The invention relates to a method for an optical scanning device for the reading and/or writing of an optical and /or a magneto-optic recording medium, wherein a light source radiates light onto the recording medium and wherein the light reflected from the recording medium is guided onto a first photodetector or onto a second photodetector in dependence on its direction of polarisation, wherein the data signal, which contains the data stored in the magnetic domains of the recording medium, is obtained from the difference of the photo-electric voltages of the first and second photodetectors and wherein the data signal, which contains the data stored in the pits of the recording medium, is obtained from the sum of the photo-electric voltages of the first and second photodetectors.

The invention further relates to a method for an optical scanning device for the reading and/or writing of an optical and /or a magneto-optic recording medium, in which a light source radiates light onto the recording medium, the recording medium reflects a portion of the light onto a first photodetector from whose output the data signal, which contains the data stored by means of pits in the recording medium, is derivable.

The invention relates further to a method for an optical scanning device for the reading and/or writing of an optical and /or a magneto-optic recording medium, wherein a light source radiates light onto the recording medium, wherein the light reflected from the recording medium is guided onto a first photodetector or onto a second photodetector in dependence on its direction of polarisation, and wherein the data signal, which contains the data stored in the magnetic domains of the recording medium, is obtained from the difference of the photoelectric voltages of the first and second photodetectors.

The invention relates finally to a method for an optical scanning device for the reading and/or writing of an optical and /or a magneto-optic recording medium, wherein a light source radiates light onto the recording medium and wherein the light reflected from the recording medium is guided onto a first photodetector or onto a second photodetector in dependence on its direction of polarisation, wherein the data signal, which contains the data stored in the pits of the recording medium, is obtained from the sum of the photoelectric voltages of the first and second photodetectors, and wherein the difference of the photoelectric voltages of the first and second photodetectors is formed.

A known optical recording medium is e.g. the CD disc in which a light reflecting aluminium layer succeeds the transparent layer.

The light reflecting aluminium layer has cavities, so-called pits, which represent the data stored on the CD disc. The data from the CD disc is readable by means of an optical scanning device because the reflective behaviour of the light reflecting aluminium layer depends on the pattern which the cavities form on the disc. Less light is reflected from a cavity, also frequently called a groove, than from a hillock which is often also referred to as a land.

The optical scanning device therefore recognises from the intensity of the light reflected from the CD disc whether the scanned bit is for example a logical one or a logical zero.

A further optical recording medium of such a type, known by the name of a magneto-optic disc, is described in the article "Magnetooptische Versuche dauern an" in Funkschau 13, 20 June 1986 at pages 31 - 41.

In contrast to a conventional CD disc, a magneto-optic disc does not have pits. A magnetic layer is located behind the transparent layer into which the data is writable and from which the data is readable. It will now be explained how data is written onto a magneto-optic disc.

The magnetic layer is heated above the Curie temperature by means of a laser beam focused on the disc. It is usually sufficient however, to only heat the magnetic layer up to the compensation temperature which lies somewhat below the Curie temperature. An electromagnet is arranged behind the focal point on the disc which magnetises the region heated by the light beam in the one or other direction of magnetisation. Because the heated spot again cools below the Curie temperature after the laser beam is turned off, the direction of magnetisation determined by the electromagnet is maintained; it freezes so to speak. In this manner, the individual bits are stored in domains of different direction of magnetisation. Thereby, the one direction of magnetisation of a domain corresponds for example to a logical one while the opposite direction of magnetisation represents a logical zero.

For reading the data, one makes use of the Kerr effect. The plane of polarisation of a linearly polarised light beam is rotated through a measurable angle upon being reflected at a magnetised mirror. In accordance with the direction in which the mirror is magnetised, the plane of polarisation of the reflected light beam is rotated to the right or to the left. But, because the individual domains in the disc act as magnetised mirrors, the plane of polarisation of a scanning light beam will be

rotated through a measurable angle to the left or right in accordance with the direction of magnetisation of the currently scanned domain.

The optical scanning device recognises which bit, a logical one or a logical zero, is present from the rotation of the plane of polarisation of the light beam reflected from the disc. In contrast to a CD disc having pits, a magneto-optic disc can be erased and rewritten almost as often as desired.

An optical scanning device for the reading of a magneto-optic disc and an optical disc is known from the JP -A -60234235. The light from a laser is focused onto the optical or the magneto-optic disc and reflected from the disc onto a first or onto a second photodetector in dependence on its direction of polarisation. When reading from a magneto-optic disc, the data signal is produced from the difference of the photoelectric voltages of the first and second photodetector while when scanning an optical disc, the data signal is produced from the sum of the photoelectric voltages of the first and second photodetector.

A new type of recording medium is a combination of a CD disc and a magneto-optic disc. With this recording medium, data is stored both in the magnetic domains and in pits.

The object of the invention is therefore to develop an optical scanning device which is capable of reading both a CD disc and a magneto-optic disc as well as a new type of combination of the two recording mediums.

In a method for an optical scanning device for the reading and/or writing of an optical and /or a magneto-optic recording medium, wherein a light source radiates light onto the recording medium and wherein the light reflected from the recording medium is guided onto a first photodetector or onto a second photodetector in dependence on its direction of polarisation, wherein the data signal, which contains data stored in the magnetic domains of the recording medium, is obtained from the difference of the photoelectric voltages of the first and second photodetectors and wherein the data signal, which contains the data stored in the pits of the recording medium, is obtained from the sum of the photoelectric voltages of the first and second photodetectors, this object is achieved in that, the sum of the photoelectric voltages of the first and second photodetectors modulates the light output of the light source or that, there is provided a fourth photodetector which receives

the light reflected from the recording medium and whose output signal modulates the light output of the light source.

In a method for an optical scanning device for the reading and/or writing of an optical and /or a magneto-optic recording medium, in which a light source radiates light onto the recording medium, the recording medium reflects a portion of the light onto a first photodetector from whose output the data signal is derivable which contains the data stored by means of pits in the recording medium, this object is achieved in that, a portion of the light radiated from the light source penetrates the recording medium, that the light penetrating the recording medium is guided by a polariser provided behind the recording medium onto a second photodetector or onto a third photodetector in dependence on its direction of polarisation, and that the outputs of the second and third photodetectors are connected to the inputs of a differential amplifier from whose output the data signal is derivable which contains the data stored in the magnetic domains of the recording medium.

In a method for an optical scanning device for the reading and/or writing of an optical and /or a magneto-optic recording medium, in which a light source radiates light onto the recording medium, this object is achieved in that, a portion of the light radiated from the light output penetrates the recording medium, that the light penetrating the recording medium is guided by a polariser provided behind the recording medium onto a second photodetector or onto a third photodetector in dependence on its direction of polarisation, that the outputs of the second and third photodetectors are connected to the inputs of a differential amplifier from whose output the data signal is derivable which contains the data stored in the magnetic domains of the recording medium, that the sum of the photoelectric voltages of the second and third photodetectors modulates the light output of the light source and that the sum of the photoelectric voltages of the second and third photodetectors contains the data stored by means of pits in the recording medium.

In a method for an optical scanning device for the reading and/or writing of an optical and /or a magneto-optic recording medium, wherein a light source radiates light onto the recording medium, wherein the light reflected from the recording medium is guided onto a first photodetector or onto a second photodetector in dependence on its direction of polarisation, and wherein the data signal, which contains the data stored in the magnetic domains of the recording medium, is obtained from the difference of the photoelectric voltages of the first and second

photodetectors, this object is achieved in that, the data signal, which contains the data stored by means of pits in the recording medium, is obtained in accordance with the transmitted light process by means of a third photodetector provided behind the recording medium.

In a method for an optical scanning device for the reading and/or writing of an optical and /or a magneto-optic recording medium, wherein a light source radiates light onto the recording medium and wherein the light reflected from the recording medium is guided onto a first photodetector or onto a second photodetector in dependence on its direction of polarisation, wherein the data signal, which contains the data stored in the pits of the recording medium, is obtained from the sum of the photoelectric voltages of the first and second photodetectors, and wherein the difference of the photoelectric voltages of the first and second photodetectors is formed, this object is achieved in that, the difference signal of the photoelectric voltages of the first and second photodetectors is divided by their sum signal and that the so-formed quotient signal represents the data signal which is stored in the magnetic domains.

There is shown in

Figure 1 a first embodiment of the invention;

Figure 2 a second embodiment of the invention;

Figure 3 a third embodiment of the invention;

Figure 4 a fourth embodiment of the invention;

Figure 5 a fifth embodiment of the invention;

Figure 6 a sixth embodiment of the invention;

Figure 7 a seventh embodiment of the invention;

Figure 8 and 9 a new type of magneto-optic recording medium.

In Figure 1, the data scanning light beam from a light source 1, usually a laser, is focused by a lens 2, a prismatic beam splitter 3 and a further lens 4 onto the new type of recording medium 5 which reflects the light beam via the lens 4 back to the prismatic beam splitter 3. The reflected light beam is guided through a right angle by the prismatic beam splitter 3 onto a prismatic beam splitter 6. The light beam which has just

passed through the prismatic beam splitter 6, strikes, via a lens 12, a prismatic beam splitter 13 which guides the one light beam onto a photodetector 16 which may be built up from e.g. two photodiodes E and F. As is known for an optical scanning device which functions in accordance with the three beam technique, a so-called three-beam optical pick-up, the tracking error signal TE = ES - FS is formed in a differential amplifier from their output signals ES and FS. A light beam is also guided however by the prismatic beam splitter 13 through a right angle via a lens 14 onto a photodetector 15 which may for example be built up from four square shaped photodiodes A, B, C and D. The focusing error signal FE = (AS + CS) - (BS + DS) is formed from their output signals AS, BS, CS and DS as is usual for an optical scanning device which functions in accordance with the three beam technique.

The prismatic beam splitter 6 however, also guides a light beam through a right angle via a $\lambda/2$ plate 7 to a polarisation beam splitter 8. In the polarisation beam splitter 8, the light beam is now guided via a lens 9 onto a first photodetector 11 if its plane of polarisation is rotated in the one direction. On the other hand, the light beam is guided via a lens 10 onto a second photodetector 17 if its plane of polarisation is rotated in the other direction. The photoelectric voltage of the first photodetector 11 is supplied via an amplifier 19 to the first input of a summing amplifier 21 and to the subtracting input of a differential amplifier 20. The photoelectric voltage of the second photodetector 17 is supplied via an amplifier 18 to the second input of the summing amplifier 21 and to the summing input of the differential amplifier 20. The output of the summing amplifier 20 is connected via a regulator 22 to the input of a modulator 23 which controls the light output of the laser 1.

Due to the pits in the new type of recording medium 5, the intensity of the reflected light would constantly vary and be imposed interferingly on the data signal at the output of the differential amplifier 20. In order to avoid this superimposition, the intensity of the reflected light is kept constant by means of the modulator 23 which controls the laser 1.

The data signal MS which represents the data stored in the magnetic domains of the new type of recording medium is thus derivable at the output of the differential amplifier 20. Nevertheless, the data contained in the pits does not get lost since it is contained in the control signal of the modulator 23. Consequently, the data signal PS, which represents the data

contained in the pits, is simultaneously derivable at the output of the modulator 23.

The second embodiment shown in Figure 2 differs only slightly from the first embodiment. The regulator 22 as well as the modulator 23 are dispensed with. Instead, the output of the summing amplifier 21 is connected to the one input of a divider 24 whose other input is connected to the output of the differential amplifier 20. Of course, in the second embodiment, the modulation product of the one data signal MS which represents the data stored in the magnetic domains and the other data signal PS, which represents the data contained in the pits is present at the output of the differential amplifier 20, however the modulation product is divided in the divider 24 by the other data signal PS so that only the one data signal MS which originates from the magnetic domains appears at the output of the divider 24. The other data signal PS, which represents the data contained in the pits is derivable simultaneously at the output of the summing amplifier 21.

If, for example, the depth of the pits in the new type of recording medium is made smaller than about 1/4 of the wavelength λ of the scanning light beam, as is the case for CD discs, the power of the laser can be reduced. Thereby, the new type of recording medium will be heated less on reading so that the safety margin to the critical Curie temperature will be greater. A depth of the pits of approximately 1/10 of the wavelength of the scanning light beam has proved to be favourable because the modulation in this case is noticeably lower.

A third embodiment of the invention which is suitable for the reading of a new type of recording medium, which is illustrated in the Figures 8 and 9, will now be described and explained with the help of the Figure 3.

If the magneto-optic layer MO is selected to be approximately equally thick or thinner than the wavelength of the scanning light, a portion of the light shines through. On the one hand, the magneto-optic layer MO must be so thin that it is transparent but on the other hand, it must be so thick that a measurable Kerr effect occurs in it. The choice of the thickness of the magneto-optic layer MO therefore also depends on the choice of the material of the layer. It is shown in Figure 8, that for a pit depth of λ at the spots where there are no cavities P, approximately 9 % of the impinging light passes through, compared with approximately 15 % that is reflected; the rest is absorbed. The magneto-optic layer MO is protected from

damage by a transparent layer LD whose refractive index amounts to $n_1 = 1$. A further protective layer is referenced S.

The division of the light at a pit P, a cavity, whose depth corresponds to the wavelength of the scanning light is illustrated in Figure 9. Once again, approximately 15 % of the impinging light is reflected. However, because of the pit depth of λ, diffraction patterns occur behind the recording medium since, as a result of the path difference of $\lambda/2$, those portions of the light which pass through a cavity interfere with those portions of the light which pass through the thicker layer that surrounds the cavity. In order to protect the magneto-optic layer MO from damage such as scratches, there is provided a transparent layer LD.

Because the path difference between the light reflected at a hillock and at a cavity amounts to $\lambda/2 + \lambda/2 = \lambda$ due to the pit depth of $\lambda/2$, the light reflected at the magneto-optic layer MO, which is scanning the magneto-optically stored data, does not falsify the pit pattern. Instead of $\lambda/2$, the pit depth may amount to an odd numbered multiple of $\lambda/2$. It depends only on the path difference λ amounting to an even numbered multiple of λ.

The embodiment of the invention shown in Figure 3 differs from the embodiment which is illustrated in Figure 1 in that an e.g. circularly shaped photodetector 24 whose output is connected to the input of an amplifier 26 is provided behind the recording medium 5.

The pits are recognised by means of the circularly shaped photodetector 24 because without a pit approximately 9 % of the light impinges on the photodetector 24 whereas with a pit, because of the interferences, no light at all falls on the photodetector 24 in the ideal case. The data signal PS, which contains the data stored by means of the the pits in the recording medium 5, is therefore derivable at the output of the amplifier 26.

In the fourth embodiment of the invention shown in Figure 4, a photodetector 25, in the shape of a ring for example, which detects the diffraction maxima of first order, is provided instead of a circularly shaped photodetector.

The data stored by means of the pits can be read, because the diffraction maxima of first order for a pit, can be detected by means of the ring shaped photodetector 25. In the ideal case, without a pit, no light shines on the ring shaped photodetector

25 whereas the diffraction maxima of first order are formed behind a pit on the photodetector 25. The data signal (PS), which contains the data stored by means of the the pits in the recording medium (5), is therefore present at the output of the amplifier 26.

Finally, it is also possible, as a fifth embodiment of the invention in Figure 5 shows, to combine both photodetectors 24 and 25 together in such a way that the circularly shaped photodetector 24 is surrounded by the ring shaped photodetector 25. The non-diffracted light beams are captured by the circularly shaped photodetector 24 whereas the diffracted beams of first order are detected by the ring shaped photodetector 25. The output of the circularly shaped photodetector 24 is connected to the subtracting input of a differential amplifier 30 while the output of the ring shaped photodetector 25 is connected to the summing input of the differential amplifier 30. Because the signals of these two photodetectors 24 and 25 always have different signs, the difference of these two signals present at the output of the differential amplifier 30 provides the data stored by means of the the pits in the recording medium (5).

The summing amplifier 21, the regulator 22 and the modulator 23 may be dispensed with in the embodiments shown in the Figures 3, 4 and 5. However, a laser driver must be provided for the control of the laser instead of the modulator 23.

The sixth embodiment of the invention shown in Figure 6 will now be described and explained.

In this embodiment, data is read from a recording medium whose pit depth is selected to be $\lambda/4$ so that the path difference amounts to $\lambda/2$. Instead of $\lambda/4$, the pit depth may amount to an odd numbered multiple of $\lambda/4$. What alone is decisive is that the path difference between the light reflected at a pit and the light reflected from its surroundings amount to $\lambda/2$ or $\lambda/2 + n \cdot \lambda$, wherein n is a whole number.

In contrast to the previously explained magneto-optic recording medium, the reflected light contains the data which is stored by means of the pits whereas the magnetically stored data is contained in the transmitted light. For the reading of the magnetically stored data, instead of the Kerr effect, the similar Faraday effect is used.

In the embodiment shown in Figure 6, the light beam produced by a laser 1 whose light output is controlled by a laser driver 23,

runs via a lens 2, a prismatic beam splitter 3 and a lens 4 to the recording medium 5. A portion of the light emitted by the laser 1 is reflected back from the recording medium 5 via the lens 4 to the prismatic beam splitter 3 which guides one light beam via a lens 12 and a prismatic beam splitter 13 onto a photodetector 16 from whose output signals, the tracking error signal TE for the tracking control loop is produced. However, the prismatic beam splitter 13 also guides one light beam via a lens 14 onto a photodetector 15 which may be built up as a four quadrant detector from four square shaped photodiodes A, B, C and D for example. The focusing error signal FE for the focusing control loop and the data signal PS which contains the data stored by means of the pits in the recording medium 5, are obtained from the output signals of the photodetector 15. A polariser 27, which is realised for example as a circular or square shaped polarisation filter, is provided behind the recording medium 5. The one half of the polarisation filter 27 only transmits the light beams whose plane of polarisation is rotated in the one direction, while the other half transmits those light beams whose plane of polarisation is rotated in the other direction. A photodetector 28 is aranged behind the one half of the polarisation filter 27, a further photodetector 29 being arranged behind the other half. The two photodetectors 28 and 29 are connected to the inputs of a differential amplifier 20.

Due to the polarisation filter 27, more light shines either on the one photodetector 28 or on the other photodetector 29 in accordance with the direction in which the individual magnetic domains of the recording medium 5 are magnetised. The data signal MS, which contains the data stored in the magnetic domains, is thus derivable from the output of the differential amplifier 20.

A development of the embodiment illustrated in Figure 6 is shown in Figure 7 which is expanded by a summing amplifier 21, a regulator 22 and a modulator 23 in such a way that the two photodetectors 28 and 29 are connected to the inputs of the summing amplifier 21 whose output is connected to the input of the regulator 22. The output of the regulator 22 is connected to the input of the modulator 23 whose output is connected to the control input of the laser 1. In this embodiment, the intensity of the light reflected from the recording medium 5 is likewise controlled at a constant value by means of the modulator 23. Consequently, the data signal PS, which contains the data stored by means of the pits, is also obtainable at the output of the regulator 22 or the modulator 23. The data signal PS may also be

taken from the output of the four quadrant detector 15 as in the previous embodiment.

Instead of the polarisation filter, a polarisation beam splitter 31 may be utilised which guides the light, whose polarisation component is rotated in the one direction, onto the one photodetector 28, whilst it guides light, whose polarisation component is rotated in the other direction, onto the other photodetector 29.

With the polarisation beam splitter, the light loss is of course lower than with the polarisation filter but a polarisation filter is cheaper than a polarisation beam splitter; moreover, a simple filter requires less space than a beam divider.

All of the embodiments in which the intensity of the light reflected from the recording medium is controlled at a constant value may be equipped with an additional photodetector which receives the light reflected from the recording medium and whose output signal is supplied to the modulator 23 for the modulation of the laser 1. Alternatively, the monitor diode of the laser for example may be used for this purpose. In this embodiment, the output signal of the monitor diode modulates the laser.

With the optical scanning device in accordance with the invention, the data contained in the magnetic domains and in the pits can be read simultaneously from a new type of recording medium. Moreover, it is even possible to read the data contained in the pits and to simultaneously write data into the magnetic domains. A conventional CD disc or magneto-optic disc can likewise be read by the optical scanning device in accordance with the invention.

The invention is especially suitable for the data processing because data can be read and written simultaneously. However, the invention also offers the advantage that sound and pictures can be recorded simultaneously with the reproduction in CD players and optical disc players. A substantial advantage of the new type of recording medium, a combination of a ROM disc and a RAM disc, consists in that its storage capacity is double that of a ROM or a RAM disc, i.e. of a CD disc or magneto-optic disc.

Claims

1. Method for an optical scanning device for the reading and/or writing of an optical and /or a magneto-optic recording medium (5), wherein a light source (1) radiates light onto the recording medium (5) and wherein the light reflected from the recording medium (5) is guided onto a first photodetector (11) or onto a second photodetector (17) in dependence on its direction of polarisation, wherein the data signal (MS), which contains the data stored in the magnetic domains of the recording medium (5), is obtained from the difference of the photoelectric voltages of the first and second photodetectors (11, 17) and wherein the data signal (PS), which contains the data stored in the pits of the recording medium (5), is obtained from the sum of the photoelectric voltages of the first and second photodetectors (11, 17), characterised in that, the sum of the photoelectric voltages of the first and second photodetectors (11, 17) modulates the light output of the light source (1) or that there is provided a fourth photodetector which receives the light reflected from the recording medium and whose output signal modulates the light output of the light source.

2. Method for an optical scanning device for the reading and/or writing of an optical and /or a magneto-optic recording medium (5), in which a light source (1) radiates light onto the recording medium (5), the recording medium (5) reflects a portion of the light onto a first photodetector (15) from whose output the data signal (PS), which contains the data stored by means of pits in the recording medium, is derivable, characterised in that, a portion of the light radiated from the light source (1) penetrates the recording medium (5), that the light penetrating the recording medium (5) is guided by a polariser (27) provided behind the recording medium (5) onto a second photodetector (28) or onto a third photodetector (29) in dependence on its direction of polarisation, and that the outputs of the second and third photodetectors (28, 29) are connected to the inputs of a differential amplifier (20) from whose output the data signal (MS), which contains the data stored in the magnetic domains of the recording medium (5), is derivable.

3. Method for an optical scanning device for the reading and/or writing of an optical and /or a magneto-optic recording medium (5), in which a light source (1) radiates light onto the recording medium (5), characterised in that, a portion of the light radiated from the light source (1) penetrates the recording medium (5), that the light penetrating the recording

medium (5) is guided by a polariser (27) provided behind the recording medium (5) onto a second photodetector (28) or onto a third photodetector (29) in dependence on its direction of polarisation, that the outputs of the second and third photodetectors (28, 29) are connected to the inputs of a differential amplifier (20) from whose output the data signal (MS), which contains the data stored in the magnetic domains of the recording medium (5), is derivable, that the sum of the photoelectric voltages of the second and third photodetectors (28, 29) modulates the light output of the light source (1) and that the sum of the photoelectric voltages of the second and third photodetectors (28, 29) contains the data stored by means of pits in the recording medium.

4. Method for an optical scanning device for the reading and/or writing of an optical and /or a magneto-optic recording medium (5), wherein a light source (1) radiates light onto the recording medium (5), wherein the light reflected from the recording medium (5) is guided onto a first photodetector (11) or onto a second photodetector (17) in dependence on its direction of polarisation, and wherein the data signal (MS), which contains the data stored in the magnetic domains of the recording medium (5), is obtained from the difference of the photoelectric voltages of the first and second photodetectors (11, 17), characterised in that, the data signal (PS), which contains the data stored by means of pits in the recording medium (5), is obtained in accordance with the transmitted light process by means of a third photodetector (24, 25) provided behind the recording medium (5).

5. Method for an optical scanning device for the reading and/or writing of an optical and /or a magneto-optic recording medium (5), wherein a light source (1) radiates light onto the recording medium (5), and wherein the light reflected from the recording medium (5) is guided onto a first photodetector (11) or onto a second photodetector (17) in dependence on its direction of polarisation, wherein the data signal (PS), which contains the data stored in the pits of the recording medium (5), is obtained from the sum of the photoelectric voltages of the first and second photodetectors (11, 17), and wherein the difference of the photoelectric voltages of the first and second photodetectors (11, 17) is formed, characterised in that, the difference signal of the photoelectric voltages of the first and second photodetectors (11, 17) is divided by their sum signal and that the so-formed quotient signal represents the data signal (MS) which is stored in the magnetic domains.

* C L M S *

6. Method in accordance with claim 4, characterised in that, the sum of the photoelectric voltages of the first and second photodetectors (11, 17) modulates the light output of the light source (1).

7. Method in accordance with claim 4, characterised in that, a fourth photodetector is provided which receives light reflected from the recording medium and whose output signal modulates the light output of the light source.

8. Method in accordance with claim 4, 6 or 7, characterised in that, the third photodetector (24) provided behind the recording medium (5) is shaped in the form of a circle.

9. Method in accordance with claim 4, 6 or 7, characterised in that, the third photodetector (25) provided behind the recording medium (5) is shaped in the form of a ring.

10. Method in accordance with claim 4, 6 or 7, characterised in that, the third photodetector (25) provided behind the recording medium (5) detects the diffraction maxima of first order.

11. Method in accordance with claim 4, 6 or 7, characterised in that, behind the recording medium (5) there is provided a circular shaped photodetector (24) which is surrounded by a ring shaped photodetector (25) which detects the diffraction maxima of first order.

12. Method in accordance with claim 4, 6 7, 8 or 9, characterised in that, the output of the third photodetector (24, 25) provided behind the recording medium (5) is connected to the input of a first amplifier (26) from whose output the data signal (PS), which contains the data stored by means of pits in the recording medium (5), is derivable.

13. Method in accordance with claim 11, characterised in that, the ring shaped photodetector (25) and the circular shaped photodetector (24) are connected to the inputs of a first differential amplifier (30) from whose output the data signal (PS), which contains the data stored by means of pits in the recording medium (5), is derivable.

14. Method in accordance with claim 1 or 6, characterised in that, the sum of the photoelectric voltages of the first and second photodetectors (11, 17) is formed in a summing amplifier (21) whose output is connected to the input of a modulator (23) which controls the light output of the light source (1) and that the data signal (PS) which contains the data stored in the pits

of the recording medium (5), is derivable at the output of the modulator (23).

15. Method in accordance with claim 2, characterised in that, the sum of the photoelectric voltages of the second and third photodetectors (28, 29) is formed in a summing amplifier (21) whose output is connected via a regulator (22) to the input of a modulator (23) which controls the light output of the light source (1) and that the data signal (PS) which contains the data stored in the pits of the recording medium (5), is derivable at the output of the modulator (23) or the regulator (22).

16. Optical scanning device for carrying out the method in accordance with claim 1, 3, 4 or 6 wherein the light beam produced by the light source (1) shines via a first lens (2), a first prismatic beam splitter (3) and a second lens (4) onto the recording medium (5), wherein the light beam reflected from the recording medium (5) passes back via the second lens (4) to the first prismatic beam splitter (3) where it is guided to a second prismatic beam splitter (6), wherein the second prismatic beam splitter (6) guides a light beam via a third lens (12) and a third prismatic beam splitter (13) onto a fourth photodetector (16) from whose output signals the tracking error signal for a tracking control loop is formed, wherein the third prismatic beam splitter (13) guides a light beam via a fourth lens (14) onto a fifth photodetector (15) from whose output signals the focusing error signal for a focusing control loop is formed, wherein the second prismatic beam splitter (6) guides a light beam via a $\lambda/2$ plate (7), a polarisation beam splitter (8) and a fifth lens (9) onto the first photodetector (11) and wherein the polarisation beam splitter (8) guides a light beam via a sixth lens (10) onto the second photodetector (17), characterised in that, the output of the first photodetector (11) is connected to the subtracting input of a differential amplifier (20) via a first amplifier (19), that the output of the second photodetector (17) is connected to the summing input of the differential amplifier (20) via a second amplifier (18) and that the data signal (MS), which contains the data stored in the magnetic domains of the recording medium (5), is derivable from the output of the differential amplifier (20).

17. Optical scanning device for carrying out the method in accordance with claim 1, 4, 6 or 14 wherein the light beam produced by the light source (1) shines via a first lens (2), a first prismatic beam splitter (3) and a second lens (4) onto the recording medium (5), wherein the light beam reflected from the recording medium (5) passes back via the second lens (4) to the first prismatic beam splitter (3) where it is guided to a second

prismatic beam splitter (6), wherein the second prismatic beam splitter (6) guides a light beam via a third lens (12) and a third prismatic beam splitter (13) onto a fourth photodetector (16) from whose output signals the tracking error signal for a tracking control loop is formed, wherein the third prismatic beam splitter (13) guides a light beam via a fourth lens (14) onto a fifth photodetector (15) from whose output signals the focusing error signal for a focusing control loop is formed, wherein the second prismatic beam splitter (6) guides a light beam via a $\lambda/2$ plate (7), a polarisation beam splitter (8) and a fifth lens (9) onto the first photodetector (11) and wherein the polarisation beam splitter (8) guides a light beam via a sixth lens (10) onto the second photodetector (17), characterised in that, the output of the first photodetector (11) is connected via a first amplifier (19) to the one input of a summing amplifier (21) and to the subtracting input of a differential amplifier (20), that the output of the second photodetector (17 is connected via a second amplifier (18) to the other input of the summing amplifier (21) and to the summing input of the differential amplifier (20), that the output of the summing amplifier (21) is connected via a regulator (22) to a modulator (23) whose output is connected to the control input of the light source (1), that the data signal (MS), which contains the data stored in the magnetic domains of the recording medium (5), is derivable from the output of the differential amplifier (20) and that the data signal (PS), which contains the data stored by means of pits in the recording medium (5) is derivable from the output of the modulator (23).

18. Optical scanning device for carrying out the method in accordance with claim 5, wherein the light beam produced by the light source (1) shines via a first lens (2), a first prismatic beam splitter (3) and a second lens (4) onto the recording medium (5), wherein the light beam reflected from the recording medium (5) passes back via the second lens (4) to the first prismatic beam splitter (3) where it is guided to a second prismatic beam splitter (6), wherein the second prismatic beam splitter (6) guides a light beam via a third lens (12) and a third prismatic beam splitter (13) onto a fourth photodetector (16) from whose output signals the tracking error signal for a tracking control loop is formed, wherein the third prismatic beam splitter (13) guides a light beam via a fourth lens (14) onto a fifth photodetector (15) from whose output signals the focusing error signal for a focusing control loop is formed, wherein the second prismatic beam splitter (6) guides a light beam via a $\lambda/2$ plate (7), a polarisation beam splitter (8) and a fifth lens (9) onto the first photodetector (11) and wherein the polarisation beam splitter (8) guides a light beam via a sixth

lens (10) onto the second photodetector (17), characterised in that, the output of the first photodetector (11) is connected via a first amplifier (19) to the one input of a summing amplifier (21) and to the subtracting input of a differential amplifier (20), that the output of the second photodetector (17) is connected via a second amplifier (18) to the other input of the summing amplifier (21) and to the summing input of the differential amplifier (20), that the output of the summing amplifier (21) is connected to the one input of a divider (24), that the output of the differential amplifier (20) is connected to the other input of the divider (24), that the data signal (MS), which contains the data stored in the magnetic domains of the recording medium (5), is derivable from the output of the divider (24), and that the data signal (PS), which contains the data stored in the pits of the recording medium (5) is derivable from the output of the summing amplifier (21).

19. Optical scanning device for carrying out the method in accordance with claim 2 or 15, wherein the light beam produced by the light source (1) shines via a first lens (2), a first prismatic beam splitter (3) and a second lens (4) onto the recording medium (5), characterised in that, a polariser (27) is provided behind the recording medium (5), that the light beam reflected from the recording medium (5) passes back via the second lens (4) to the first prismatic beam splitter (3) where it is guided via a third lens (12) to a second prismatic beam splitter (13), that the second prismatic beam splitter (13) guides the light beam via a fourth lens (14) onto a first photodetector (15) from whose output signals the data signal (PS), which contains the data stored by means of pits in the recording medium (5) and the focusing error signal for a focusing control loop are formed, that the second prismatic beam splitter (13) guides a light beam onto a second photodetector (16) from whose output signals the tracking error signal for a tracking control loop is formed, that the polariser (27) directs the light, in dependence on its direction of polarisation, either onto a third or a fourth photodetector (28, 29) and that the output of the third and the output of the fourth photodetector (28) are connected to the inputs of a differential amplifier (20) from whose output the data signal (MS), which contains the data stored in the magnetic domains of the recording medium (5) is derivable.

20. Optical scanning device in accordance with claim 19, characterised in that, a polarisation beam splitter (31) is provided as the polariser (27).

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21. Optical scanning device in accordance with claim 19, characterised in that, a polarisation filter is provided as the polariser (27), whose one half transmits that light beam whose plane of polarisation is rotated in the one direction and whose other half transmits that light beam whose plane of polarisation is rotated in the other direction.

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