COMMISSIONER'S DECISION

OBVIOUSNESS: The claims were refused over the teachings of the prior art, although claim 3 with minor amendments would be considered as related to patentable subject matter.

The invention involved storing and handling sulfur. A massive block was formed with the total base embedded in steam coils. These coils were used to heat the total base area in a controlled manner as molten sulfur is required.

FINAL ACTION: Affirmed. However some claims will be allowable when amendments are made.

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This decision deals with a request for review by the Commissioner of Patents of the Examiner's Final Action dated June 28, 1974 on application 127,640 (Class 201-149). The application was filed on November 15, 1971 in the name of Hilton A. McCabe and is entitled "Method of Handling Block Sulfur."

The application relates to a method of handling large quantities of sulfur in massive block form, such as is found in sulfur recovery plants. Steam coils are placed on a concrete pad onto which molten sulfur is poured and stored in the form of a block. These massive blocks may weigh 10 to 20 thousand tons. When it is desired to transfer the sulfur for shipping, steam is introduced into the system of coils on the concrete pad, molten sulfur is then withdrawn and transferred directly into a suitable conveyance.

In the Final Action the examiner refused the application for failing to disclose any patentable step over the following reference:

Canadian Patent		
618,034	April 11, 1961	Dykstra

In that action the examiner stated (in part):

> It is pointed out that Dykstra describes a method of obtaining free sulfur in a readily transportable form from a massive sulfur deposit 12, comprising melting said sulfur by heating means 34 positioned

near the base of the massive sulfur deposit, withdrawing the resulting molten sulfur by means of gravity flow from the vicinity of the base of the partially melted massive sulfur deposit and placing said molten sulfur into a suitable container 26, substantially as defined by the applicant in claim 1.

There is no patentable merit in merely stipulating that the sulfur is melted by "indirect" heating means. Applicant's attention is again drawn to page 7 of the above cited Canadian Patent which states, "The bins 26 ... are preferably provided with heating coils 27 for melting the sulfur if it becomes solidified in the bin. The reheating coils 27 may be of the hot water circulating type and are operatively connected to distributor 28". Clearly, Dykstra teaches that sulfur, whether it be poured sulfur which has solidified into a massive block, or native sulfur in an underground deposit, may be rendered molten not only by direct contact by high pressure steam, but also by means of indirect heating means as proposed by the applicant.

The fact that the claims call for a poured massive block of sulfur at ground level does not render the claims patentably different from the teachings of Dykstra. To merely elect whether sulfur will be stored below, at, or above ground level is a matter of design expediency and involves no inventive ingenuity.

In applicant's letter of April 9, 1974, it is argued that in Dykstra's case, all of the sulfur must not only be melted before he removes it from the pit by means of a pump, but the entire batch of sulfur must be maintained in molten form, whereas the applicant is concerned with heating the base of the sulfur block and removing the molten sulfur from the base of the block by gravity drainage.

However, there is nothing in Dykstra's disclosure to support the applicant's contention that the entire batch of sulfur in storage bin 26 must be maintained in a molten state before sulfur may be removed from the bin. Dykstra shows the intake conduit of pump 30 extending downwardly to the base of bin 26, and it is reasonable to assume that pump 30 may be operated to withdraw molten sulfur from bin 26 well before all of the sulfur is melted by the heating coils.

The applicant in his response dated September 10, 1974 to the Final Action stated (in part):

...

Specifically, Claim 1 includes the manipulative step of "melting said sulfur by indirect heating means at the base of said block." In order to argue that this step is taught by Dykstra, the Examiner has subdivided the explicit wording of applicant's step into three subelements and then proceeded to correlate these subelements with separate points in Dykstra's process.

The "said sulfur", a "poured massive block", is equated to the offshore sulfur deposits discussed in Dykstra. This correlation is legally inaccurate in that the two expressions do not read on common subject matter and technically inaccurate in that applicant's invention involves remelting a free-standing massive block of sulfur while Dykstra is extracting sulfur which is naturally entrapped in a honey-combed limestone deposit.

The second subelement in the Examiner's analysis involves identifying the applicant's act of "melting...at the base" as being synonymous with Dykstra placing a heating means near the base of the massive sulfur deposit. Again this is inaccurate. Applicant's invention as explicitly worded is restricted to the act of melting the sulfur at the base of the block exclusively. In other words, the melting occurs at the interface of the indirect heat exchanger and the free-standing block resting on the heat exchanger. As the block melts it falls and a new base comes in contact with the heat exchanger. In contrast, Dykstra's process inherently involves the drilling of a vertical shaft from the underside of the sulfur deposit up into the deposit. The fact that the Frosch type heating means is placed near the base does not amount to the claimed manipulative step of melting at the base. In the Dykstra process the entrapped sulfur does not flow to the base until after the hot steam has come in direct contact with the sulfur. In other words, the act of melting in the Dykstra process occurs exclusively within the honey-combed limestone matrix and not at the base of the deposit.

The third subdivision of the aforementioned novel step involves equating the indirect heating of applicant's invention with the heating coil in Dykstra's storage bin located downstream from the melting step. To argue that the intended use of this reservoir is for crystallizing and remelting of sulfur is inaccurate. By Dykstra's own admission, this heating coil is merely preferred (optional) and is used to melt the sulfur if it becomes solidified. Thus the clear intent of this heating coil is to sustain the sulfur in a melt state. The obvious purpose of having Dykstra's storage bin is that it acts as a surge tank on the inlet side of a pump to account for upstream variations in flow (a well recognized engineering principle). To further emphasize this point, please note that applicant's drawing, Fig. 2, shows a surge tank prior to the pump; applicant also teaches the advantage of heating downstream from the melting to prevent freezeup, and that these elements are remote from and are not part of the claimed improvement.

Hence, applicant's basic position is that Dykstra does not, in fact, perform the melting step as explicitly stated in applicant's claims. Further, Dykstra does not teach the combination of subelements selected from remote areas of his overall process. He does not teach this combination into two senses. The first is that combining of these subelements would create a manipulative melting step which would be inoperative with respect to the purpose of his disclosure; i.e., you don't remove sulfur from natural deposits by indirect heating. The second is that Dykstra does not disclose the specific advantages of the combination, particularly applicant's observations of reduced sulfur dust emissions and improved heat flux efficiency.

The Dykstra citation relates to a method of extracting and recovering sulfur from earth bearing sulfur deposits. Claim 1 of that patent clearly sets forth the method and reads:

> The method of extracting and recovering sulfur from a sulfur deposit surrounded by a competent formation submerged under water, said method comprising the steps of sinking a substantially vertical shaft into said competent formation to a point below the bottom of the sulfur deposit, installing a watertight casing from at least the top of said shaft to a point above the wave level of the water, forming at least one substantially horizontal tunnel from a point near the lower end of said shaft to the boundaries of said sulfur deposit at a level below said sulfur deposit in the competent formation, extending at least one small-diameter shaft upwards through said competent formation into sulfur body thereabove, installing a pair of pipes in said shaft in communication between said tunnel and said sulfur deposit, pumping hot fluid up one of said pipes into said sulfur deposit to melt the sulfur therein, flowing the molten sulfur down the other pipe to said tunnel and removing the sulfur from the tunnel up said shaft to storage means at the surface.

The applicant also sets forth the state of the art in his disclosure on page 1, second paragraph, which reads:

> Sulfur has been stored principally in two different forms, in blocks and in piles of loose flakes. The block sulfur is formed by pouring molten sulfur into a low, rectangular form and as the level of the liquid sulfur approaches the top of the existing sides, an additional section of sideboards is placed around the top of the edge of the original form, preferably in liquid-tight relationship therewith. By following this procedure large blocks of sulfur weighing several thousands of tons are formed, and while such method of storage requires a minimum of spacing, the block has to be broken by the use of explosives when it is desired to remove sulfur therefrom. Considerable dust is formed during this process, requiring those in the vicinity to wear special industrial masks. Sulfur is also stored in flake form in large piles. Flake sulfur is produced by placing it in molten form on an endless belt, one end of which is submerged in water. When the molten sulfur contacts the water it solidifies and breaks up into flakes as the belt passes over and around the end roller. Sulfur in this form can be readily loaded into gondola freight cars; however, such a loading operation is undesirable because it also generates large quantities of sulfur dust. Flaked sulfur has an additional disadvantage when stored on the ground, i.e. the pollution problem created due to rain percolating through the pile since run-off therefrom is very acidic.

As mentioned, the application relates to a method of handling large quantities of sulfur in massive block form in sulfur recovery plants. The block is formed by pouring molten sulfur into a form at the base of which are located steam coils. These massive blocks may weigh 10 to 20 thousand tons. When it is desired to transfer the sulfur for shipping, steam is introduced into the system of coils on the concrete pad, molten sulfur is then withdrawn and transfered directly into a suitable conveyance. Claim 1 reads:

> In the method of obtaining free sulfur in a readily transportable form from a poured massive block thereof at ground level, the improvement comprising melting said sulfur by indirect heating means at the base of said block, withdrawing the resulting molten sulfur by means of gravity flow from the base of the partially melted block and placing said molten sulfur into a suitable container.

The question which the Board must consider is whether the applicant has disclosed and claimed a patentable advance in the art.

In the applicant's view there was a problem in the storage and handling of large quantities of sulfur in massive blocks. The specific problem was one of removing a portion of the sulfur from the massive block. According to the applicant the removal of a portion of the sulfur was normally carried out by using explosives, accompanied by the usual nuisances and precautions which are necessary in a procedure of this kind.

The applicant maintains that he has overcome that problem by forming the block in a special manner. The molten sulfur is poured into a form at the base of which are located steam coils. When it is desired to transfer the sulfur for shipping, steam is introduced into the system of coils to melt the lower portion of the massive block; this molten sulfur is then withdrawn by gravity and transfered directly into a suitable conveyance. Generally, it is preferable to have a higher concentration of coils or heating pipes near the center of the sulfur block. That arrangement aids in increasing the melting rate of the center portion of the block,

results in desired stress toward the center of the block, and minimizes the tendency of the block to crack during the melting operation. Furthermore, throttling valves may be used to adjust the heating rate, so that the stresses in the block due to uneven melting can be controlled.

There is no reason to disbelieve the applicant's claim that he has overcome a problem in the storage and handling of massive blocks to molten sulfur. The specific issue, however, is whether his solution involved such an exercise of the creative faculties of the human mind as to merit the distinction of invention, or a claim to monopoly. It has been authoritatively stated that the art of combining two or more parts, whether they be new or old, or partly new and partly old, so as to obtain a new result, or a known result in a better, cheaper, or more expeditious manner, is valid subject matter if there is sufficient evidence of thought, design, and skillful ingenuity in the invention, and novelty in the combination. (See Merco Nordstrom Valve Co. v. Comer (1942) Ex. C.R. 138 at 155.)

The applicant has argued that the examiner has subdivided the explicit wording of applicant's step (of claim 1) into three subelements and related them to separate parts in Dykstra's process. There is, however, nothing objectionable in analysing a claim to ascertain whether the prior art teaches the different steps. A claim must then, however, be scrutinized as a complete combination to ascertain whether there is invention in the new combination, whether it produces a new result, or a known result in a more expeditious manner, even though all of the elements be old (see the discussion in the previous paragraph).

We now consider the claims.

In claim 1 the alleged improvement is stated to be "melting said sulfur by indirect heating means at the base of said block, withdrawing the resulting molten sulfur by means of gravity flow from the base of the partially melted

block and placing said molten sulfur into a suitable container." It is well known in the art (as taught by Dykstra) to use heating means to melt a body of sulfur, and then remove the molten sulfur by gravity flow into a suitable storage container. In Dykstra's arrangement the stored molten sulfur is also kept in a fluid state in the container by an arrangement of heating coils. The preparation of a poured massive block of molten sulfur such as that melted in claim 1 was also known previously (see page 1 of the present disclosure). To merely apply heating means to the base of a known block of sulfur does not involve an inventive step.

In our view certain essential features are missing from claim 1. First the block is poured in a special manner, i.e. the molten sulfur is poured into a form, on a concrete slab, at "the base area of which are located heating coils." It also omits reference to the fact that the heating means are applied to the "total base area" of the block, and in a "controlled manner," Claim 1 is too broad in scope in view of the prior art, and in our view is also broader than the invention disclosed.

Claim 2, which depends on claim 1, adds a particular heating means as a limitation. This does not introduce anything of patentable significance to what has been defined in rejected claim 1.

Claim 3, which depends indirectly on claim 1, introduces further limitations: "... said block is formed by pouring molten sulfur into a form at the base of which are located steam coils adapted to control the amount of heat available therefrom to said base (area)" (emphasis added). The block formed with the heating coils embedded in the base and the control means to heat the "total area" of said base, or possibly to a given area of the base, are essential features and must be included in any allowable claim to the new process.

This claim (3), therefore, if amended as to form and clarity, and rewritten in independent form (including the necessary steps of claim 1,) would, in our

view, express some element of inventive ingenuity for there is no teaching of handling stock piles of sulfur in this manner. It has been held that a "mere scintilla" of invention will suffice for the validity of a patent (The King v Smith Incubator 1935 Ex.C.R. 105 at 112), and simplicity is not in itself an impediment (Adams and Westlake v. Wright, 1928 Ex. C.R. 112 at 115). Viewed in that light, the benefit of doubt should be weighed in favour of the applicant. Should any amendment be made, the steps of the process should be recited in correct sequential order. It should also be made clear that the "form" for the block includes or has in addition to it "a slab or base" as a foundation for the sulfur block, and a heating control applied to the "total base area."

Claim 4, which depends on claim 3, adds a heat control unit. It would be allowable if dependent on a revised claim 3.

Claim 5, which depends on claim 2, is directed to recesses in the base supporting the block. This is not a patentable feature in itself, but the claim would be allowable if dependent on an amended claim 3.

We are satisfied that claims 1, 2 and 5 fail to include the necessary essential elements of a patentable advance in the art. We are also satisfied that claims 3 and 4 are directed to a patentable invention, but require amendment to define the invention explicitly. The feature added in claim 5 could also be protected if made dependent upon a modified claim 3.

The Board recommends that the decision of the examiner to refuse the claims on file be affirmed. Since by appropriate amendment it is possible that some subject matter might be accepted, we do not recommend rejection of the application itself.

J.F. Hughes
Assistant Chairman
Patent Appeal Board

I concur with the findings of the Patent Appeal Board and refuse the claims of this application. The applicant has six months within which to present a new claim (or claims) drafted along the guidelines indicated, or to appeal this decision under the provision of Section 44 of the Patent Act.

Decision accordingly,

A.M. Laidlaw
Commissioner of Patents

Dated at Hull, Quebec
this 5th. day of
June, 1975

Agent for Applicant

Gowling & Henderson,
Ottawa, Ontario.