

COMMISSIONER'S DECISION

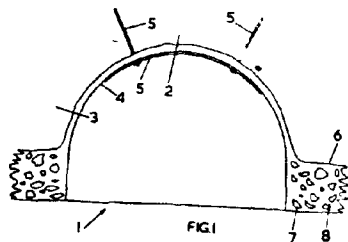
OBVIOUSNESS: Fibre & Cement Support for Underground Tunnels

Spraying a fibre-reinforced cementitious mixture on the surface of an underground tunnel is not patentable over the prior art, which shows spraying block walls with the same mixture.

Final Action: Affirmed.

This decision deals with a request for review by the Commissioner of Patents of the Examiner's Final Action dated April 29, 1975, on application 152,834 (Class 61-65). The application was filed on September 28, 1972, in the name of James A. Harvey, and is entitled "Method Of Supporting The Roof and Walls Of An Underground Tunnel." The Patent Appeal Board conducted a Hearing on November 17, 1976, at which Mr. G.W. Partington represented the applicant.

This application relates to a method of supporting the roof and walls of an underground tunnel by spraying a fibre-reinforced cementitious mixture on the surface. The cementitious mixture consists of any Portland Cement product or any High Alumina Cement product in combination with sand, gravel and ground materials. The fibre reinforcement may consist of one inch metal strands, or fibres such as alkaline resistant glass or plastic materials, for example, polypropylene. Figure 1 shown below is representative of the applicant's arrangement.



Reference numerals 2 and 3 represent the roof and walls of the underground tunnel while 4 is a layer of hardened fibre-reinforced cementitious mixture.

In the Final Action the examiner refused the application for lack of patentable subject matter in view of the following patents.

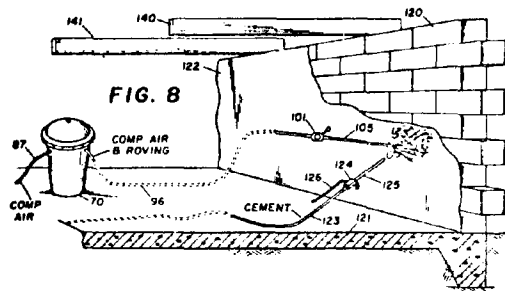
British Patent

1,042,606                      Sept. 14, 1966                      Winn

United States Patent

3,381,479                      Nov. 7, 1968                      Curzio

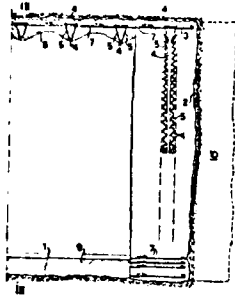
The Winn patent relates to the dispensing and use of a fibrous material for spraying as a cementitious mixture on a block wall. Figure 8 of the patent is shown below.



Claim 7 of the Winn patent reads as follows:

In the manufacture of fibre-reinforced structures, in which multi-strand continuous fiber roving is passed through a flow channel to a discharge means from a supply spool disposed in an enclosed container, the method which comprises maintaining the pressure within said container and within said flow channel in excess of atmospheric pressure, embracing said continuous fiber roving in air flowing from said pressurized container to said discharge means through said flow channel and controlling the movement of said fiber roving through said flow channel by the opening or closure of said discharge means.

Curzio discloses the use of reinforcing arches on which rapid setting cement mortar is sprayed. Figure 1 (below) illustrates that invention.



In the Final Action the examiner stated in part:

Applicant has amended his claims to stress the load-bearing and self-supporting feature of his method and argues that these characteristics distinguish over the prior art. This argument is not accepted.

...

The reference construction is in every respect analogous to that disclosed by applicant. The roof and walls of applicant's mine roadway are not solid, i.e. without fracture planes of separation, for if they were no support would be required. On the contrary, the walls and roof are composed of discrete blocks and applicant's spray strengthens the wall and roof in the same manner as that taught by the British reference, it "permits transference of loads and stresses throughout the entire structure."

Applicant argues that he has invented a new use for an old material, the fibre-reinforced cementitious mixture, but no new use is disclosed. In his disclosure as filed applicant states (page 3, paragraph 4):

"The invention is not limited to supporting mine roadways and it will be appreciated that pack walls, explosion proof stoppings, shaft linings and cappings may be sprayed in this way since each forms at least part of the walls of an underground tunnel". This is exactly the same use for the old material as taught by the reference. It emphasizes the sameness of the reference method and applicant's method. It is held that the above quoted paragraph is necessary for a perfect understanding of the disclosed method and it may not be deleted.

The United States patent to Curzio is cited to show there is no novelty in the use of arches and other reinforcing under the spray coating as also claimed by applicant.

In response to the Final Action the applicant stated (in part):

The only relevant embodiment of British Specification No. 1,042,606 is illustrated in Figure 8 and its accompanying description appearing at pages 5 and 6 of the reference. In particular, the method associated with Figure 8 clearly recites that the

structural elements are dry stacked by any suitable means including hand labour. In this regard, page 5, lines 40 and following clearly provides that the dry stacked structural elements must be self-supporting or otherwise maintained erect temporarily. As is also clearly apparent from lines 51 and following of page 5 of this disclosure, the reasons for applying the spray of cementitious mixture to the stack of structural elements is to provide greater structural strength than would be produced by conventional methods of mortaring or brick laying. Further, at lines 105 and following of page 5, it is noted that the stacked block wall produced by the method according to the British Specification incorporates load supporting capabilities not previously achieved in mortar construction since the monolithic membrane joins the elements of the wall and strengthens the wall throughout the entire inner and outer surfaces. As a result, the resulting wall will support and withstand greater beam loads than conventional masonry construction because of the capability of the wall to act as a monolithic structure even though it is formed from basically separate elements such as the bricks illustrated in Figure 8. As a further advantage, it is also noted at lines 125 and following, of page 5, that the wall may be formed to utilize broken blocks or bricks and second grade elements ordinarily unacceptable in usual construction. Further, it is also noted in the disclosure that the erection and ultimate construction costs are substantially less than conventional brick or block walls in which mortar is placed between the blocks by trowel or by hand or by other conventional methods. (See page 6, lines 18 ff.).

(3) It is Applicant's submission that a disclosure which teaches a method of spraying a cementitious mixture on opposing surfaces of a block wall comprising a plurality of stacked dry structural elements neither anticipates nor renders obvious a method comprising the spraying of a similar mixture on the walls and/or roof of an excavated underground tunnel so as to form a load-bearing, self-supporting tunnel lining. Since the tunnel lining produced according to Applicant's method is self-supporting, the same does not require that any reinforcements be erected.

...

It is Applicant's submission that it would not be obvious to a person skilled in the art of constructing underground tunnels, such as a mining engineer, to look to a specification which deals with the spraying of dry block walls as a solution to providing a more efficient method of providing a load-bearing, self-supporting lining for the roof and/or walls of an underground tunnel. The Examiner's position that the reference teaches a method which is in every respect analogous to that disclosed by the Applicant is quite incorrect. The Examiner submits that the walls and roof of Applicant's underground tunnel are composed of discrete blocks and that Applicant's spray strengthens the walls and roof in the same manner as that taught by the Winn patent. In this regard, the Examiner's completely ignoring the fact that the British Specification explicitly requires the providing of a stack of dry blocks which are either self-supporting or otherwise maintained erect temporarily.

The question to be considered by the Board is whether or not the applicant has made a patentable advance in the art. Claim 1 of this application reads as follows:

A method of supporting an excavated earth roof and/or excavated earth walls of an underground tunnel by spraying directly onto said excavated earth roof and/or excavated earth walls a fibre-reinforced cementitious mixture and allowing concrete thereby formed to harden into a load-bearing, self-supporting tunnel lining.

At the Hearing Mr. Partington emphasized that the invention resides in the new use of an old material, which is applying a fibre-reinforced cementitious mixture to an underground tunnel. He raised some interesting arguments which must be considered carefully. All the claims are directed to a method of supporting an excavated earth roof and walls of an underground tunnel.

In the Final Action the examiner discussed in great detail Figure 8 of the Winn patent, which is concerned with the formation of concrete blocks reinforced with a sheath of cement strengthened with fibre roving (glass fibres or the like). He also questioned the applicant's allegation that his is a new use for an old material.

The Winn patent shows that the use of a "fibre-reinforced cementitious mixture" on a block wall is known. As evidenced in any mining engineer's handbook and acknowledged by the applicant at the Hearing, it is also well known to use "shotcrete" or "gunite" on the rock surface of underground tunnels. Shotcrete and gunite are cementous formulations which are not fibre reinforced.

The applicant puts emphasis on the fact that the method shown in Figure 8 of the British patent to Winn relates to structural elements that are dry stacked by any suitable means, including hand labour. He states that "the dry stacked structural elements must be self supporting or otherwise maintained erect temporarily." Depending on the rock formation, a mine

tunnel consists of stacked components which must be self supporting or otherwise maintained erect temporarily. Since the roof and walls of a tunnel consist of discrete blocks which have fracture planes of separation the formation is one of discrete elements, which essentially is no different from that of Winn.

Another feature stressed by the applicant is that his arrangement does not require a wire mesh reinforcing on the surface of the tunnel prior to spraying with the fibre-reinforced cementitious mixture. Yet "shotcrete" or "gunite" are applied directly to the rock surface of an underground tunnel, and this has been recognized as an effective and economical means of wall support in the industry for some time. In any event Winn does not require a wire mesh on the wall surface before applying his fibre-reinforced mixture.

Another point made by the applicant was that the apparatus in Winn would not work satisfactorily under moisture and dust conditions encountered in tunnelling. Since the applicant is only concerned with a method of supporting an excavated earth roof wall and has not described any apparatus in his specification, we need not consider that issue.

The applicant has said at the Hearing that his construction offers improved fire resistance, and is effective as an air and moisture sealant. However such beneficial results are inherent characteristics of the well-known "gunite" process, and of course in the Winn process, and hardly lend patentability to the alleged invention. In any event the disclosure of the application does not make any reference to these alleged advantages.

In support of his position, the applicant has submitted affidavits from Mr. E. Murphy (now retired from the U.S. Bureau of Mines) and Mr. P.B. Reeves (Director General of the National Coal Board and Director of Planning Major Projects in Great Britain). Both affiants state that they were aware of the use of fibre-reinforced concrete before applicant's "Caledonian" process was introduced in 1971. The advantages prescribed in the affidavits to the new process, such as load bearing, self-supporting irregular wall surface, transfer of

load stresses, and greater tensile and support strength, were all covered by Winn. For example, page 5 of his disclosure, at lines 105 ff., reads as follows:

Production of stacked block wall through the method above described incorporates load supporting capabilities not heretofore achieved in mortar construction. This results from the fact that the monolithic membrane or sheath 122 joins the elements of the wall and strengthens the wall throughout the entire inner and outer surfaces. This permits transference of loads and stresses throughout the entire structure. As an example, the stacked block wall has greater than normal resistance to shearing and damage caused to foundations by beam loads as ordinarily encountered on isolated sections of the wall. The monolithic system, in other words, will support and withstand greater beam loads than conventional masonry construction because of the capability of this wall to act as a monolithic structure even though it is formed from basically separate elements such as the bricks illustrated in Figure 8. The wall may be formed to utilize broken blocks or bricks and second grade elements ordinarily unacceptable in usual construction. The practical result is to permit far more economical construction with substantially greater tensile and support strength characteristics.

We cannot consequently see how the advantages ascribed in the affidavits to the alleged invention differ from what one would expect to flow from its application in mines.

It is clear that the overall objective of Winn is the same as that of the applicant. The properties and advantages of using the reinforced concrete is well documented in the Winn reference. One difference is that Winn did not mention that his process could be used in a mining tunnel.

It is well established that a new use of a known material employing properties or advantages not apparent in the old material may be inventive, providing it is not obvious to recognize these advantages and properties. The Court in Van Heusen Inc. v. Tooke Bros. Ltd. Ex. C.R. (1929) 89 at 97, stated however, that:

There is no invention in a mere adaptation of an idea in a well known manner for a well known or clear purpose in a well known art, without ingenuity....

And at page 99:

A patent for the mere new use of a known contrivance, without any additional ingenuity in overcoming fresh difficulties, is bad, and cannot be supported. If the new use involves no ingenuity,

but is in manner and purpose analogous to the old use, although not quite the same, there is no invention. (emphasis added)

We believe that the applicant's use of fibre-reinforced concrete in which there is served no function or purpose different from the old use does not warrant patent protection.

Pertinent to our finding is the rationale of the court in Bergeon v. De Kermor Electric Heating Co., Ltd. (1927) Ex. C.R. at 188, where Audette J. stated:

The adaptation of old continuances or denier of a similar nature to a new or similar purpose, especially to the same class of articles, performing an old well known function will not amount to or constitute invention.

...

In the present case the improvement claimed consists in a combination which, considering the state of the prior art, discloses no new function or discovery which could, to my mind, amount to invention. There is no sufficient invention in merely applying well known things, in a manner or to a purpose which is analogous to the manner as to the purpose in or to which it has been previously applied.

Claim 1 is directed to a method of supporting an excavated underground tunnel by spraying with a fibre-reinforced cementitious mixture. The material used is old, and the use of similar materials for that purpose is old. We note, too, that in the application as originally filed, page 3 stated: "The invention is not limited to supporting mine roadways and it will be appreciated that pack walls, explosive-proof stoppings, shaft linings and cappings may be sprayed in this way since each forms at least part of the walls of an underground tunnel. This paragraph would seem clearly to link the sprayed structure of the reference to the sprayed structure of the applicant. In our view claim 1 does not define a patentable advance in the art beyond the teaching of Winn, and such common general knowledge as is taught by Curzio. It covers a mere substitution of a known material to an analogous purpose, and the result is expected. The method serves no function or purpose patentably different from the old use. The applicant is applying a well known thing in a manner or to a purpose which is analogous to the manner or to the purpose in or to which it has been previously applied (see Bergeon v. De Kermor, supra). Claim 1 should be refused.



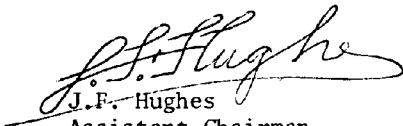
Claims 2 to 9, which depend directly or indirectly on claim 1, relate to the type, the size, and the percentage by weight of the fibre-reinforcement used. These features contribute nothing patentable to the subject matter of refused claim 1.

Claim 10 is directed to filling cavities before spraying. It recites essentially the same method as that taught on page 5 of the Winn patent.

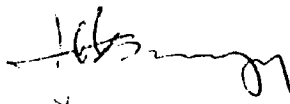
Claims 11 and 12 add support means to the tunnel. There is nothing of significance in doing so.

We are satisfied that neither the claims nor the specification as a whole are directed to a patentable advance in the art over the cited references.

We recommend that the decision in the Final Action to refuse the application be affirmed.

  
J.F. Hughes  
Assistant Chairman  
Patent Appeal Board

I have reviewed the prosecution of this application and the recommendations of the Patent Appeal Board. It is my decision that this application should be refused. If the applicant intends to appeal this decision, he must do so within six months of the date of this Decision (see Sec. 44).

  
J.H.A. Gariépy  
Commissioner of Patents

Dated at Hull, Quebec

this 20th. day of December, 1976

Agent for Applicant

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