

COMMISSIONER'S DECISION

OBVIOUSNESS: Method Claims Fail in View of Prior Art.

The application relates to an apparatus for spraying powdered materials at low controlled rates. The prior art failed to teach or suggest the combination in rejected apparatus claims. The method claims, by contrast, failed to recite that relationship, and were considered too broad in scope, though they could be modified to overcome the rejection.

FINAL ACTION: Modified.

This decision deals with a request for review by the Commissioner of Patents of the Examiner's Final Action dated October 23, 1974 on application 141,564 (Class 302-25). The application was filed on May 8, 1972 in the name of Robert G. Coucher and is entitled "Powder Feeder and Methods for Transporting Particulate Material."

This application relates to a powder feeder, especially useful for spraying powdered materials at low controlled rates. The feeder is provided with an orifice to admit gas up through the bottom at a high velocity. A pair of concentric conduits are suspended from the top of the feeder in approximately axial alignment with the orifice so that the column of gas is captured within the outer conduit and substantially all enters the inner conduit. The powdered material is stored in the space between the outer conduit and the wall of the feeder. The spacing of the outer conduit from the bottom of the feeder is adjustable to admit the powdered material in a controlled manner to the vicinity of the orifice. The inner conduit is also adjustable with respect to the outer conduit as an added control. When gas is forced through the orifice, the powdered material is lifted by the venturi pressure effect created by the gas.

In the Final Action the examiner refused claims 1,2, 4 to 7 and 9 to 12 for lacking invention over the following references:

French Patent

947,479 June 10, 1947 BOURDILLON

United States Patent

3,501,602 March 17, 1950 De Witt

In that action the examiner stated (in part):

Claims 1, 2, 4-7 and 9-12 in this application stand rejected for failing to define a clear inventive step over the French Patent in view of the United States Patent. To arrange the teaching of the French Patent for use in a closed vessel is held to be a mere matter of expected skill. The United States Patent shows that closed vessels are known. To adapt the teaching of the French patent for use in known closed systems is held to be a mere matter of expected skill and normal engineering. To vibrate the vessel to facilitate feed is held to be but expected skill and common knowledge in any event. No claimed features in claims 1, 2, 4-7 and 9-12 are seen to be beyond choice, elementary design or expected skill.

The applicant in his response dated October 23, 1974 to the Final Action Stated (in part):

...

It would appear that the Examiner considers the sleeve 10 (shown in the French patent) to be the equivalent of the first conduit defined in applicant's claim 1 and the tube 9c to be the equivalent of applicant's second conduit. Applicant agrees that the United States patent teaches a closed vessel and judging from the drawing of the French patent it would appear that the most logical manner of closing the French vessel would be to place a cover over the spider members which space the outer cylindrical wall of the vessel from the inner cylindrical threaded portion indicated at 10c. Since the wheel 10b is intended to rotate the sleeve 10 it would certainly not be practical to enclose that wheel 10b in a closed vessel since the ease of adjustment now achieved with the French apparatus would be completely lost....

...

Turning now to the method claims 9 to 12, applicant is again unable to agree that these claims are obvious in view of the prior art. Unfortunately, the Examiner has not advanced any specific arguments with respect to the method claims. However, applicant strongly believes that the method of claims 9 to 12 is distinct from the prior art. In the United States patent, for example, metering is accomplished by adjusting the gap 86 between the ring 82 and the top of the member 60. Metering, as set forth in claim 9 of the present invention, is accomplished by adjusting the vertical and horizontal spacings of the barrier from the orifice. The physical phenomena involved in the two methods are very different. In the reference, the material adjacent to the member 60 must be fluidized

or it will not flow to the vicinity of the orifice. The method of claim 9 relies only on the inherent angle of repose of the material for rate control. Energizing the material to the extent taught by the reference would be detrimental because once a material is fluidized it obviously cannot exhibit a stable angle of repose. Hence there would be no predetermined flow of material under the barrier (30a, Figure 1) downward to the vicinity of the orifice 39 as required by claim 9. The remaining claims 10 to 12 are certainly not found in the United States patent....

The Bourdillon reference relates to an apparatus for depositing powder, or dust, in suspension in a current or stream of gas. The apparatus comprises a vessel in which the powder can be stored; an orifice opening into the vessel from its bottom; a conduit mounted in the vessel in axial alignment with the orifice and an adjustable sleeve surrounding the conduit to control the feed of the powder.

The De Witt reference was cited to show the use of a "closed vessel" powder feeder working on the same general principle as that shown in Bourdillon.

The state of the prior art was also discussed by the applicant on page 1, 2nd para. of the disclosure and reads:

.... The pneumatic conveying of finely divided, particulate material is conventional. The venturi principle is employed in various commercial equipment for drawing particulate material from a reservoir into a moving stream of gas or liquid. Such techniques have not heretofore been successfully applied to the uniform transport of particulate materials at low rates, however.

Heretofore, for applications requiring uniform feeding of a powdered material, e.g. to a plasma flame for plasma flame spraying of a substrate, various types of mechanical feeders have been relied upon. At very low rates, mechanical feeders become erratic, however. Limitations imposed by the mechanics of such feeders make it impractical to feed powders from a stock at rates much below about a pound per hour. Many potential applications exist for well-controlled, uniform, lower feed rates, but it has not heretofore been practical to achieve them.

As mentioned, this application relates to a powder feeder, especially useful for transporting particulate materials at a low controlled rate. A container is provided with an orifice to admit gas up through the bottom of the vessel in a high velocity column or jet. A pair of concentric conduits

are suspended from the top of the vessel in approximately axial alignment with the orifice so that the column of gas is captured within the outer conduit and substantially all enters the inner conduit. Particulate material (such as metal powder) is stored in the space between the outer conduit and the wall of the vessel. The spacing of the outer conduit from the bottom of the vessel is adjusted to admit particulate material to the vicinity of the orifice at a controlled rate. When gas is forced through the orifice, particulate material is lifted by the venturi pressure effect created by the gas column. Claim 1 reads:

Apparatus comprising: a closed vessel with an interior; means for introducing particulate material to the interior of said vessel;

an orifice, opening into the vessel from its bottom, oriented to admit gas forced therethrough in an upwardly directed jet stream into the interior of said vessel;

an outlet at the top of said vessel;

a first conduit, mounted within the vessel in approximately axial alignment with said orifice, with the lower end of said first conduit directly above said orifice and sufficiently near the bottom of the vessel to prevent powder contained within the vessel from filling the space between said lower end and said orifice, and with the upper end of said first conduit in open communication with the interior of said vessel; and

a second conduit of smaller cross section than said first conduit mounted within and in approximately axial alignment with said first conduit with the lower end of said second conduit directly above said orifice and the upper end of said conduit openly communicating with said outlet.

The question which the Board must consider is whether claims 1, 2, 4 to 7 and 9 to 12 should be refused as lacking patentable subject matter over the art cited.

First it is observed that in order to refuse for lack of inventive subject matter, the prior art when taken collectively must substantially teach the combination as claimed.

The applicant has stated that he has overcome a problem of feed control at low feed rates. He maintains that: "Limitations imposed by the

mechanics of such (prior art) feeder make it impractical to feed powders from a stock at rates much below about a pound per hour (see page 1 of the disclosure). On the other hand, the second last sentence, on page 3, reads: "...the invention is of particular interest, at the present time, because of its unique capability of transporting such materials at very low rates. The preferred embodiment of the apparatus may be adjusted to deliver particulate material at feed rates ranging from a fraction of a gram up to several pounds per hour." There is no reason apparent to discredit the applicant's claim to have solved that problem, as it is well documented by the results of a number of experiments which appear in the disclosure.

We will now consider the rejected claims.

The first portion of claim 1, a vessel, an orifice, an outlet at the top of the vessel and a conduit are shown by Bourdillon. The applicant does, however, claim a "closed" vessel, but this is shown by De Witt. The last portion of the claim reads: "...a second conduit of smaller cross section than said first conduit within and in approximately axial alignment with said first conduit with the lower end of said second conduit directly above said orifice and the upper end of said second conduit openly communicating with said outlet."

There is no teaching in the cited art wherein a second conduit is coaxially contained within a first conduit. A conduit, by definition, is a tube or channel which is adapted to carry a fluid. Since the applicant uses two conduits coaxially aligned the construction must, by definition, provide an annular space between the first and second conduits for the passage of fluid or air therebetween. The Bourdillon reference on the other hand shows an outer cylindrical casing, which can only be considered as a sleeve for the purpose of adjusting the quantity of powder to the orifice. The claim also brings out the

fact that "the first conduit (is) in open communication with the interior of said vessel." That arrangement has a particular role to play as explained in the last paragraph on page 5 of the disclosure, which reads "The inner conduit should be of sufficient cross section to receive most of the gas column rising up from the orifice. It should be sufficiently smaller than the other conduit to define an annular space capable of passing the gas and suspended powder which fails to enter the inner conduit without clogging."

In our view therefore, the combination of claim 1 is not taught nor suggested by the cited art. The applicant has in our view produced a result in a more expeditious manner than had apparently been done before. Accordingly, the Board is satisfied that there is in the new combination claimed a degree of ingenuity which was the result of thought and experiment. (See Crossley Radio Corporation v. Canadian General Electric Company (1936) S.C.R. 551 at 560. It follows that the rejection of claim 2 and 4 to 7, which depend on claim 1, is also traversed.

The examiner also refused method claims 9 to 12. Claim 9 reads:

A method for transporting finely divided, particulate material at a controlled rate, which comprises:

establishing and maintaining a column of gas flowing up from an orifice of selected cross section at high velocity;

positioning a quantity of the finely divided, particulate material so that it tends to flow toward said orifice;

providing a barrier between the gas column and the particulate material, located to permit passage of such material beneath said barrier at a region spaced vertically up and horizontally out from said orifice at distances selected to permit a predetermined flow of particulate material to the vicinity of said orifice; and

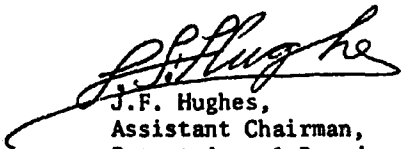
capturing the gas column above the orifice for transport to a remote location.

That claim recites the steps of: maintaining a column of gas from an orifice; providing a quantity of particles in a controlled manner and transporting the particles to a remote location by means of the gas column. These steps are clearly inherent in the Bourdillon reference. In other words that claim does not include the essential features of the invention; namely, a first and a second conduit coaxially aligned, which feature is argued by the applicant, as noted above, to be an important part of his advances in the art. It is observed that the claim refers to "a barrier," but not the specific barrier "an outer cylindrical conduit," and as a result reads on the "sleeve barrier" of Bourdillon. It is really a matter of the claim failing to comply with Section 36(2) of the Patent Act.

Claims 10 to 12, which depend on claim 9, also fail to recite the first and second conduit relationship. The same arguments used to refuse claim 9 therefore, apply equally to claim 10 to 12.

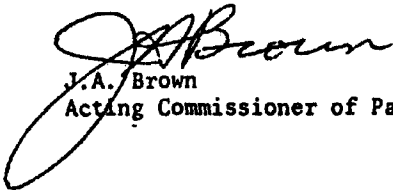
The Board is satisfied that rejected claims 1, 2 and 4 to 7 recite a patentable advance in the art over the references cited, and we recommend that the rejection be withdrawn.

The Board is also satisfied that claims 9 to 12 fail to recite a patentable advance over the art cited, and we recommend that the rejection of claim 9 to 12 be affirmed.


J.F. Hughes,
Assistant Chairman,
Patent Appeal Board.

I concur with the findings of the Patent Appeal Board and withdraw the rejection against claims 1, 2, and 4 to 7, but refuse to allow claims 9 to 12. The applicant has six months within which to delete claims 9 to 12, to amend along the guidelines suggested, or to appeal this decision under the provision of Section 44 of the Patent Act.

Decision accordingly,


J.A. Brown
Acting Commissioner of Patents

Dated at Hull, Quebec
this 7th day of May, 1975

Agent for Applicant

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