 W (M12)	6400 lb (2900 kp)	5000 lb (2300 kp)
5/8 W (M16)	8000 lb (3650 kp)	7150 lb (3250 kp)
3/4 W (M20)	13000 lb (5900 kp)	10500 lb (4800 kp)

We conclude that the smooth external cylindrical surface with the matching internal expanding surfaces and a reduced outer end portion of the cylinder does produce increased holding power.

Claim 1 was amended in the response to the Final Action. This claim now reads as follows:

A straddling dowel comprising a metallic sleeve having a leading end, which is inserted first into a bore hole formed to receive the dowel, and a trailing end and forming a continuous bore extending between the leading and trailing ends, said sleeve having a spreading range extending rearwardly from its leading end so that said sleeve can be spread radially outwardly and anchored to the surface of the bore hole, said sleeve having slots extending in the axial direction for a portion of its length from the leading end and the axial length of said slots approximately determining the axial length of the spreading range of said metallic sleeve, and a spreader insertable into the continuous bore from the trailing end and displaceable within the bore toward the leading end for effecting the spreading action, wherein the improvement comprises that the surface of the continuous bore is tapered in a frusto-conical shape for an axially extending portion thereof from the leading end with said tapered surface diverging in the direction of the trailing end and terminating adjacent to and spaced forwardly of the trailing ends of said slots, the outer surface of said sleeve in its spreading range from the leading end presenting a smooth rounded surface in the circumferential direction, said spreader having a frusto-conically shaped, axially extending portion extending rearwardly from its end which is located closer to the leading end of the bore and which effects the spreading action within the spreading range of said sleeve, the frusto-conically shaped portion of said spreader having an angle of taper corresponding to the angle of taper of the frusto-conically shaped tapered portion of said bore at the trailing end thereof so that the frusto-conically shaped portion of said spreader seats in closely fitting surface contact with the correspondingly shaped surface of said bore before it is driven forwardly through the tapered surface of said bore whereby to ensure even expansion of said sleeve in said spreading range to an enlarged diameter which is essentially the same throughout said spreading range, after driving in of said spreader, the axial length of the frusto-conically shaped portion of said spreader being a fractional part of the axial length of said tapered surface at the leading end of the said bore so that prior to driving said spreader forwardly toward the leading end for effecting the spreading action, its end closer to the leading end of the bore is spaced rearwardly from the leading end, the outer surface of said sleeve for an intermediate portion thereof spaced from its leading and trailing ends and extending into the spreading range has a cylindrically shaped surface, the forward end of the outer surface of said sleeve between the leading end and the cylindrically shaped surface of said intermediate portion being spaced radially inwardly from a projection of the cylindrically shaped surface and having a minimum diameter such that the leading end is not widened to more than the diameter of the bore hole upon completion of the spreading action and the axial length of the forward end of the outer surface being not greater than the axial distance which the end of said spreader located closer to the leading end of said sleeve is spaced rearwardly from the leading end when it is in position in contact with the tapered surface therein and before it is driven forwardly toward the leading end, and the plane of the surface of the projection of the cylindrically shaped portion is, at its junction with the cylindrically shaped portion disposed angularly relative to the cylindrically shaped portion.

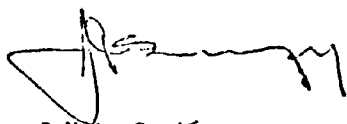


This claim includes the features discussed above. The new data with respect to the increased pullout resistance was not before the Canadian examiner when he made his assessment of patentability. In view of it we conclude that a certain degree of unobviousness is present, and that amended claim 1 is clear of the objection made in the Final Action. We consequently recommend that amended claim 1 and dependent claims 2, 3 and 4 be accepted.



G.A. Asher  
Chairman  
Patent Appeal Board, Canada

Having reviewed the prosecution of this application, and considered the amendment proposed, and the new test results provided by the applicant, I direct that the application be returned to the examiner. Prosecution should be resumed on the basis that the amendment overcomes the previous objections made by the examiner.



J.H.A. Gariépy  
Commissioner of Patents

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Dated at Hull, Quebec

this 18th. day of November, 1977