found in a manual or the like. Its atomic structure at high resolution happens to be well known. This density distribution could thus be generated and inserted in the reconstruction system. That part is then cut out from the reconstruction, i.e. an envelope is done of the other parts excluding the well known part. The reconstruction of the complicated structure could then be done using fewer variables and fewer degrees of free-dom than if the reconstruction was made on the whole structure and with the same result. This implies that the numerical force could be enhanced for the rest of the structure.

Thus, it is possible to insert known fragments in the object to be reconstructed and thus enhance the resolution of the remaining parts. For instance at a tomographic reconstruction of a patient having injured tissue but for instance the bones are intact then the bones need not be reconstructed and thus only the tissue.

Description of a Second Embodiment

FIG. **4** shows a second embodiment of an apparatus for data acquisition and processing according to the invention, used in order to achieve a 2D image reconstruction at high resolution of a picture which is presented for instance on a television monitor or on paper or as an oil-painting or the like. In the 3D reconstruction described above the projection data was provided as 2D projections. In the 2D reconstruction in this embodiment the "projections" are provided as lines. Elements corresponding with elements in FIG. **1** have the same reference numerals. It is to be noted that the calculation device preferably is a fast computer being able to process images at least with the same speed as the vertical rate of a TV-monitor.

An imaging and scanning unit **40** is connected to an input of a filtering and normalization means **43** comprised in the computer **12**. The imaging and scanning unit is scanning a picture or a TV screen on which a picture is presented. When scanning a picture on a TV screen several scanning sequences are done for each picture in order to have an overdetermination of it, since the meaning of providing this inventive kind of operation is to enhance the image resolution. The output of said filtering and normalization means **43** is connected to an input of the calculation means **15** also comprised in the computer **12**. The imaging and scanning unit **40** is also connected to a point spread function generator **42**, the outputs of said function generators being connected to the computer **12**. An output of the calculation unit **15** is connected to a presentation means **46** which in this embodiment when processing TV picures for instance could be a large sized high resolution screen or the like.

The computer **12** is supplied with digitized image data from a unit **44** for providing digitized data of an estimated structure. The unit **44** could comprise the television receiver unit itself or a video camera directed to the picture to be processed and an A/D converter. However, almost any picture scanning data could be presented as the estimated structure but the computing will be faster if the resemblance between the picture to be processed and the estimated picture is good. The output of the unit **44** is normalized before it is fed to the calculating means **15** in the computer **12**.

A prior prejudice distribution $m(\overline{X})$ is either inserted separately to the calculating means in the computer **15** by a unit **44** or created by the calculating means **15** itself by blurring the estimated structure by making a Fourier transform and multiplying the coefficients of this Fourier transform with the Fourier coefficients of a gaussian and spherical filter. The prior prejudice distribution is normalized.

Since the resolution in the processed picture is to be enhanced a rather dense 2D grid **47** is fed into the computer **12**.

The computation will be done according to the same principles as described above but in a less complicated way.

The data is processed in accordance with the inventive method, so that a higher resolution and a lower noise level is achieved than is possible using conventional techniques. The processed data is then fed to the presentation means **16** where it provides an image of greatly improved quality.

Description of a Third Embodiment

This embodiment is a card reading unit for checking pass-cards and processes data in 3D form. It relates to a kind of pattern reconstruction. A card **50** having a number of small designs **51** being slightly different but which for the naked eye seems to be the same is inserted in a card reader **52**. The designs could illustrate almost anything, such as stars, rings, clouds, trees, bears. The designs **51** have the same positions in all cards adapted to be read by the card reader **52** having either an individual scanning device per design or having a movable scanning device scanning the designs in sequence. The scanned designs could be regarded as different 2D projections of a 3D sample and are presented to the filtering means **13** in the computer **12**. However, the filtering process could be extensively simplified as compared to what is necessary in the embodiment according to FIG. **1**, since the card reader could be designed such that there is no need for processing regarding geometry description and bringing the projections in harmony with each other.

Parameters for providing a PSF **53** of the card reader **52** is fed to the calculating means **15** in the computer **12**. The computer is a part of the card reading unit and this means that these parameters could be presented to the computer during manufacture and the PSF could be calculated and stored at that time.

The digitized data of estimated structure **54** could also be provided and normalized during manufacture for instance comprising designs of the same structure as on the card but for instance all being exactly alike or else being read from a reference card provided in the card reader in the factory and normalized and stored permanently.

The prior prejudice distribution $m(\overline{X})$ **55** could also be normalized and stored permanently at the factory and also the 3D grid **56**.

The computer processes the data in the way described above and send the result to a unit **57** when the last iteration is done. The card **50** could have a conventional magnetic strip **58** or the like providing a simple identification of the card. Alternatively, the card owner could have a personal code or the like inserted through an identical data insertion means which could be a keyboard, a voice identifier or the like.

When a card **50** is inserted into the card reader **52** the identity of the card is read from the strip **58** and provided directly to the calculating means **15** which in turn feeds it to the unit **57**. The unit **57** cooperates with a storage **60** having processed data of cards stored in addresses identified by the identity of the card.

If the inserted card has been used earlier the data for it is found and delivered to the unit **57**. When the processing operation of the designs on the card is ready the unit **57** compares the stored processed data with the new one and accepts a card only for a true compare.

If the inserted card has not been used before and thus data of it is not stored then an identity check could for instance be provided in an external register through an external connection device **61**.

This device could also receive updated information about cards from a central office. The identity cards could be used