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GB 1371493

(58) Field of search
G4M
G4R

(54) Character recognition

(57) At least one optical sensor (3) is movable relative to characters (5), to provide at least one signal S1, and at least one series of indices (6), to provide at least one signal S2, the sensor (3) providing at least one output video signal S3 (preferably digital) comprising components corresponding to signals S1 and S2, the signal S3 being processed (50) to recognise the characters.

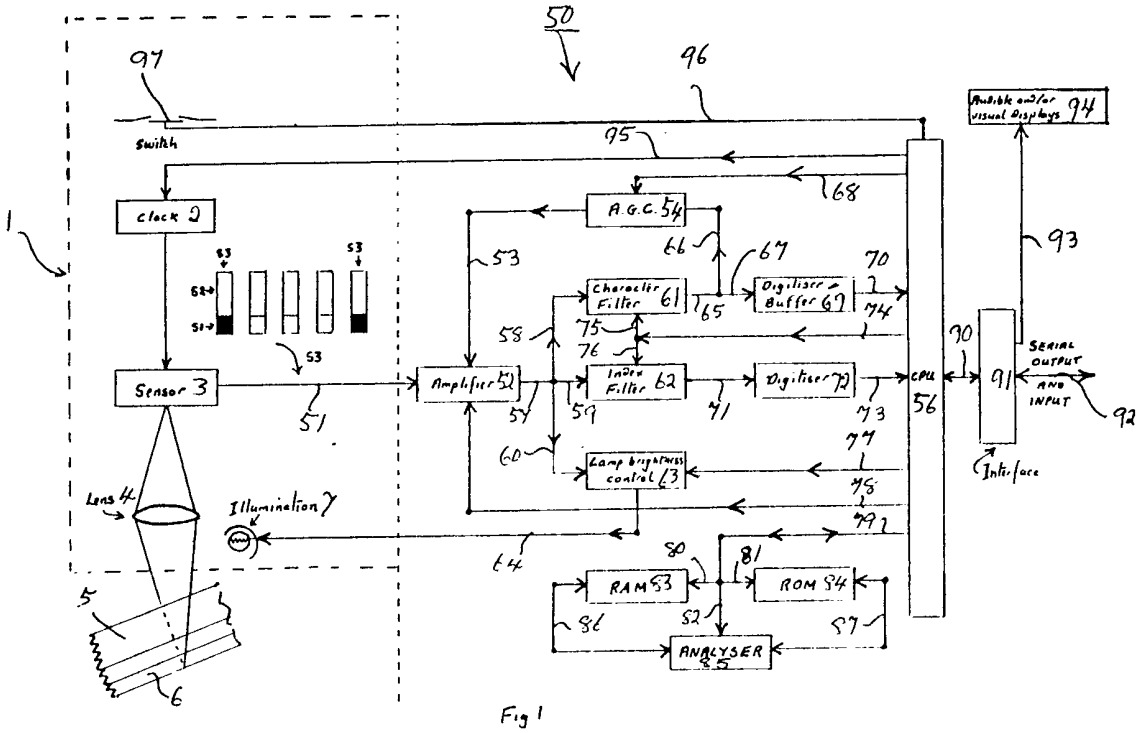

Fig 1

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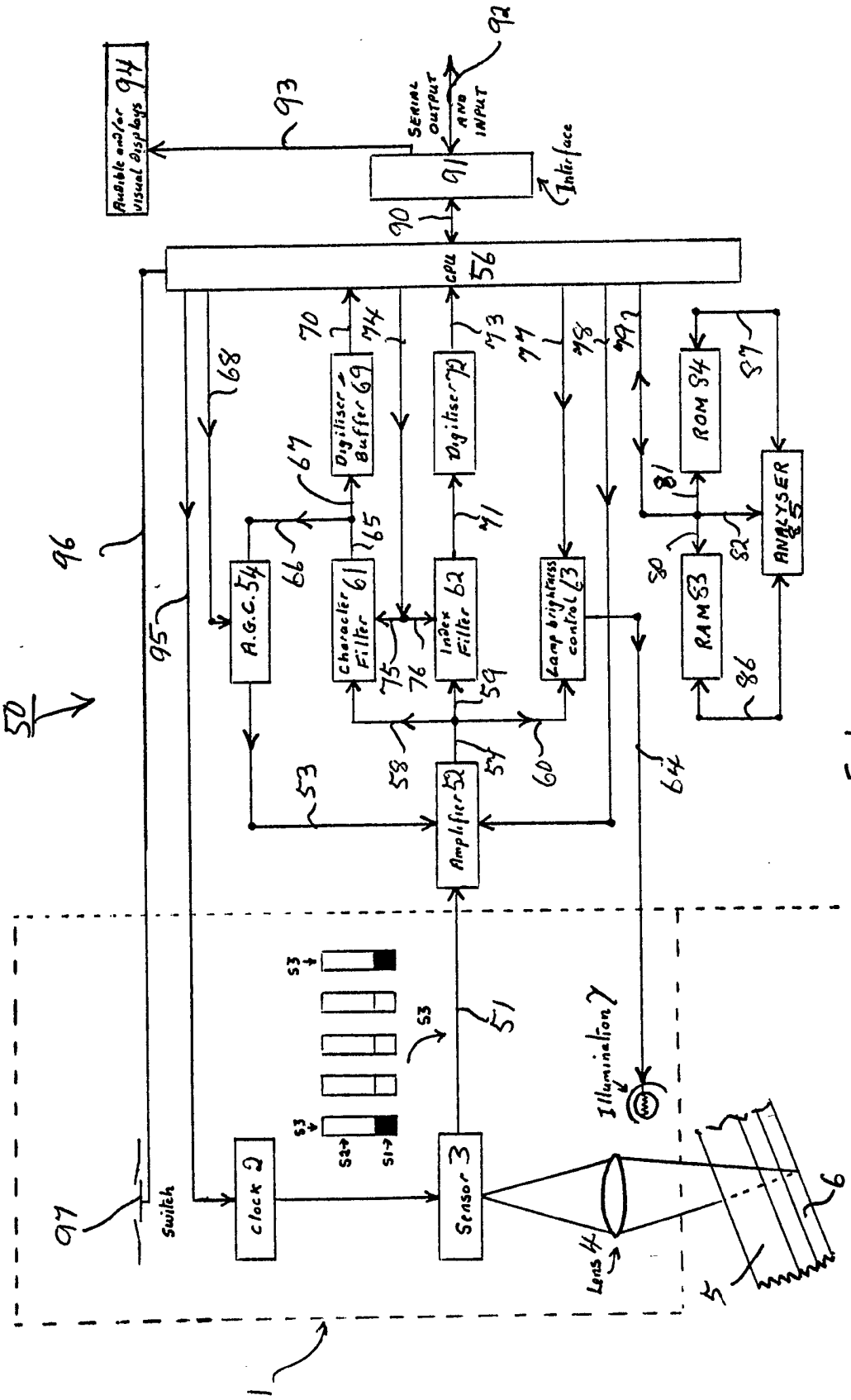

Fig 1.

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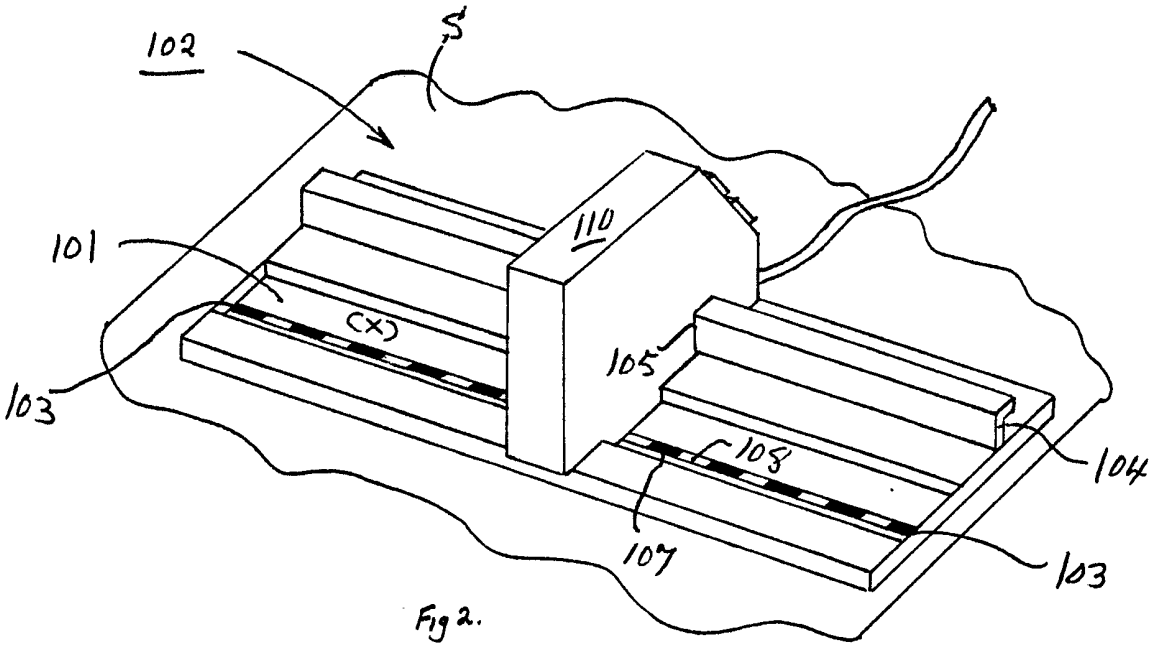

Fig 2.

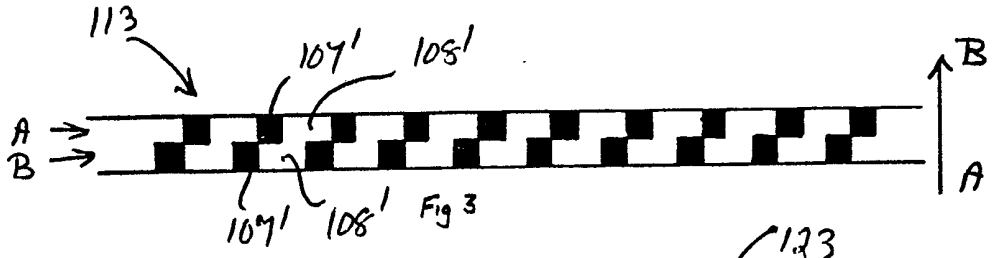

Fig 3

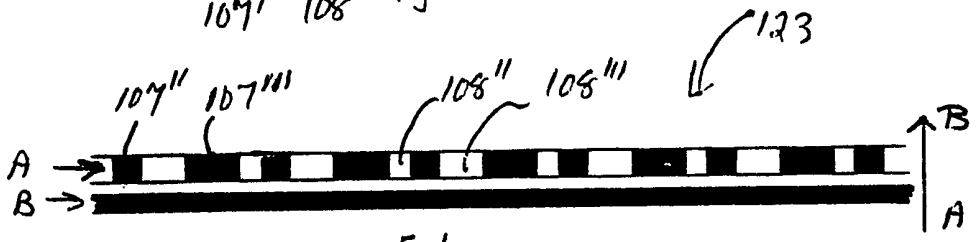

Fig 4

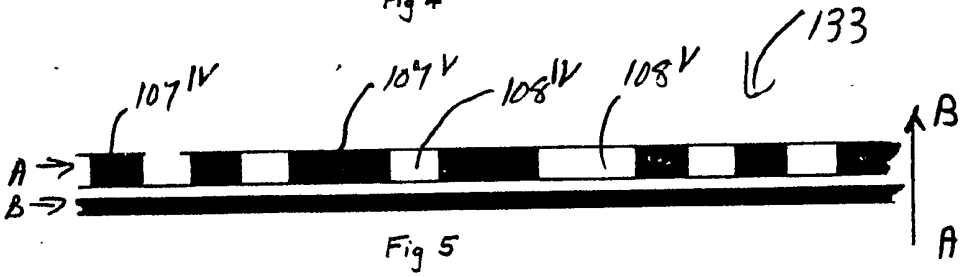

Fig 5

SPECIFICATION

Processing of optical information

Optical information can be constituted in any suitable manner, e.g. the appearance of: a body; a two or three dimensional image (e.g. a printed or a xerographic image) comprised by a substrate; a two or three dimensional projection (e.g. from a film- or slide- projector). One kind of optical information is available from a character source comprising at least one character defined by at least one body and/or at least one indicium. Some examples of bodies or indicia are: drawings; letters, words, numbers, of various scripts; ideograms (e.g. Chinese, Egyptian, or Japanese hieroglyphs); musical notes; shapes of air-, land-, sea-, or space-vehicles; or astronomical, geometrical, or terrestial shapes. A preferred character source is a document, e.g. a book, letter, map, or report.

A first aspect of the present invention provides detector apparatus for detecting optical information for recognition of a source of said optical information, said apparatus comprising: (a) at least one sensor movable relative to said source,

said sensor being able to sense in response to at least one clock input thereto optical inputs corresponding to portions of the appearance of said source, those optical inputs being for enabling that sensing to provide at least one signal S1 (preferably digital); (b) at least one register comprising indices, said optical inputs being assignable to said at least one register, said at least one sensor being able to sense in response to at least one clock input thereto optical inputs corresponding to said assigned indices those optical inputs being for enabling that sensing to provide at least one signal S2 (preferably digital) for indicating the absence or presence of a said index in the field of view of at least one said sensor or for indicating the transition from absence to presence or presence to absence of a said index in the field of view of at least one said sensor; said apparatus being to enable said at least one sensor to provide at least one output video signal S3 (analogue or digital) comprising components corresponding to signals S1 and S2, said at least one signal S3 being processable to enable character recognition of said source, said processing optionally being able to extract signal S1 and/or signal S2 from at least one signal S3, said processing optionally being able to control the frequency of at least one said clock input, said control optionally being derived from at least one signal S3 or from at least one said component thereof, said control optionally being in a relationship (optionally with the spatial distribution and/or a count of said indices) of said indices in said register and/or in a relationship with the rate of said motion of said at least one sensor.

In general, said detector apparatus can be embodied in any suitable manner(s), e.g. have a read head comprising at least one said sensor. Said head can cooperate with at least one guide, and/or be embodied as a mouse, pen, or probe, for example.

A second aspect of the present invention provides apparatus for character recognition of a source of optical information, said apparatus comprising: detector apparatus according to said first aspect of the present invention; and processor means comprising at least one processor stage for processing said at least one signal S3 to enable character recognition of said source, said processor means optionally being able to extract signal S1 and/or signal S2 from at least one signal S3, said processor means optionally being able to control the frequency of at least one said clock input, said control optionally being derived from at least one signal S3 or from at least one said component thereof, said control optionally being in a relationship (optionally with the spatial distribution and/or a count of said indices) of said indices in said register and/or in a relationship with the rate of said motion of said at least one sensor.

In general, said character recognition apparatus can be embodied in any suitable manner(s). That apparatus can comprise any suitable processor e.g.: *converter means* for converting at least a portion of at least one electrical signal into at least one further signal, e.g. convert an analogue signal from a suitable embodiment of said detector apparatus into a digital signal (preferably a digital video signal); *signal processor means*, e.g. digital signal processor means for enhancing said digital video signal; *microprocessor means*, e.g. comprising memory means, for instance a random access memory (RAM) and/or a read only memory (ROM, for instance of the programmable kind, PROM, or the erasable programmable kind, EPROM); *display means*, e.g. a cathode ray tube display or liquid crystal display.

A third aspect of the present invention provides a method of detecting source optical information for a method of character recognition of said source optical information, said detection method comprising utilising at least one said detector apparatus according to said first aspect of the present invention.

A fourth aspect of the present invention provides a method of character recognition of source optical information, said character recognition method comprising utilising at least one apparatus according to said second aspect of the present invention.

Analogue or digital video signals S3 can be outputted from said at least one sensor, at appropriate time intervals determined by a sequence of clock signals. In said processor means, signals S3 can be converted by said converter means into digital signals if that has

not already been done by said detector apparatus. In said processor means, signals S3 can be amplified, filtered, or otherwise enhanced or modified. Automatic compensation can be provided for reflectivity of a document's substrate and for print on that substrate. Video signals S3 can be examined for the presence or absence of any said index. Because such an index can always occur in the same position within the respective said video signal S3, and may be preceded by a black to white transition or vice versa, the presence or absence of a said index can be easily determined. The index is preferably processed to provide speed and directional information. By interpolation (or any other suitable technique) between indications of indices, it is possible to sample video signals S3 at appropriate time intervals so as to provide in at least one memory (e.g. random access memory) a binary pattern corresponding to signals S1 and/or S2. Not all signals S3 need be necessarily used to provide that pattern. Said pattern can be subdivided (i.e. framed) into framed elements representing individual characters in said source optical information. Any said framed element can be relocated in said at least one memory or elsewhere so as to be aligned (i.e. normalised) with a predetermined datum or with any adjacent framed element. The normalised framed elements can be transferred to a buffer store before subjection to feature analysis and e.g. context checking by a suitable program preferably contained as an algorithm in e.g. at least one memory (e.g. read only memory) or dedicated digital and/or analogue processor means.

Each framed and normalised character element in said buffer store to which that element has been transferred can be successively withdrawn therefrom and subjected to at least one stage of analysis, wherein the or each stage does:

(a) Look for whether or not a said withdrawn element contains at least one predetermined feature of appearance, e.g. a curve, a hole, or a line.

(b) Assess the relevance of the absence or presence of any said predetermined feature in a a said withdrawn element, e.g. determine the rank of such a feature in a predetermined order of features.

Optionally, each successive stage of analysis can be modified depending on the result(s) of at least one preceding said stage of analysis. Said analysis stage(s) enable recognition of said withdrawn element. When there is a plurality of said analysis stages, for successive application, each successive stage can look for the same or different at least one said predetermined feature of appearance. Context analysis is optional depending on the result(s) of preceding feature analysis. The analysis stage or stages are preferably contained as a stored program in at least one memory (e.g. read only memory) or dedicated digital and/or analogue processor means. Optionally, after the feature analysis, a context analysis check is provided for each said analysed element, this check being in accordance with a program of rules stored in at least one memory (e.g. read only memory) or dedicated digital and/or analogue processor means. A code (e.g. ASCII code) representing the analysed character elements can be stored in a buffer store to be outputted at appropriate time(s) to enable e.g. a print out.

There can be at least one optical path for leading optical information from said source optical information to at least one said sensor. At least a portion of at least one said optical path can lead at least a portion of optical information from optically viewable indices to at least one said sensor. There can be at least one optical path for leading at least a portion of optical information from said viewable indices to at least one said sensor, this path not containing optical information from said source optical information.

A single said sensor can be used when receiving scanning illumination, e.g. from a scanning source of illumination. Scanning illumination can be provided in any suitable manner(s) by any suitable means, e.g. using a scanning reflector. At least one said sensor can be movable or static. An array or other assembly of said sensors can be provided, e.g. a matrix array with columns and rows of said sensors. One example of at least one said sensor comprises a charge coupled device constituted as a linear array, e.g. an integrated circuit fabricated on a single silicon chip. There can be any suitable number (e.g. 64 to 1000) of charge coupled elements in a said array, those elements serving as photosensitive areas or regions from which charge can leak away in response to suitable illumination falling on those areas. After a specified period of time (the integration period, which is determined e.g. by the speed of scan and intensity of illumination of the radiation incident on the array), the finite charge packet on each said photosensitive area is transferred in parallel into a shift register, the transfer being in response to a series of shift clock pulses. The contents of the shift register can be clocked out serially by further shift clock pulses. Another example of at least one said sensor comprises an array of photodiodes, preferably as an integrated circuit, e.g. with an associate capacitor and fabricated on a single silicon chip. There can be any suitable number (e.g. 16 to 1000 in a row) of photodiodes in a said array, and that array can comprise rows and columns of photodiode elements. Suitable illumination falling on the diodes causes charge to leak away from them, after which the diodes are interrogated in turn, and the amount of charge remaining on them is a measure of the radiation (preferably

visible light) which illuminated them.

The output of any linear array of sensor elements may be a slice across said source optical information, in the present invention. A said silicon chip can contain a shift register, and there may be amplifiers and/or clocks comprised by the silicon chip. A video signal can be obtained with only one or more control clock inputs for controlling the process of producing that signal. A further example of at least one said sensor comprises a semiconductor memory integrated circuit adapted to undergo change in stored information in response to suitable illumination from said source optical information and said optical indices. For example, a digital output can be provided from a dynamic random access memory chip that has at least one portion of its memory cells approachable by radiation from said source optical information, e.g. via at least one window provided in the package of that chip. The suitable illumination falling on those approached memory cells causes charge comprised by them to leak away so that when those cells are addressed their voltages are proportional to the amount of radiation (preferably visible light) which illuminated them from said source optical information and said optical indices, since the last refresh period of that chip.

Any said register of indices can be constituted in any suitable manner(s). Said register can be at least partly movable or at least partly static. Said register can comprise at least one index that is movable or static relative to said register. Indices can be disposed in at least one plane, e.g. on a planar surface which can be the surface of e.g. a rigid bar. Indices can be disposed in a configuration that is at least partly a closed or open figure. The outline of such a figure can have at least one sloping or otherwise changing portion, e.g. when a said figure is at least partly circular, conical or otherwise tapering, elliptical, helical, hyperbolic, parabolic, recessed, or ridged (e.g. toothed). Some figures have changing portions (e.g. recesses, slopes, or teeth) comprised by surfaces of orbit, e.g. by peripheries of rotatable cones, discs, drums, rollers, wheels, or movable tracks. Motion of at least one said register relative to source optical information optionally actuates motion (preferably without slip) of at least one succession of said indices, e.g. a said surface of orbit can engage a said source of optical information, or a surface (e.g. transparent cover, mask, or shield) corresponding thereto, such that motion of said register causes said surface of orbit to move in correspondence with said source optical information. That correspondence can be ensured e.g. by viewing by a person and/or apparatus. Departure (e.g. slip) from that correspondence can be detected and/or prevented manually and/or by optional control means. A said index can be constituted in any suitable manner, e.g. comprise at least one solid area (which optionally is lowered or raised area) and/or at least one void (e.g. an area through which radiation can pass). A solid area can be at least partly opaque and/or at least partly transmit radiation. At least two adjacent spaced apart indices can be independent from each other or be interconnected, e.g. when at least some of those indices are constituted by clearances, recesses, or projections (e.g. teeth), or portions of a continuance (e.g. a helix). The pitch distance between any two successive sets of two or more successive indices is preferably the same for the total of the indices, the indices in each said set being the same or different. The pitch distance between any two successive indices can have any suitable value, e.g. be in the range 0.01 to 10.00 mm, for instance 1 mm apart, to enable e.g. clocked samples of source optical information to be taken of the appearance of said source optical information. Preferably, said indices are in a linear succession. Indexing can be in accordance with any suitable geometry, e.g. be expressed in x,y coordinates, polar coordinates, or other mathematical relationships. Indexing can be for at least one period of time, e.g. be determined manually and/or be determined by feedback from operation of apparatus of said first and/or said second aspect of the present invention. Indexing can be adapted to enable positional and/or speed information in at least two dimensions so as to determine places at which said samples should be taken. In a succession of indices, at least two indices can be the same or different, e.g. be different in size in the direction of succession.

Apparatus of said first and/or said second aspect of the present invention can utilise at least one at least partly movable or at least partly static said source of illumination. Any said apparatus can comprise means for generating optical information, e.g.: image projection means (e.g. projectors of films, slides, or transparencies); image magnification means (e.g. binoculars, microscopes, or telescopes); image intensifier means; and display means. Apparatus of said first and/or said second aspect of the present invention can be adapted to compare source optical information received at the same or different or overlapping times from at least two said sources of optical information(s). Apparatus of said first and/or said second aspect of the present invention can comprise at least one at least partly movable or at least partly static means for radiating at least a portion of source optical information and/or said indices with visible and/or invisible radiation for aiding or enabling source optical information and/or indices to provide optical information, e.g. by reflection. Illumination provided by said at least one radiation means can be for at least

one period of time, e.g. be determined manually and/or be predetermined and/or determined by feedback from operation of said apparatus of said first and/or said second aspect of the present invention. If desired, pulses of said illumination can be provided in accordance with said indexing. Examples of said radiation means are: cathode ray tubes; fluorescent lamps; incandescent lamps; flash discharges; spark discharges; lasers; light emitting diodes; and phosphorescent means or other luminescent means. Spectral property(s) of said radiation can have any suitable character or quality, and can be processed by at least one optical device if such processing is required (see below), e.g. for removing unwanted or spurious radiation unwanted by a said sensor.

It will be appreciated from the above that optical information can pass along any suitable optical path, e.g. an optical path of which at least a portion is curved, folded (e.g. a fold containing a 90° bend), or straight. Such a path can pass through gas, liquid, or solid, e.g. through air or an optical fibre. At least one said optical path can comprise at least one optical device, e.g. selected from: dispersion means; filter means; grating means; lens means; optical fibre means; polariser means; reflector means (e.g. a mirror or prism); screen means. An optical device can be a composite device, e.g. have at least one lens on the surface of a prism. At least one said optical device can be at least partly movable or at least partly static. Scan means can be provided for providing scanning or other motion (e.g. oscillation) of any suitable movable constituent or portion of said apparatus of said first and/or said second aspect of the present invention. Such motion can be for at least one period of time, e.g. be determined manually and/or be predetermined and/or determined by feedback from operation of said first and/or said second aspect of the present invention, and be in at least one direction. At least one said optical device can be utilised in coding optical information, if such coding is required. Optical fibres in a plurality thereof (e.g. an array or bundle) can be disposed relative to each other in any suitable manner, e.g. at least two optical fibres can be parallel, slope, or cross over relative to each other. Preferably, the cross section of at least one optical fibre will be substantially the same as the cross section of at least a portion of said source optical information. In general, said optical device(s) will be chosen, when present, so as to be compatible with the intended use of the present invention, and therefore have any suitable dimension(s) or other property(s).

Some examples of embodiments of the present invention are:

apparatus for recognising number, shape, and/or at least one colour of at least one source optical information (e.g. a character or a stamp);

apparatus for use in navigation (e.g. in navigating a vehicle);

apparatus for translating and/or coding information;

apparatus for facsimile or other transmission of information;

apparatus for providing control in operation of further apparatus (e.g. in manufacture or in war applications);

apparatus for use in medicine and/or surgery.

In the accompanying drawings which are given by way of schematic example of the present invention:

Figure 1 shows one example of apparatus for detecting and processing source optical information so as to recognise character of that information.

Figure 2 shows one example of a read head mounted on an indexer tablet.

Figure 3 shows one example of a register of indices.

Figure 4 shows another example of a register of indices.

Figure 5 shows a further example of a register of indices.

In Fig. 1, a movable read head 1 comprises a clock 2, a sensor 3 clockable by clock 2, and a focussing lens 4 for conveying to sensor 3 input optical information from character source 5 (e.g. typescript on paper) and from register 6 of indices. Clock 2 can be any suitable clock means, e.g. a crystal controlled oscillator. Sensor 3 can be any suitable sensor, e.g. a clockable solid state video camera comprising charge coupled device(s) not shown, responsive to clocking signals from clock 2. Focussing lens 4 can have any suitable characteristics, and can be e.g. a single lens or an optical unit comprising e.g. filter(s) and/or other optical device(s) for processing light. Character source 5 contains at least one character defined by at least one indicium (not shown), e.g. a letter, number, or shape comprised by a document. Register 6 contains visual indices (not shown in Fig. 1 but e.g. as in Figs. 2 to 5, spatially distributed in a predetermined linear manner. The pitch distance between any two successive indices is preferably the same for the total of the indices. The pitch distance between any two successive indices can have any suitable value. Preferably, all of the indices are in a linear succession. Preferably, all of the indices are distributed in one plane, e.g. on a planar surface, for instance the surface of a bar or rule. Alternatively, the indices can be distributed in a plurality of planes, e.g. planes constituted by portions of the periphery of a surface of revolution, for instance a wheel's peripheral surface. Character source 5 and register 6 can be illuminated by illumination unit 7.

Ordered motion of read head 1 enables

optical information corresponding to ordered portions of the appearance of a character comprised by character source 5 to pass via lens 4 to sensor 3, the order of those character portions corresponding to ordered motion of read head 1 relative to character source 5, whereby the character portions enable at least one signal S1 to be generated by sensor 3 in response to clocking of sensor 3 by clock 2. The ordered motion of read head 1 enables optical information corresponding to said indices to pass via lens 4 to sensor 3 so as to enable sensor 3 to provide at least one signal S2 that will indicate the absence or presence of a said index in the field of view of sensor 3, or the transition from absence to presence or presence to absence of a said indixed in the field of view of sensor 3. The character portions are thereby assignable in any suitable predetermined relationship to said indices, such that signals S1 and S2 enable sensor 3 to give output signals S3 comprising components corresponding to signals S1 and S2, signals S3 being processable by processor 50 so as to enable character recognition of said character comprised by character source 5, that processing optionally extracting signals S1 and S2 from signal S3.

In processor 50, signals S3 pass via input line 51 to amplifier 52, which also receives via input line 53 automatic gain control signals from automatic gain control unit 54, and also receives via input line 78 control signals from central processing unit 56. Signals S3 exit from amplifier 52 by passing into line 57 which branches into lines 58, 59, 60. Line 58 passes signals S3 to character filter unit 61. Line 59 passes signals S3 to index filter unit 62. Line 60 passes signals S3 to lamp brightness control unit 63, which has output line 64 for passing control signals to illumination unit 7. Character filter unit 61 has an output line 65 which branches into lines 66, 67. Line 66 passes signals to automatic gain control unit 54, which receives control signals via an input line 68 from central processing unit 56. Line 67 passes signals from character filter unit 61 to a digitiser and buffer unit 69, which has an output line 70 for passing signals into central processing unit 56. Index filter unit 62 has an output line 71 for passing signals into digitiser unit 72, which has an output line 73 for passing signals into central processing unit 56. An output line 74 from central processing unit 70 branches into lines 75, 76. Line 75 leads control signals into character filter unit 61. Line 76 leads control signals into index filter unit 62. An output line 77 from central processing unit 56 leads control signals into lamp brightness control unit 63. An output line 78 from central processing unit 56 leads control signals into amplifier 52. A bidirectional line 79 from and to central processing unit 56 branches into bidirectional lines 80, 81, 82. Line 80 leads to and from random access memory unit 83. Line 81 leads to and from read only memory unit 84. Line 82 leads to and from analyser unit 85. Bidirectional line 86 interconnects analyser unit 85 and random access memory unit 83. Bidirectional line 87 interconnects analyser unit 85 and read only memory unit 84. Said bidirectional lines enable respective traffic of data between the units respectively connected to those lines. Thus, signal traffic can be organised for feature analysis and context checking utilising random access memory unit 83, read only memory unit 84, and analyser unit 85. Read only memory unit 84 preferably contains:

(a) *A look up table,* such that when feature analysis has been made, accessing of that table will determine which character corresponds to the features found. Such a feature can be positive, i.e. indicate presence. Such a feature can be negative, i.e. indicate absence.

(b) *Program for feature analysis and feature(s) being sought.* This program can enable read only memory unit 84 to store at least one set of characters, e.g. 4 different sets of characters.

(c) *Operating program,* for clock, sensor, lamp brightness, output interface, selection of character set, learn mode (see below), or other parameters. The learn mode refers to error conditions, when the characters being sensed do not correspond to those in read only memory unit 84, such that in the learn mode random access memory unit 83 can accept the sensed characters which are then analysed by a program in read only memory unit 84 so as to give a set of features corresponding to those characters, which set can then be used to read characters of the kind in that set.

Random access memory unit 83 comprises:

(a) *Working storage,* for feature analysis.

(b) *Storage of ASCII codes,* for characters.

(c) *Storage of learnt features,* in said learn mode.

(d) *Storage of feature(s) downloaded,* from a host computer (see below).

Bidirectional line 90 from central processing unit 56 enables signals to pass from that unit to interface 91, or signals from that interface to pass to central processing unit 56. Bidirectional line 92 from interface 91 enables serial output from interface 91 to provide information stating recognition of character(s) comprised by character source 5. Alternatively, line 92 enables interface 91 to receive signals from a host computer (not shown). Line 93 from interface 91 leads output from interface 91 into audible and/visual display unit 94, which unit can comprise e.g. a cathode ray tube display, or a multi-segment display (e.g. a light emitting diode display, a liquid crystal display, a plasma display containing gas ionisable by an excitation x,y grid, so as to provide a visual image.

Optionally, central processing unit 56 has

an output line 95 for leading control signals to clock 2, so as to control the frequency of at least one clock signal provided by clock 2. This control can be derived from at least one signal S3 or from its components S1 and/or S2. Said control can be in a predetermined relationship with the rate of said ordered motion of read head 1.

Optionally, central processing unit 56 has an input line 96 from switch 97 so that switch 97 can control function(s) of that unit, etc.

In Fig. 2, an object X (e.g. a typed character) reflects light upwardly through a lateral slot 101 in indexer tablet 102 placed on a substrate S comprising object X. Light from substrate S is also reflected upwardly through a light transmitting rule 103 constituting a register of indices. Tablet 102 comprises rule 103, and has an upward key 104 keyed into a corresponding keyway 105 in a laterally movable read head 110 (which is one example of read head 1 of Fig. 1). Rule 103 provides as a register the black indices 107 spaced apart by clear intervals 108, so as to provide a spatial arrangement that will enable read head 110 to sense direction of motion of read head 110 along rule 103. Fig. 3 shows an alternative rule 113 for rule 103. Rule 113 has two index tracks A,B each having respective black indices 107^{i} spaced apart by clear intervals 108, staggered to enable read head 110 to sense direction of motion and/or speed of read head 110 in the direction of arrow A to B. Fig. 4 shows another alternative rule 123 for rule 103. Rule 123 has two index tracks A,B, track A having respective black indices 107^{iiaa}, 107^{iii} spaced apart by clear intervals 108^{ii}, 108^{iii}, track B being a black continuous bar enabling read head 110 to sense start of a valid area of photoreceptor sites in read head 110 when that head scans in the direction of arrow A to B. Fig. 5 shows a further alternative rule 133 for rule 103. Rule 133 has two index tracks A,B, track A having respective black indices 107^{iv}, 107^{v} spaced apart by clear intervals 108^{iv}, 108^{v}, track B being a black continuous bar enabling read head 110 to sense start of a valid area of photoreceptor sites in read head 110 when that head scans in the direction of arrow A to B. The bars B enable software to respond to the transition in the direction of the respective arrow A to B, i.e. transition from black of a bar B to clear of a respective said clear interval of track A, thereby indicating start of valid scanning of read head in the direction of said arrow A to B.

The above disclosures with reference to the accompanying drawings can be embodied or modified in accordance with the description given above before the description of the accompanying drawings. Preferably, illumination unit 7 is contained in read head 1 or 110, so as to provide illumination of substrate S. Preferably, switch 97 is part of read head 1 or 110.

CLAIMS

1. Detector apparatus for detecting optical information for recognition of a source of said optical information, said apparatus comprising:

(a) at least one sensor movable relative to said source, said sensor being able to sense in response to at least one clock input thereto optical inputs corresponding to portions of the appearance of said source, those optical inputs being for enabling that sensing to provide at least one signal S1;

(b) at least one register comprising indices, said optical inputs being assignable to said at least one register, said at least one sensor being able to sense in response to at least one clock input thereto optical inputs corresponding to said assigned indices those optical inputs being for enabling that sensing to provide at least one signal S2 for indicating the absence or presence of a said index in the field of view of at least one said sensor or for indicating the transition from absence to presence or presence to absence of a said index in the field of view of at least one said sensor; and wherein said at least one sensor will provide at least one output video signal S3 comprising components corresponding to signals S1 and S2, said at least one signal S3 being processable to enable character recognition of said source.

2. Apparatus as claimed in claim 1, wherein said at least one sensor is adapted to output at least one analogue video signal S3.

3. Apparatus as claimed in claim 1, wherein said at least one sensor is adapted to output at least one digital video signal S3.

4. Apparatus as claimed in any one of claims 1 to 3, wherein said at least one sensor comprises a plurality of photoreceptor sites.

5. Apparatus as claimed in claim 4, wherein said at least one sensor comprises at least one charge coupled device.

6. Apparatus as claimed in any one of claims 1 to 5, wherein at least one said register is at least partly movable relative to said source.

7. Apparatus as claimed in any one of claims 1 to 5, wherein at least one said register is at least partly static.

8. Apparatus as claimed in any one of claims 1 to 7, wherein a plurality of said indices has at least one pitch distance for spacing apart any two successive said indices.

9. Apparatus as claimed in claim 8, wherein at least one said pitch distance is in the range substantially 0.01 to substantially 10.0 mm.

10. Apparatus as claimed in any one of claims 1 to 9, at least one said register comprises a plurality of opaque spaced apart

said indices in at least one spatial arrangement that will enable sensing of direction of motion of said at least one sensor.

11. Apparatus as claimed in any one of claims 1 to 10, comprising at least one reference index for being sensed by said at least sensor so as to enable said at least one sensor to sense start of a valid area of photoreceptor sites in said at least one sensor according to claim 4 or 5.

12. Apparatus as claimed in claim 11, wherein said at least one reference index comprises an opaque continuous bar index.

13. Apparatus as claimed in any one of claims 1 to 12, comprising an index rule constituting said at least one register, optionally with said at least one reference index.

14. Apparatus as claimed in claim 13, wherein said index rule comprises a single said register.

15. Apparatus as claimed in claim 13, wherein said index rule comprises two said registers.

16. Apparatus as claimed in any one of claims 13 to 15, wherein said index rule comprises a single said reference index.

17. Apparatus as claimed in any one of claims 13 to 16, wherein said index rule has a slot through which optical information can pass from said source to said at least one sensor.

18. Apparatus as claimed in any one of claims 13 to 17, comprising a read head movably mounted to said index rule, said read head comprising said at least one sensor.

19. Apparatus as claimed in any one of claims 1 to 18, comprising illumination means for illuminating said source.

20. Apparatus as claimed in any one of claims 1 to 19, comprising clock means for providing said at least one clock input.

21. Apparatus as claimed in claim 1, substantially as hereinbefore described with reference to and as shown in Fig. 1 of the accompanying drawings.

22. Apparatus as claimed in claim 1, substantially as hereinbefore described with reference to and as shown in Fig. 2 of the accompanying drawings.

23. Apparatus as claimed in claim 1, substantially as hereinbefore described with reference to and as shown in Fig. 3 of the accompanying drawings.

24. Apparatus as claimed in claim 1, substantially as hereinbefore described with reference to and as shown in Fig. 4 of the accompanying drawings.

25. Apparatus as claimed in claim 1, substantially as hereinbefore described with reference to and as shown in Fig. 5 of the accompanying drawings.

26. Apparatus for character recognition of a source of optical information, said apparatus comprising: detector apparatus as claimed in any one of claims 1 to 25; and processor means comprising at least one processor stage for processing said at least one signal S3 to enable character recognition of said source.

27. Apparatus as claimed in claim 26, substantially as hereinbefore described with reference to and as shown in Fig. 1 of the accompanying drawings.

28. A method for detecting optical information, comprising utilising detector apparatus as claimed in any one of claims 1 to 25.

29. A method as claimed in claim 28, wherein said optical information comprises at least one letter and/or at least one number.

30. A method for character recognition of a source of optical information, comprising utilising character recognition apparatus as claimed in claim 26 or 27.

31. A method as claimed in claim 30, wherein said optical information comprises at least one letter and/or at least one number.

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