OBVIOUSNESS & NONSTATUTORY, SEC. 2 & 28(3)   Control of Industrial Plant

A control system for operating a plant which includes control drive means for

controlling the plant, means for detection, the running state of the plant and control

means responsive to a signal from the detecting means for applying a control

signal to the drive means is statutory subject matter and not obvious in view

of the cited art.   Final Action: Reversed
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Patent application 241,635 (341-110) was filed on December 12, 1975 for

an invention entitled METHOD AND SYSTEM OF CONTROLLING PLANTS. The invent-

ors are Yoichiro Kogure, Toshima Minoura, and Toshio Fujiwara, assignors

to Tokyo Shibaura Electric Co. Ltd. The Examiner in charge of the applic-

ation took a Final Action refusing to allow the application to proceed to

patent.

The application relates to a control system for industrial plants as shown

in figure 7 reproduced below. Signals of the plant's running state of

operation pass to transmitter PT for coding and transmission to the process

input device PI for entry into the computer structure. These coded

operating state signals enter element SCN which forms part of the system

for continually comparing the operating state with a predetermined stored

plant state. Any change detected by element SCN is acted on by another

part of the control process, member ACP, to produce a trigger signal which

passes into the auxiliary memory to seek out an appropriate signal from

one of the action lists ACTL stored therein. Each action list is a module

incorporating several actions indicative of a plant state, and the action

list emits one signal representative of the several actions for controlling

the plant state. The ACP receives an appropriate action list signal and

interprets and translates it into a control output signal which is sent to

output device PO and from there to the controlled operation, for example

to a control drive CD to correct the plant's operation.

FIG. 7
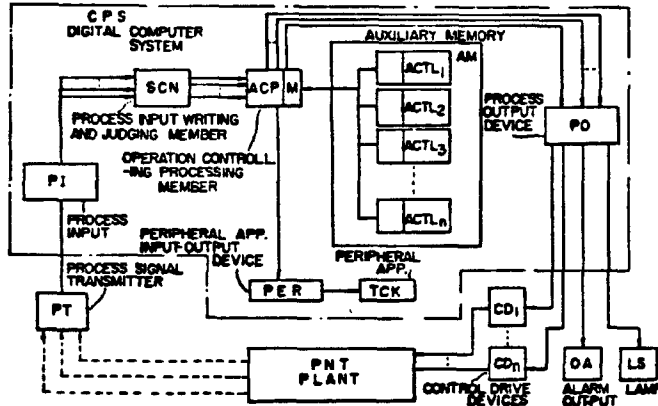
In the Final Action the Examiner refused all the claims for being obvious in view of the following patents:

Canada	925,193	Apr. 24, 1973	Koepcke
	928,829	Jan. 19, 1973	Bakke
United States	3,614,745	Oct. 19, 1971	Podvin
	3,555,251	Jan. 12, 1971	Shavit
	3,555,252	Jan. 12, 1971	Garden

The patent to Koepcke relates to controlling a process as changes occur caused by variables therein, such as flow or temperature. Figure 1 on the next page depicts the arrangement. The process responds to two control means. The first means 14 transmits a signal derived from the controller circuits 12 interacting with a separate set of processing circuits 26. The second means comprises a plurality of separate controllers providing signals supplied by an equation solver 22 continually receiving information directly from the process. The solver also sends a signal to a comparator circuit 16 in the controller circuits for comparison with a signal from a sensor 20 of the actual position of the first means. Thus the error signal is determined. This is sent to control circuits 18 in the controller, and at the same time is passed to the processing circuits where a gain signal is produced indicative of a forward or reverse change in the process performance. The gain signal is sent to a gain adjustments device 24 in the controller. The signal from this device is then interacted with the error signal by the control circuits 18 to produce the signal transmitted from the first means to the process.

FIG.-I
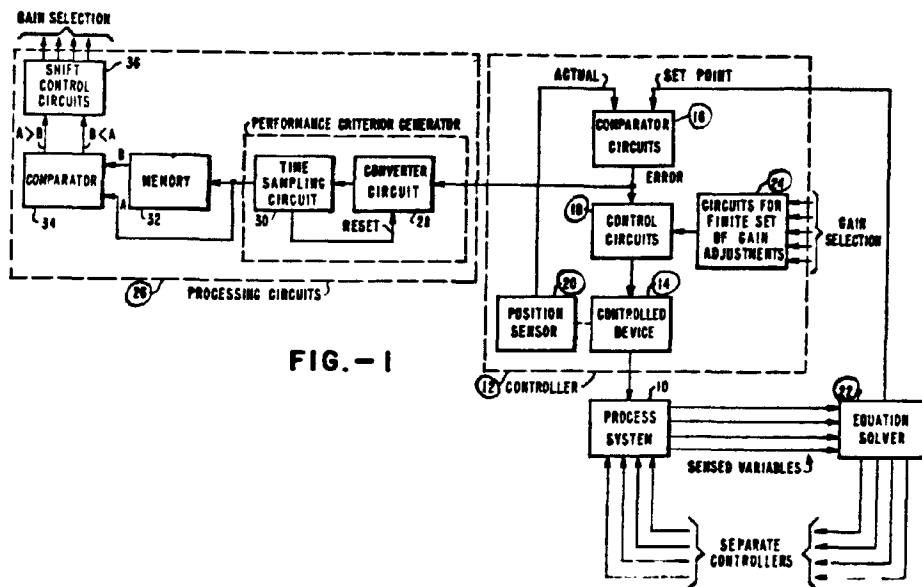
The Bakke control system provides manipulated signals to control the actuator means which regulates the process, as shown in figure 1 following.

An output signal 16 of process operation is fed continuously to a summing amplifier 15, and to a response generator 17 containing inter alia comparator circuits for measuring the output against a predetermined model. An input analog electric signal 18 for example, and a manipulated signal 19 are also received by the response generator which uses the comparator circuits to produce two signals. The first, 22, representative of the input signal, and the process output signal are fed to the amplifier which sums them and produces an error indication signal 23. The error signal in turn receives feedback compensation correction and then arrives at an integrator 26, as does the second signal 21 derived by the comparative circuits at the generator to indicate the value and direction of the correction needed. Using these two signals the integrator produces the manipulated signals. The system therefore reacts to changes in input signals and to process changes during operation.

FIG. 1
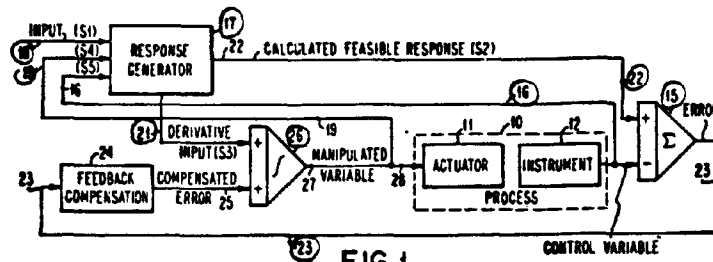
The patent to Podvin et al describes a data processing system for detecting independent tasks, and provides a means and method for allowing the dynamic allocation of system resources to independently operable tasks. It has a control apparatus which acts both as a resource distributor-manager, and as a controller into which each system resource reports when it is free from whatever task it was performing.

The control system of the Shavit patent distributes a total temperature conditioning load among several apparatuses. It uses a computer to optimize overall efficiency by distributing the load to them in accordance with their capability according to stored efficiency data for each apparatus, in order to obtain a minimum power input to each of them. The computer also updates the stored efficiency data periodically by measuring operating characteristics and making changes to the stored data, and then storing the revised data for subsequent operation.

The patent to Garden describes a process control system including a learning control system using a technique which derives and applies a signal from a stored command to provide a position resolution of an element, and after an interval to permit the element to come to rest, compares the obtained results with those expected and makes a correction to the stored commands.

In the Final Action the Examiner rejected the application and all claims
in view of Sections 2 and 28(3) of the Act for failing to define patentable
subject matter. He also rejected claim 1 for being directed to commonly
known steps, and claims 5 and 6 for reciting computer components known
in the art. He further rejected all the claims for differing from the
cited patents merely by the nature of the algorithm.

-The Applicant presented arguments in response to the Examiner's objections,
and said (in part) as follows:

> ...

> ...the Examiner has failed to indicate where in the references
> the features are described nor has he indicated upon what
> basis the features even if described in the references could
> be said to be common general knowledge.

> It would appear that the Examiner is attempting to circumvent
> the obviousness test wherein there is need to show a basis
> for combining various features from various sources to mosaic
> the invention by simply asserting that the features were common
> general knowledge.

> ...

> The invention defined in the system claims does not constitute
> an algorithm. These claims are means combination claims and are
> not such as to "preempt a mathematical algorithm". The invention
> provides advantages as are described on pages 34 through 36
> which show the invention to provide novel results and have a
> real utility. Among the advantages of the invention is the use of
> action lists which produce new and unexpected advantages. By
> means of the invention it is possible to conduct the operation
> of the plant without requiring laborous steps such as preparation
> of block diagrams and flow charts and coding of the information
> into machine words, thus greatly saving time and labour.

The issues before the Board are whether or not the application and claims
present patentable features in view of Section 2 and Section 28(3) of the
Patent Act and in view of the cited art.

> Claim 1 reads:

> In a method of controlling the operation of a plant by means
> of an electronic computer including memory means of the type
> wherein a process signal corresponding to the operation state of
> the plant is generated, the process signal being compared with a

predetermined reference signal and the plant being controlled
by the result of the comparison, the improvement which comprises
the steps of predetermining the judging conditions of the
plant states and control and supervisory operations corresponding
to respective judging conditions in the form of tables, preparing
a plurality of action lists having a standard form of plant state
judging conditions plus controlling and supervisory operations,
storing the contents of respective action lists in memory means
of said computer, sampling said process signal, comparing said
sampled process signal with a reference signal for producing a
trigger signal, selecting an action list corresponding to said
process signal in accordance with said trigger signal, judging
the content of the selected action list for producing a control
signal, and controlling said plant in accordance with said
control signal.

In considering the issues raised in this application, we believe certain
passages in Schlumberger Canada Ltd. v The Commissioner of Patents 56 CPR(2d)
at 204 (1981) to be relevant. Being handed down in 1981, this decision was not
available to the Examiner nor the Applicant during prosecution leading to
the Final Action on this case. The Schlumberger decision involved computer-
related subject matter, and Pratte J. had these comments:

> In order to determine whether the application discloses a
> patentable invention, it is first necessary to determine
> what, according to the application, has been discovered.

and

> I am of opinion that the fact that a computer is or
> should be used to implement discovery does not change
> the nature of that discovery

In determining what has been discovered in the present application, we note
in the Final Action the Examiner acknowledges that the sequence of data
processing steps is new. He has also commented that the cited art "...was
not applied to show anticipation, but ... to show the state of common know-
ledge in the art." For his part the Applicant points out that with respect
to the features of the invention, the Examiner has not indicated any way
"...one would be guided as to what features are selected and what features
are rejected..." from the cited art. The Applicant asserts that consideration
of his subject matter as a whole is necessary in determining the issue of
subject matter.

We learn from the application that Applicant has discovered a method and apparatus directed to a control system for operating a plant, which inter alia includes control drive means for controlling the plant, means for detecting the running state of the plant and control means responsive to a signal from the detecting means for applying a control signal to the drive means. The particular sequence of steps in Applicant's method of _operating the system is also presented. We see that computer structure forms part of the combination, and is used for storing certain information in the form of modules. Also disclosed are appropriate means to transmit and judge input signals and other means to control the process. We are satisfied that Applicant's combination of components of a plant operating system with computer structure arranged to participate in the system presents subject matter which amounts to more than the mere discovery that useful information may be extracted from stored material. In our view, Applicant has provided a control system useful in operating an industrial plant which is the kind of subject matter that should be acceptable under Section 2. Further, we have no doubt the system is directed to more than a mere scientific principle or abstract theorem, and Section 28(3) is no impediment to the application.

On reviewing the claims we are satisfied the features of the system set down in the disclosure are defined in the claims. We believe the sequence of steps and the combination of elements recited therein are not directed solely to a program or an algorithm and are not directed merely to a computer programmed in such a manner that the novelty lies solely in the program or algorithm. We agree with the comment by the Examiner that the sequence of data processing steps is new, but more than that, we believe Applicant has placed these steps in an industrial art in a manner not found in the patents relied on by the Examiner. Notably, the cited art does not show Applicant's combination of elements and their cooperation to produce a trigger signal which seeks out an appropriate signal, judges the content and produces a control signal for controlling the plant's running state. We find therefore the claims define an acceptable combination of elements and sequence of steps to control an industrial plant.
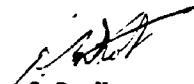
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Having found the application and the claims to be acceptable, we believe
a Hearing would be unnecessary. We recommend withdrawal of the rejection
of the application and claims for failing to describe patentable subject
matter in view of Section 2 and Section 28(3) of the Act, and for failing
to define patentable features in view of the cited art. We recommend
that the application be returned to the Examiner for continued prosecution.
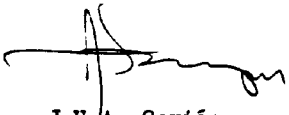

A. McDonough   M.G. Brown   S.D. Kot
Chairman   Assistant Chairman   Member
Patent Appeal Board

I concur with the findings and the recommendation of the Patent Appeal

Board. Accordingly, I withdraw the Final Action and remand the application

for prosecution consistent with the recommendation.

J.H.A. Gariépy
Commissioner of Patents

Dated at Hull, Quebec

this   6th.   day of May, 1985

Agent for Applicant

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